

# Harmful Exotic Species of Aquatic Plants and Wild Animals in Minnesota

## Annual Report 1998

*for the year  
ended December 31*



---

**Minnesota Department of Natural Resources  
Exotic Species Program  
500 Lafayette Road  
St. Paul, Minnesota 55155-4025**

contributing authors and editors\*

**Tom Baumann**

**Michelle Bratager**

**Wendy Crowell**

**Steve Enger**

**Mark Johanson**

**Gary Montz**

**Donna Perleberg**

**William J. Rendall\***

**Luke Skinner**

**Charles H. Welling**

**David Wright\***

Submitted to  
**Environment and Natural Resources Committees  
of the Minnesota House and Senate**

This report should be cited as follows:

Exotic Species Program 1999. Harmful Exotic Species of Aquatic Plants and Wild  
Animals in Minnesota: Annual Report for 1998. Minnesota Department of Natural  
Resources, St. Paul, MN.

Copyright 1999 by the State of Minnesota, Department of Natural Resources

---

# Table of Contents

|   | <u>Page</u> |
|---|-------------|
| 1998 Highlights .....   | 2           |
| Executive Summary .....   | 3           |
| Introduction  |             |
| Administration of state exotic species control programs .....   | 7           |
| Requirement to prepare annual report .....                      | 7           |
| Overview of Minnesota's Exotic Species Programs                 |             |
| History of exotic species programs in Minnesota .....           | 8           |
| Responsibilities assigned to the DNR .....                      | 8           |
| Program staff .....   | 9           |
| Other staff support .....                                       | 9           |
| Funding .....   | 10          |
| Contracts .....   | 10          |
| Federal and Regional Coordination .....                         | 11          |
| Regulations .....   | 13          |
| Expenditures .....  | 18          |
| Education / Public Awareness Activities .....                   | 23          |
| Watercraft Inspections .....                                    | 28          |
| Enforcement Activities .....                                    | 38          |
| Management of Species   |             |
| Eurasian Watermilfoil .....                                     | 44          |
| Purple Loosestrife .....  | 57          |
| Flowering Rush .....  | 67          |
| Curly-leaf Pondweed .....                                       | 72          |
| Zebra Mussel .....  | 78          |
| Rusty Crayfish .....  | 83          |
| Ruffe .....   | 86          |
| Round Goby .....  | 90          |
| Eurasian Swine .....  | 94          |
| Mute Swan .....   | 96          |
| The Potential Risk for Exotic Aquatic Plant Introductions ..... | 99          |
| Appendices  |             |
| A - Minnesota Statutes Regarding Exotic Species .....           | 103         |
| B - Minnesota Rules Regarding Harmful Exotic Species .....      | 114         |
| C - Other Infested Waters .....                                 | 126         |

## 1998 Annual Report Highlights

### Monitoring Populations of Harmful Exotic Species

- Eurasian watermilfoil was found in nine additional lakes and rivers, including Mille Lacs and Minnewaska. The new statewide total is 96 waters.
- A flowering rush population was discovered in Forest Lake (Washington Co.) and researchers from Queen's University, Ontario, conducted an assesment of North American flowering rush populations, including sites in Minnesota.
- DNR Exotic Species Program staff reviewed DNR Fisheries records to determine the extent of curly-leaf pondweed. It was recorded in 543 lakes.
- Zebra mussel and round goby populations appear to be reproducing and increasing in the St. Louis River estuary.

### Limiting the Spread and Preventing Introductions

- New administrative rules were adopted by the DNR after public hearings were held in St. Paul and Brainerd. The rules designated several additional species into the *prohibited*, *regulated*, and *unregulated* exotic species categories.
- Paid television and radio advertising during the Fishing Opener, Memorial Day, Fourth of July, and Labor Day weekends was used to increase public awareness of exotic species and how watercraft should be cleaned.
- DNR Watercraft Inspectors checked over 38,419 watercraft at water accesses on infested waters including the first time at lakes Mille Lacs and Minnewaska.
- Conservation officers conducted five road checks for trailered boats. Civil citations and warnings were issued to 120 individuals for violations.

### Cooperation

- The DNR licensed several states and the USFWS to use Minnesota's television spots about zebra mussels and Eurasian watermilfoil.
- The State, Wisconsin, federal agencies, and tribal governments cooperated to develop an interstate management plan for aquatic nuisance species on the St. Croix riverway. Federal funding was obtained to implement it.
- The DNR and Minnesota Sea Grant continued cooperative educational activities to maintain high levels of public awareness about exotic species.
- Cooperative research on purple loosestrife and Eurasian watermilfoil biological control was continued with the U of M and Cornell University. Many public and private groups provided valuable assistance.

### New Research

- Exotic Species Program staff conducted a study of aquatic plants available through mail order to determine the risk of new introductions into Minnesota.
- A ballast water demonstration project that tested filtration technology, with partial state sponsorship recommended by LCMR, took place in Duluth.
- The Army Corps of Engineers completed an assessment of the potential for several exotic aquatic plants to infest Minnesota waters.



## Executive Summary

This report is required by state statute and describes the progress made during 1998 by the Exotic Species Program of the Minnesota Department of Natural Resources (DNR) and its cooperators in Minnesota. The Exotic Species Program is responsible for monitoring and management of harmful exotic species of aquatic plant and wild animal species. These are species that may harm communities of native plants and animals, limit water recreation, and increase operating costs for industry.

Exotic species program funding is derived primarily from a \$5 surcharge on the registration of watercraft. The surcharge generate approximately \$1,00,000 annually and additinal funding comes from other sources. Activities documented in this report occurred in state fiscal years 1998 (FY98) and 1999 (FY99). A breakdown of FY98 expenditures by major category, as well as expenditures planned in FY99, are shown in Table 1.

**Table 1. Water recreation account spending (in thousands of \$s) by the exotic species program in fiscal year 1997 (FY97) and fiscal year 1998 (FY98) and projected spending in fiscal year 1999 (FY99).**

|                            | FY97     | FY98     | FY99     |
|----------------------------|----------|----------|----------|
| Administration             | 123      | 156      | 158      |
| Program Planning Direction | 140      | 136      | 143      |
| Public Awareness           | 216      | 57       | 84       |
| Control/Management         | 191      | 235      | 240      |
| Inspections/Enforcement    | 397      | 379      | 381      |
| Research                   | 136      | 85       | 141      |
| Totals                     | \$ 1,203 | \$ 1,048 | \$ 1,147 |

The three primary goals of the Exotic Species Program are:

- Prevent introductions of new harmful exotic species into Minnesota;
- Prevent the spread of harmful exotic species within Minnesota; and
- Reduce the impacts caused by harmful exotic species to Minnesota's ecology, society, and economy.

To accomplish these goals the DNR and its cooperators undertake a wide variety of activities (A program summary is shown on page 4). This report details the program's progress in these areas in 1998 and provides species specific updates for Eurasian watermilfoil, purple loosestrife, zebra mussels, flowering rush, and curly-leaf pondweed, ruffe, round goby, mute swan, and Eurasian swine. Information on the potential threat that other exotic aquatic plants present to Minnesota is also provided.

| Exotic Species of Aquatic Plants and Wild Animals in Minnesota | Elements of DNR's Exotic Species Program  |   |     |     |     |   |   |
|--|---|---|-----|-----|-----|---|---|
|  | A = Public information and education<br>B = Watercraft inspections to prevent spread<br>C = Population surveys and monitoring<br>D = Control to reduce nuisance<br>E = Control to reduce populations<br>F = Research on biology and management<br>G = Regulations |   |     |     |     |   |   |
|  | A   | B | C   | D   | E   | F | G |
| <b>Aquatic Plants</b>  |   |   |     |     |     |   |   |
| Flowering rush ( <i>Butomus umbellatus</i> )                   | ✓   |   | ✓   | ✓   |     | ✓ | ✓ |
| Purple loosestrife ( <i>Lythrum salicaria</i> )                | ✓   |   | ✓   |     | ✓   | ✓ | ✓ |
| Eurasian watermilfoil ( <i>Myriophyllum spicatum</i> )         | ✓   | ✓ | ✓   | ✓   | ✓   | ✓ | ✓ |
| Non-native hybrid waterlilies ( <i>Nymphaea</i> spp.)          | ✓   |   | ✓   |     |     |   | ✓ |
| Curly leaf pondweed ( <i>Potamogeton crispus</i> )             | ✓   |   |     | APM |     | ✓ | ✓ |
| <b>Animals</b>   |   |   |     |     |     |   |   |
| Common carp ( <i>Cyprinus carpio</i> )                         |   |   | F   |     | F/W |   | ✓ |
| Ruffe ( <i>Gymnocephalus cernuus</i> )                         | ✓   | ✓ | F/O |     | NIF | ✓ | ✓ |
| Round goby ( <i>Neogobius melanostomus</i> )                   | ✓   | ✓ | F/O |     | NIF |   | ✓ |
| Spiny waterflea ( <i>Bythotrephes cederstroemii</i> )          | ✓   | ✓ | F   |     |     |   | ✓ |
| Zebra mussel ( <i>Dreissena polymorpha</i> )                   | ✓   | ✓ | ✓   |     |     | ✓ | ✓ |
| Rusty crayfish ( <i>Orconetes nesticus</i> )                   | ✓   |   |     |     |     |   | ✓ |
| Mute swan ( <i>Cygnus olor</i> )                               |   |   | ✓   |     |     |   | ✓ |

- APM - Individuals or groups apply for aquatic plant management permits  
 F - DNR Section of Fisheries monitors this species  
 F/O - DNR Section of Fisheries and other agencies monitor this species  
 F/W - DNR Section of Fisheries and/or Section of Wildlife occasionally manage this species at priority sites  
 NIF - Inland waters will be addressed as outlined in a Nonindigenous Fish Plan

Inventory efforts in 1998 confirmed more state waters infested with exotic species. Eurasian watermilfoil populations were confirmed in nine additional lakes (including Mille Lacs and Minnewaska), 48 new sites with purple loosestrife were identified, and one new flowering rush population was discovered. In contrast, no change was documented in the distribution of a number of other species. No evidence was found that spiny waterflea, zebra mussels, ruffe, or round goby have expanded their range in Minnesota. However, based on many new sightings of young zebra mussels on boats and structures, they appear to be reproducing for the first time in the St. Louis River estuary.

The goal of DNR's educational efforts, built around a Clean Boats: Clean Waters theme, is to increase the public's awareness of exotic species, the problems they can cause, and to promote the adoption of Clean Boats behavior. In 1998, DNR used paid TV and radio ads and undertook cooperative efforts with Minnesota Sea Grant to reach the boating public. Survey results indicate that past educational efforts have been effective at elevating Minnesotans' awareness of exotic species (Minnesota boaters are more aware of exotic species than boaters in neighboring states). However, to be fully effective, awareness of exotic species needs to be coupled with specific actions to keep boats and boating equipment clean of exotics.

The Minnesota Legislature mandated (M.S. 84D.02, Subd. 4) that the DNR focus particular attention on watercraft leaving lakes and rivers already infested with exotic species (20,000 hours of inspections are to be accomplished annually). This standard was reached in 1998 (20,041 hours of inspections were logged between May 1 and October 15) and over 38,419 trailered watercraft were inspected. Special inspection efforts continue to be focused on events (e.g. fish tournaments, sailing regattas, water ski tournaments, and the waterfowl hunting season) that bring many watercraft users to infested waters. The Minnesota Conservation Corps employees who conduct watercraft inspections met thousands of additional Minnesotans during the State Fair at DNR's Exotic Species exhibit.

Enforcement of exotic species laws was continued in 1998 to help reinforce the Clean Boats theme. Conservation Officers spent about 1,242 hours enforcing exotic species laws and rules, the majority of their time was spent enforcing the law which prohibits transporting aquatic vegetation and zebra mussels on public roads. Five road checks were conducted throughout the state to assess compliance with the law and to increase public awareness of it. Aquatic vegetation was found in, or on, 20% of the watercraft inspected, although in most cases only a small amount of vegetation was present. These results indicate that although most Minnesotans are aware of exotic species, the potential for watercraft to accidentally move exotics plants or animals to new waters remains high.

The DNR amended Minnesota Rule 6216 regarding harmful exotic species. The amendments designated additional exotic species as *prohibited*, *regulated*, or *unregulated*, described the process the DNR will use to issue exotic species permits, modifies various restrictions placed on the use of infested waters, and triggered statutes that require exotic species of wild animals and aquatic plants to a review

process before they may be placed into a free-living state. Two public hearings on the amendments were held in January, 1998.

The Exotic Species Program, alone or in cooperation with local groups, undertook a wide variety of control actions in 1998. It sponsored or assisted with Eurasian watermilfoil control efforts on 34 lakes, identified 117 high-priority sites where purple loosestrife was sprayed with herbicide, and continued to coordinate flowering rush control activities in the Detroit Lakes and Twin Lakes areas. Significant progress was made in 1998 to implement an integrated control program for purple loosestrife (a program that combines both chemical and biological control approaches). The use of new outdoor rearing techniques and the assistance of new local partners (e.g. County Agricultural Inspectors and DNR Area Wildlife Managers) dramatically increased the number of leaf-eating beetles that were raised and released on purple loosestrife infestations statewide (total releases were about 1,000,000 insects). The DNR expects the size of this biocontrol effort and the number of local partners to continue to grow.

Research to further biological control methods for managing exotic species continued in 1998 and two new research efforts were initiated. Additional funding recommended by the Legislative Commission on Minnesota Resources (LCMR) and appropriated by the Legislature was particularly important. Using funds from LCMR and from the exotics species program budget, efforts to develop biological-control methods for Eurasian watermilfoil and expand biological controls for purple loosestrife continued under the direction of scientists at the University of Minnesota.

Commercial ships have been identified as a major pathway for moving exotic species to North America and around this continent. A Great Lakes ballast water technology demonstration project was continued (with LCMR recommended funding) to test filtration as a method to curb transfer of exotic species through the ballast water of ships and produced encouraging results in 1998. The exotic species program also initiated a new research program with the Army Corps of Engineers Center for Aquatic Plant Research and Technology. This project is focused on the efficacy of herbicides to manage curly-leaf pondweed populations at varied water temperatures.

The Army Corps of Engineers completed a study, "Evaluating the Potential for selected Nonindigenous Aquatic Plant Species to Colonize Minnesota Water Resources." This work, done under contract with the DNR, indicated that six plants not yet present in Minnesota are potential problems. And the growth of four species, water chestnut (*Trapa natans*), variable milfoil (*Myriophyllum heterophyllum*), hydrilla (*Hydrilla verticillata*, the monoecious biotype), and fanwort (*Cabomba caroliniana*) could be expected to be the most severe. The Exotic Species Program also conducted a study of aquatic plants available through mail order to determine the risk of new introductions into Minnesota. The study determined that many exotic as well as "restricted" aquatic plants are available through mail order and are shipped to Minnesota.

## Introduction

### **Administration of state exotic species control programs**

The control and prevention programs for harmful exotic species in the State of Minnesota are administered by the Department of Natural Resources (DNR) and the Department of Agriculture. The DNR's Exotic Species Program within the Division of Fish and Wildlife is responsible for programs covering exotic aquatic plant and wild animal species. DNR's Division of Forestry, working in cooperation with the Minnesota Department of Agriculture, is charged with surveying and controlling forest pests, including exotic organisms such as gypsy moth and evergreen spruce bark beetle. A separate annual report is prepared by the Forest Pest Program to report on those issues. The Minnesota Department of Agriculture is responsible for the state's noxious weed and seed laws which apply primarily to terrestrial plants that harm agricultural crops. Information about control, prevention, and regulatory programs for harmful terrestrial exotic plants may be obtained from the Minnesota Department of Agriculture.

### **Requirement to prepare annual report**

Each year, by January 15, the DNR is required to prepare a report for the legislature which summarizes the status of management efforts for harmful exotic species under its jurisdiction (see M.S. 84D.02, Subd. 3 in Appendix A). According to statute, this report must include:

- (1) detailed information on expenditures for administration, education, management, inspections, and research;
- (2) an analysis of the effectiveness of management activities conducted in the state, including chemical control, harvesting, educational efforts, and inspections;
- (3) information on the participation of other state agencies, local government units, and interest groups in control efforts;
- (4) information on management efforts in other states;
- (5) information on the progress made in the management of each species; and
- (6) an assessment of future management needs.

Additional sections on regulations, enforcement, and distribution of species have been added to this report to provide a thorough account of Exotic Species Program activities. Background information on select harmful exotic species which are present in Minnesota but are not currently actively managed are also included.



## Overview of Minnesota Exotic Species Program

### History of DNR's Exotic Species Program

Although harmful exotic species have been present in Minnesota for many years (e.g. common carp and sea lamprey), a specially identified program to prevent their spread and mitigate their negative impacts is relatively new to state government. In 1987, the Minnesota Department of Natural Resources (DNR) was designated the lead agency for control of purple loosestrife, an invasive plant of particular concern for the state's wetlands. Minnesota was the first state in the country to create a program for purple loosestrife control. In 1989, DNR was officially assigned an additional coordinating role for Eurasian watermilfoil (EWM) control (see M.S. 84D.02, Subd. 2 in Appendix A).

During its 1991 session, and in response to the "Report and Recommendations of the Interagency Exotic Species Task Force" (Minnesota Interagency Task Force 1991), the legislature called for the DNR to develop and coordinate a statewide program to prevent the spread of ecologically harmful exotic wild animals and aquatic plants. Many species, in addition to purple loosestrife and Eurasian watermilfoil, fall under the DNR's statewide responsibility. They include harmful exotic species that are currently found in Minnesota, such as zebra mussel and ruffe, as well as harmful species that have the potential to move into Minnesota.

### Responsibilities assigned to the DNR

The purpose of the Exotic Species Program is to curb the spread and minimize the current and future harmful effects of exotic species that can naturalize in the state and either:

- (1) cause or may cause displacement of, or otherwise threaten, native species in their natural communities; or
- (2) threaten or may threaten natural resources or their use in the state.

The DNR is assigned the responsibility for preparing a long-term plan for the statewide management of harmful exotic species (see M.S. 84D.02, subd. 3 in Appendix A). Management plans for individual species are also prepared by the DNR. Preparing a statewide plan and species specific plans will be beneficial for coordinating efforts within the state, and establishing priorities for prevention, management, and research activities.

The DNR is assigned responsibility for designating *infested waters* (see M.S. 84D.03 in Appendix A). Water bodies are designated *infested* if they contain certain harmful exotic species that could spread to other waters if lake water use and related activities are not regulated and where the risk of spread to an uninfested waterbody through such activities is high. The current *infested waters* lists are included (Appendices B and C).

The DNR is also required to adopt rules (see M.S. 84D.12 in Appendix A) which place exotic species into various regulatory classification identified in state statute and prescribe how exotic species permits will be issued (see M.R. 6216.0265 in Appendix B). The DNR is authorized to adopt other rules regarding harmful exotic species and infested waters.

Prevention activities, such as identifying potentially harmful species in other areas of North America (and the world), predicting pathways of spread, and developing/ implementing solutions that reduce introduction and spread, are important. The Exotic Species Program participated in a number of prevention efforts in 1998. For example, an assessment of the potential for various non-native aquatic plants to be invasive in Minnesota was done under contract with the U.S. Army Corps of Engineers' Aquatic Plant Research Program. A second effort was the Great Lakes regional demonstration project to test technology that could eliminate exotic organisms in the ballast tanks of ships. The Legislative Commission on Minnesota Resources recommended, and the Legislature funded, a test of filtration as a ballast water control technology.

### **Program staff**

|   |                       |              |
|---|-----------------------|--------------|
| Exotic Species Program Coordinator            | William (Jay) Rendall | 651-297-1464 |
| Purple Loosestrife Coordinator*               | Luke Skinner          | 651-297-3763 |
| Eurasian Watermilfoil Coordinator (acting)*   | Wendy Crowell         | 651-297-8021 |
| General Exotic Species Issues*                | Donna Perleberg       | 218-828-6132 |
| Watercraft Inspections*                       | Michelle Bratager     | 612-297-4891 |
| Zebra Mussels \ Exotic Aquatic Invertebrates* | Gary Montz            | 612-297-4888 |
| Enforcement                                   | Mark Johanson         | 651-772-7906 |
| Budget Management                             | Dave Wright           | 612-297-4886 |
| General Information                           |                       | 651-296-2835 |

Responsibility for overall coordination of the DNR's Exotic Species Program is assigned to Jay Rendall, within the Division of Fish and Wildlife's Administrative Services Unit. Exotic species policy, rulemaking, legislation, state representation on the Great Lakes Panel on Aquatic Nuisance Species, and involvement with federal exotic species issues are coordinated by this position.

Program activities such as species management, watercraft inspections, and research coordination are carried out primarily by the Ecological Services' staff\* in the Division of Fish and Wildlife.

### **Other staff support**

Staff from other sections of the Division of Fish and Wildlife, Division of Enforcement, Trails and Waterways Unit, Bureau of Information and Education, and Minnesota Conservation Corps also contribute significantly to the implementation and coordination of exotic species activities.

Division of Fish and Wildlife Supervision of the exotic species staff is carried out by the Supervisor of the Aquatic Plant Management Program, Ecological Services Section. The Monitoring and Control Unit Supervisor (Ecological Services) is responsible for managing the watercraft surcharge budget and other issues related to implementation of exotic species activities. Pesticide Enforcement specialists from Ecological Services and Aquatic Plant Management specialists in the Section of Fisheries are also involved in the management of purple loosestrife, Eurasian watermilfoil, and flowering rush. In addition to these staff, other individuals from the Division of Fish and Wildlife contribute by providing biological expertise, assisting with control efforts, conducting inventory and public awareness activities, and providing additional avenues for public input.

Division of Enforcement Conservation Officers are responsible for enforcing the state regulations regarding harmful exotic species. A regional Enforcement Supervisor now acts as exotic species enforcement coordinator within the Division of Enforcement to assist in scheduling, conducting, and reporting on enforcement activities related to harmful exotic species. A chapter describing enforcement activities is included in this report (see Enforcement).

Minnesota Conservation Corps (MCC) In 1998, 29 corps members spent over 20,000 hours inspecting boats at public water accesses on lakes and rivers in Minnesota infested with exotic species. Corps members also assist Conservation Officers at road checks. A summary of their efforts is included in this report (see Watercraft Inspections).

Bureau of Information and Education Staff from the Bureau of Information and Education provide support for the DNR's Exotic Species public awareness activities (see Education\Public Awareness).

## **Funding**

Funding for the DNR's exotic species activities is derived primarily from the surcharge on watercraft licenses. The surcharge for a three year license period is \$5, or \$1.67 per year, and generates approximately \$1,100,000 annually. Additional appropriations, primarily for specific research efforts, have come from the Environment and Natural Resources Trust Fund and Minnesota Future Resources Fund (Table 2). In 1998, the program received approval for its first federal funding from the U. S. Fish and Wildlife Service in the amount of \$20,000, to implement an interstate management plan that addresses aquatic nuisance species on the St. Croix River.

## **Contracts**

A large portion of the research and control activity carried out by the exotic species program is done under contract. Research to identify and test organisms capable of biologically controlling harmful exotic species is contracted with various research facilities. In 1998, biological control research for Eurasian watermilfoil and purple loosestrife was done under contract with the University of Minnesota. This research is described in greater detail in the individual management chapters. The majority of control of purple loosestrife and Eurasian watermilfoil conducted by the DNR is carried

out by licensed herbicide applicators under state contract. Local lake associations, conservation districts, or local governments share the costs of many milfoil control efforts (see Eurasian watermilfoil).

### **Federal and Regional Coordination**

The DNR Exotic Species Program staff often participate in regional or federal activities regarding harmful exotic species. DNR Exotic Species Program Coordinator, Jay Rendall, is the current Minnesota representative to the Great Lakes Panel on aquatic nuisance species and was its Information and Education Committee Chair in 1998. Participation on this regional panel, established by a federal act, helps keep Minnesota informed of regional and federal efforts regarding harmful exotic species. Participation on the Great Lakes Panel also provides a voice for Minnesota interests as regional and federal policies and priorities are developed. A new aquatic nuisance species committee has formed for the Mississippi River basin by the Mississippi Interstate Resources Conservation Association (MIRCA). Jay Rendall will represent the state on that committee and be the committee chairperson.

Luke Skinner, Purple Loosestrife Coordinator, has been involved in regional and national efforts to use biological controls to manage purple loosestrife. He is a member of the National Biological Control Planning Committee established to develop national guidelines for implementation of biological controls for purple loosestrife.

Chip Welling, Eurasian Watermilfoil Program Coordinator, has been working with the U.S. Army Corps of Engineers on cooperative research on biological controls for Eurasian watermilfoil.

Jack Wingate, Fisheries Research Manager, is a member of the federal Ruffe Control Committee, established by the federal Aquatic Nuisance Species Task Force.

Gary Montz, Aquatic Invertebrate Biologist, chaired the multi-agency St. Croix River Zebra Mussel Task Force during 1996, 1997 and 1998 and directs state efforts against zebra mussels in the river. Gary and Jay Rendall have participated in the development and implementation of the St. Croix River Zebra Mussel Response Plan and the drafting of an interstate management plan for the prevention and control of nonindigenous aquatic nuisance species in the St. Croix River.

### **Future Needs for the Exotic Species Program**

- Continue to identify exotic species which are, or may be likely to, enter Minnesota and evaluate their potential to cause problems if they become established in the wild.
- Gain information necessary to classify and designate additional exotic species as prohibited, regulated or unregulated in future rulemaking.
- Work with industries which might bring prohibited exotic species into Minnesota to reduce the likelihood of those occurrences.

### **References Cited**

Minnesota Interagency Task Force 1991. Report and recommendations of the Minnesota Interagency Exotic Species Task Force. Final edit. Submitted to the Natural Resources Committees of the Minnesota House and Senate by the Minnesota Department of Natural Resources, Division of Fish and Wildlife, 500 Lafayette Road, St. Paul, MN 55155.



# Regulations

## 1998 Highlights

- New administrative rules were adopted by the DNR after public hearings were held in St. Paul and Brainerd.

## Background

### State

Most harmful exotic species were unregulated in Minnesota until the mid-1980's. In 1987, the first law prohibiting the sale of purple loosestrife was passed. As additional harmful exotic species have been introduced into Minnesota and the Great Lakes region, state statutes were modified several times to address the changing threats to the states resources and the need for technical amendments to previous laws. The current state statutes and rules are located in Appendices A and B.

In 1996 Minnesota statutes were revised, expanded, and consolidated into one chapter M.S. 84D - Harmful Exotic Species. The revised statute includes a comprehensive system for classification of exotic species. Under this system, any exotic species would belong to one of the four classes described below.

1. Prohibited exotic species are those of the highest concern because they are the most likely to naturalize and be harmful to the state's natural resources or their use. Species designated as *prohibited* species may not be possessed, imported, purchased, sold, propagated, transported, or introduced except as provided in state statutes (see Table 2).
2. Species designated as *regulated* exotic species have less of a known or predicted threat to the State's resources and use and may have significant commercial value. *Regulated* exotic species may be possessed, subject to certain conditions, but may not be introduced into a free-living state except as allowed by Minnesota Rules.
3. Unlisted exotic species are species that have not been evaluated or listed as one of the other categories of exotic species and are subject to review by the DNR before it may be lawfully introduced into a free-living state (M.S. 84D.04 in Appendix A).
4. Exotic species listed as *unregulated* are presumed to be minimal threat to the states resources, or are so widely distributed that regulating them would be pointless. Therefore, species in that category will not be subject to regulation under the harmful exotic species statutes.

When classifying an exotic species into the above categories state statutes directs the DNR to consider: the likelihood of introduction if the species is allowed to enter or exist in the state; the likelihood that the species would naturalize in the state; the potential

adverse impacts of the species on native species, outdoor recreation, and other uses of natural resources in the state; the ability to control the spread of the species once it is introduced in the state. The general criteria the DNR will use when classifying exotic species are shown in Table 3. The final classification will reflect a combination of the criteria in each category.

Many exotic species would likely be classified as "unregulated species," primarily because they would not survive if introduced into Minnesota ecosystems. For example, it is presumed that most tropical fish would be unable to survive winter in Minnesota. To date, efforts by the Exotics Species Program have focused on classifying exotics species that would be most likely to survive in Minnesota and cause problems in the state. Species such as these are subject to the maximum level of regulation in an attempt to prevent their introduction into Minnesota ecosystems. Experience in Minnesota and elsewhere has shown that prevention of introductions is usually far more effective than management of an introduced exotic that becomes established.

In 1998, the Exotic Species Program adopted amendments to Minnesota Rules 6216 that govern harmful exotic species (see Progress in Regulations below). These amendments classified numerous exotic species in the classes named above. It is important to note that classifications and designations of exotic species may change as more is learned about individual species.

#### Federal

Federal Public Law 101-646, titled the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, includes a mandate that the U.S. Coast Guard regulate ballast water discharge into the Great Lakes. Since many harmful species present in waters near Duluth are the result of ballast water discharges, this legislation was an important first step to protect Minnesota waters from future introductions of harmful species.

The National Invasive Species Act of 1996, reauthorizing Federal Public Law 101-646, was passed by the U.S. Congress and signed into law. The act is intended to enhance prevention of aquatic nuisance species introduction and spread at the national level.

**Table 2. Explanation of regulations and criteria associated with Minnesota's exotics species classifications.**

|   |   | Criteria for Classification* |                              |  |                             |   | Regulations   |   |  |   |
|---|---|------------------------------|------------------------------|--|-----------------------------|---|---|---|--|---|
| Regulatory Classification                                 | Species Examples  | Likelihood of Introduction   | Likelihood of naturalization | Magnitude of potential adverse effects | Ability to control          | Other criteria  | Transportation  | Importation, sale, possession, propagation                                      | Introduction   | Responses to escapes  |
| Prohibited  | Eurasian Watermilfoil                                     | Likely                       | Most likely                  | high to medium                         | moderate to low             |   | Prohibited - except for disposal as part of control activities or when transporting to DNR to report the presence of a species.     | Prohibited - except under permit for disposal, control, research, or education. | Prohibited   | For escaped animals, the individual must notify DNR within 48 hours and is responsible for cost of capture.                                     |
| Regulated   | Cabomba   | Likely                       | Possible                     | medium to low                          | moderate to low             | Commercial use  | Not prohibited  | Not prohibited  | Prohibited - unless excepted by rule, or under DNR permit (per M.S. 84D.07).   | For escaped animals, the individual must notify DNR within 48 hours and is responsible for costs of capture if permit conditions were violated. |
| Unlisted  | Elephant  | Unknown                      | Unknown                      | Unknown                                | Unknown                     | Not established   | Not prohibited  | Not prohibited  | Prohibited - unless reviewed and permit issued (per 84D.06) or after review the DNR designates the species as unregulated. | For escaped animals, the individual must notify DNR within 48 hours.  |
| Unregulated   | A. Tropical fish<br>B. Ringnecked pheasant<br>C. Starling |                              | A. Unlikely, or              | B. Minimal, or                         | C. Too widespread to manage |   | Not prohibited - (These species are not subject to regulation under Minn. Stat. 84D. Although may be regulated through other laws.) | Not prohibited  | Allowed  | No requirements.  |
| Species not subject to harmful exotic species regulations | A. Red deer, llamas, ostrich.<br>B. Cattle, cats          |                              |                              |  |                             | A. Species exempt by statute: birds or mammals defined as livestock<br>B. Domestic animals. | Not prohibited  | Not prohibited  | Not prohibited   | No requirements.  |

\* Combinations of all criteria will be used to classify each species

## **Progress in Regulations - 1998**

Progress was made in the following areas that were identified as future needs for 1998.

- Adopt rules that designate additional prohibited, regulated, and unregulated exotic species.
- Obtain information to improve our ability to evaluate the likelihood of introduction, the likelihood of naturalization, and the magnitude of potential adverse impacts needed to regulate pathways and classify species.

### Minnesota Rules

The Minnesota Legislature gave the Department of Natural Resources the responsibility and authority to adopt rules regarding exotic species and infested waters. The DNR held two public meetings on proposed rules on January 14 and 15, 1998. Following a favorable review of the rules by an administrative law judge, the DNR adopted the new rules and they became effective on June 2, 1998.

The new rules include:

- 1) designation of infested waters, prohibited exotic species, regulated exotic species, and unregulated exotic species;
- 2) the conditions and procedures for the issuance of permits for the propagation, possession, importation, purchase, or transport of a prohibited exotic species for the purposes of disposal, control, research or education;
- 3) the conditions and procedures for the issuance of permits for the introduction of a regulated exotic species into a free-living state;
- 4) a process for the commissioner's review of introductions of unlisted exotic species and designation to appropriate classification;
- 5) prohibit harvest of wild animals from infested waters for aquatic farm purposes; and
- 6) the notification requirements for persons that allow or cause the unauthorized introduction of an animal that is prohibited, regulated, or unlisted exotic species.

Copies of the complete harmful exotic rules are available from the Exotic Species Program, 500 Lafayette Rd, St. Paul, MN 55155-4020, 651-297-1464.

### Obtain Information regarding introduction, naturalization, and adverse impacts

A study to evaluate the risk of exotic introductions associated with mail order shipments of aquatic plants into Minnesota was conducted by the Exotic Species Program staff (see the Potential Risk For Aquatic Plant Introductions). The Exotic Species Program contracted with the U.S. Army Corps of Engineers to conduct an assessment of the potential for several exotic aquatic plants to infest Minnesota waters.

## **Effectiveness of Regulations**

The DNR believes that regulations are an important component of an effective strategy to help prevent the spread of harmful exotic species. A 1996 survey of boaters using public accesses (MDNR 1996) supports this view. Most survey respondents indicated

that laws would be effective in getting them to change their behavior and take additional steps to prevent further spread of exotics (67.5% indicated that laws would be "very effective" or "moderately effective"). In contrast, only 11.5% of surveyed boaters indicated laws would not be effective.

## **Future Needs For Regulations**

### Federal

- Support efforts to integrate and improve the comprehensiveness, enforceability, and responsiveness of federal laws regarding noxious weeds, injurious wildlife, and other designations related to harmful exotic species.

### State

- Adopt rules, under the authority in Minnesota Statutes 84D.12, that designate additional prohibited, regulated, and unregulated exotic species; and designate infested waters as they are identified.
- To aid in classifying species, obtain information to improve our ability to evaluate the likelihood of introduction, the likelihood of naturalization, the magnitude of potential adverse impacts, and the ability to eradicate or control various exotics species.

## **References Cited**

Minnesota Department of Natural Resources. December 1996. *1996 Metro Boating Survey*. An unpublished survey and report prepared for Minnesota Department of Natural Resources by Thom Tech Design Company.



## Expenditures

### Appropriations and activities

Base funding for the Exotic Species Program is derived from a \$5 surcharge on the registration of watercraft. Surcharge receipts are deposited in the Water Recreation Account and appropriated by the Legislature. The surcharge generates approximately \$1,100,000 annually and additional program funding comes from other state and federal sources. Significant support for exotic species research efforts has been appropriated from the Environment and Natural Resources Trust Fund and the Minnesota Resources Fund (as recommended by the Legislative Commission on Minnesota Resources). Federal funds also support a range of program activities, including the development and implementation of new management methods, public awareness efforts, and inspection activities. State funding for Department of Natural Resources' efforts to control exotic species was first appropriated in 1988 and has gradually increased. A summary of appropriations to the program for fiscal years 1990 through 1999 (FY90 - FY99) is provided in Table 3 along with projections for FY00.

This report covers activities in calendar year 1998, which includes half of two state fiscal years, (FY98 and FY99) that begin on July 1 and end on June 30. To provide a comprehensive review of expenditures that occurred during 1998, we report both expenditures that were incurred in FY98 and those planned in FY99 (Table 4). The following assumptions and definitions were used to report on expenditures.

### Administration

Administrative expenditures include the administrative charges assessed by the Division and the Department as well as day-to-day office expenses: clerical staff time, telephones, general postage, office rent, etc. Staff time spent on administrative activities (training or professional development activities, assistance with other division or department projects, and personal leave including holiday, sick, and vacation time) is also included under administrative expenses.

### Program planning/direction

Program planning/direction includes expenditures and activities which primarily benefit the entire exotics program, not one of the particular program components listed below. They include:

*State program coordination:* preparation of state plans and reports, hearings, promulgation of rules, development of legislation, strategic planning efforts, as well as the general oversight and planning of program activities. Expenditures represent staff time spent on these activities and costs associated with rule development.

*Coordination with regional and federal activities:* staff time and out-of-state travel to represent the state at meetings of the Great Lakes Panel on Aquatic Nuisance Species, provide relevant testimony for federal legislative development, and participate in regional meetings on exotic species issues.

**Equipment and Chemistry Services:** purchases and repair of boats, trailers, computers, and similar items and analytical chemistry services purchased from the Minnesota Department of Agriculture.

### **Public awareness**

Expenditures in this category include staff time, in-state travel expenses, fleet charges, mailings, supplies, printing and advertising costs, and billboard rental to increase public awareness of exotic species. The cost of developing and producing pamphlets, public service announcements, videos, and similar material is included.

### **Control, Management, and Inventory**

Expenditures in this category include staff time, in-state travel expenses, fleet charges, commercial applicator contracts, and supplies to prepare for, conduct, supervise, and evaluate control activities.

### **Research**

Expenditures in this category include staff time, in-state travel expenses, fleet charges, supplies, and contracts with the University of Minnesota and other research organizations that were established to develop new or improve existing control methods. Activities which are specifically focused on the prevention of new exotic species introductions into Minnesota are also included in this category.

### **Fiscal Year 1998 (FY98)**

Expenditures on exotic species activities during FY98 (July 1, 1997 - June 30, 1998) totaled \$1,213,000 and are shown in Table 4. Expenditures from watercraft license surcharge revenues in the Water Recreation Account, the primary source of funding, are listed along with spending from other accounts. The Exotics Species Program has related accounts that also support program activities. For examples, revenues from the sale of public awareness material are deposited in a Publications Account and can be used to fund future public awareness efforts. Likewise, reimbursement received from local groups for DNR-funded control efforts are deposited in a Coop Account and used to fund similar control programs. Expenditures from other Department accounts, (e.g., the Game and Fish Account and the General Fund) reflect staff in the Section of Ecological Services who are not hired as exotic species specialists, but who occasionally work on exotic species issues as part of their department positions. This summary does not reflect the contribution of all DNR staff who provide assistance to the Exotic Species Program. Exotic species research projects funded by the legislature, as recommended by the Legislative Commission on Minnesota Resources, are also shown.

The \$1,048,000 of Water Recreation Account expenditures by the Exotic Species Program during FY98 was less than the \$1,092,000 appropriated (Table 3). Appropriated funds that were not spent during the FY98 roll forward and are budgeted to support exotic species program activities in FY99.

FY98 expenditures by major category differed from those reported in FY97 (Table 1). Year-to-year variations in expenditures are expected and reflect changes in program needs. For example, the exotic species program invested a significant amount of time in FY98 meeting with constituent groups and holding public hearings to develop new rules. Expenditures in the program planning/direction category increased because of this effort. Likewise, in FY98, there was an increase in the cost of administrative support services provided by the Division of Fish and Wildlife. Of particular concern to the Exotic Species Program was the sharp decline in FY98 in "public awareness" spending. We believe that the public's help in reducing the spread of exotic species is essential. It is our belief that higher levels of spending on public awareness efforts are desirable to keep the public informed and enlist their help in our prevention efforts. Maintaining a higher level of public awareness spending is one of the Exotic Species Program's high priority goals. The following chapters describe in detail the activities that were conducted using FY98 funds.

**Fiscal Year 1999 (FY99)**

Since this report was completed in the middle of FY99, planned expenditures for this year are also reported. Expenditures in most categories are expected to remain constant between FY98 and FY99. Expenditures related to rule development (Program Planning/Direction) will decline because our new rules have been adopted. The staff time that is "saved" will be invested in other high priority area, e.g. efforts focused on preventing the introduction of new exotic species to Minnesota. Higher levels of expenditure are also expected in FY99 in both the public awareness and inspections/enforcement categories. These increases reflect the Program's belief that preventing the introduction of new exotic species to Minnesota and containing the spread of species already present are two of the most effective strategies available. This increased effort will be funded, in part, by FY98 funds that were carried forward into FY99. The following chapters describe in detail the activities that have been and will be conducted using FY99 funds.

**Table 3. Appropriations (in thousands) for DNR Exotic Species Programs, fiscal years '90-'00.**

| Funding Source  | FY90                              | FY91                              | FY92                              | FY93                              | FY94   | FY95             | FY96            | FY97            | FY98   | FY99   | FY00   |
|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|------------------|-----------------|-----------------|--|--|--|
| <b>Water Recreation Account (WRA)</b>                                 | 250<br>(\$1 watercraft surcharge) | 250<br>(\$1 watercraft surcharge) | 416<br>(\$2 watercraft surcharge) | 657<br>(\$3 watercraft surcharge) | 1,011<br>(\$5 watercraft surcharge)                      | 1,112            | 1,136           | 1,087           | 1,092  | 1,106  | 1,126  |
| <b>Legislative Commission on Minnesota Resources recommendations:</b> |                                   |                                   |                                   |                                   |  |                  |                 |                 |  |  |  |
| 1) Purple Loosestrife   | 100 <sup>1</sup>                  | 100 <sup>1</sup>                  |                                   |                                   | 75 <sup>2</sup>  | 75 <sup>2</sup>  | 75 <sup>2</sup> | 75 <sup>2</sup> | 37.5 <sup>2</sup><br>(\$37,500 match from WRA funds) | 37.5 <sup>2</sup><br>(\$37,500 match from WRA funds) | 37.5 <sup>3</sup><br>(\$37,500 match from WRA funds) |
| 2) Eurasian watermilfoil  |                                   |                                   |                                   | 160 <sup>1</sup>                  | 125 <sup>2</sup><br>(requires \$100,000 non-state match) | 125 <sup>2</sup> | 75 <sup>2</sup> | 75 <sup>2</sup> | 37.5 <sup>2</sup><br>(\$37,500 match from WRA funds) | 37.5 <sup>2</sup><br>(\$37,500 match from WRA funds) | 37.5 <sup>3</sup><br>(\$37,500 match from WRA funds) |
| 3) Ballast Water Control  |                                   |                                   |                                   |                                   |  |                  |                 |                 | 125 <sup>1</sup>                                     | 125 <sup>1</sup>                                     |  |
| <b>Total</b>  | <b>350</b>                        | <b>350</b>                        | <b>416</b>                        | <b>817</b>                        | <b>1,211</b>   | <b>1,312</b>     | <b>1,286</b>    | <b>1,237</b>    | <b>1,292</b>   | <b>1,306</b>   | <b>1,201</b>   |

<sup>1</sup> From the Minnesota Future Resources Fund<sup>2</sup> From the Minnesota Environment and Natural Resources Trust Fund<sup>3</sup> Recommended to the 1999 Legislature by the LCMR

**Table 4. Exotic species related expenditures in fiscal year 1998 (FY98) and projected expenditures in FY99 (in thousands of dollars).**

|  | Water Recreation Account |              | Other Exotic Accounts |           | Other Dept. Accounts |           | Env. and Natural Resources Trust Fund* |            |
|--|--------------------------|--------------|-----------------------|-----------|----------------------|-----------|--|------------|
|  | FY98                     | FY99         | FY98                  | FY99      | FY98                 | FY99      | FY98                                   | FY99       |
| <b>Administrative/Operations</b>   |                          |              |                       |           |                      |           |  |            |
| Rent   | 20                       | 20           |                       |           |                      |           |  |            |
| Phones / postage / Misc.   |                          | 7            |                       |           |                      |           |  |            |
| Staff Administrative Activities  | 27                       | 23           |                       |           |                      |           |  |            |
| Staff Personal leave (Vacation, Holiday, Sick)                             | 55                       | 55           |                       |           |                      |           |  |            |
| Clerical   | 17                       | 16           |                       |           |                      |           |  |            |
| Div/Dept Administrative Support  | 37                       | 37           |                       |           |                      |           |  |            |
| <b>Program Planning/Direction</b>  |                          |              |                       |           |                      |           |  |            |
| State program coordination   | 114                      | 116          |                       |           | 8                    | 8         |  |            |
| Support regional / federal activities                                      | 12                       | 12           |                       |           |                      |           |  |            |
| Equipment and chemistry services   | 10                       | 15           |                       |           |                      |           |  |            |
| <b>Public Awareness</b>  |                          |              |                       |           |                      |           |  |            |
| Communications plan, workshops, presentations, radio spots, billboards, TV | 57                       | 84           | 34                    | 10        | 4                    | 4         |  |            |
| <b>Control, Management, and Inventory</b>                                  |                          |              |                       |           |                      |           |  |            |
| Eurasian watermilfoil  | 151                      | 154          | 20                    | 30        |                      |           |  |            |
| Purple loosestrife   | 64                       | 64           | 9                     |           |                      |           |  |            |
| Zebra mussel   | 10                       | 12           |                       |           |                      |           |  |            |
| Curly-leaf pondweed  | 9                        | 9            |                       |           |                      |           |  |            |
| Flowering Rush   | 1                        | 1            |                       |           |                      |           |  |            |
| <b>Inspections/Containment</b>   |                          |              |                       |           |                      |           |  |            |
| MCC - access inspections   | 296                      | 321          | 3                     |           |                      |           |  |            |
| Enforcement - road and access checks                                       | 83                       | 60           |                       |           |                      |           |  |            |
| <b>Research</b>  |                          |              |                       |           |                      |           |  |            |
| Purple loosestrife   | 25                       | 65           |                       |           |                      |           | 15                                     | 60         |
| Eurasian watermilfoil  | 48                       | 51           |                       |           |                      |           | 28                                     | 47         |
| Flowering rush   | 3                        | 3            |                       |           |                      |           |  |            |
| Zebra mussels  | 6                        | 10           |                       |           |                      |           |  |            |
| Curly-leaf pondweed  |                          |              |                       |           |                      |           |  |            |
| Ballast Water Management Prevention  | 3                        | 12           |                       |           |                      |           | 44                                     | 206        |
| <b>Total</b>   | <b>1,048</b>             | <b>1,147</b> | <b>66</b>             | <b>40</b> | <b>12</b>            | <b>12</b> | <b>87</b>                              | <b>313</b> |

\* and Minnesota Future Resources Fund



## **Education / Public Awareness Activities**

### **1998 Highlights**

- The DNR licensed several states to use generic versions of zebra mussel and Eurasian watermilfoil television spots developed for Minnesota in 1997.
- Television spots were placed on all in-state television stations as paid advertising and/or public service announcements.
- The DNR and Minnesota Sea Grant conducted cooperative educational activities to maintain high levels of public awareness about exotics and exotic issues.

### **Background**

Since 1992, the DNR's Exotic Species Program has made substantial efforts to maintain and increase public awareness and understanding about harmful exotic species. Communication efforts are built around the theme of "Clean boats, Clean waters". This theme captures the desired outcome (clean waters) and the proposed strategy (clean boats) to achieve that result.

Public awareness efforts in Minnesota are designed to:

- 1) make the public aware of the negative environmental impacts caused by some exotics;
- 2) help the public identify specific exotic species;
- 3) outline actions that boaters, anglers, seaplane pilots, waterfowl hunters, and others must do to reduce the spread of these exotics; and
- 4) summarize research and control approaches.

### **Progress in public awareness - 1998**

Key components of the Exotic Species Program's 1998 communication efforts included:

- exotic species awareness signs at public water accesses;
- information about harmful exotic species in the fishing and boating regulations;
- radio and television advertisements during Fishing Opener, Memorial Day, Fourth of July, and Labor Day weekends;
- series of press releases and media contacts throughout the year to keep current information before the public.
- staffing displays at various sport shows and the Minnesota State Fair;

- preparing and distributing radio and television public service announcements to all Minnesota stations; and
- attending meetings of lake associations and other groups concerned about exotic species.

Television was utilized again in 1998 with paid placement supplementing the use of public service time from nearly all local broadcast stations.

Radio was used in 1998 to reach boaters and anglers in several ways. Paid advertising was used on larger Twin Cities stations including WCCO-AM, KQRS-FM, KFAN-AM, WKLY-FM, and KTCZ-FM. Ads were also run on the Minnesota Bound (40 stations) radio network. These stations were selected for their listener profile which matched the desired demographics of boat owners. Radio ads were run during high activity weekends including the fishing opener, Memorial Day, Fourth of July, and Labor Day.

In addition, public service announcements were produced and distributed to all Minnesota radio stations (a total of 165). A cover memo and related materials, which encouraged station program managers to play these announcements as often as possible, were distributed with the tapes.

DNR Exotic Species Program staff participated in the Northwest Sport show and the Minnesota State Fair to distribute literature and information. At the State Fair, a barrel encrusted with zebra mussels was exhibited and drew considerable attention. Information and exotics publications were also distributed at the Minneapolis Boat Show.

DNR Watercraft inspectors made nearly 38,419 personal contacts with boaters launching their boats at public accesses (see Watercraft Inspections Section) providing them with information and tips on ways to reduce the spread of exotic species.

Presentations were given to a variety of audiences, including: university classes, high schools, teacher workshops, Rotary Club (Alexandria, MN), Minnesota Turf and Grounds Foundation Conference, Minnesota Nursery and Landscape Association, Midwest Fish and Wildlife Conference (Cincinnati, OH), Midwest Aquatic Plant Management Society Conference (Memphis, TN), National Park Service seasonal training session (St. Croix Falls, WI), 100<sup>th</sup> Meridian Initiative (Nebraska and Oklahoma), State of Washington - Zebra Mussel Task Force (Seattle, WA), annual meeting of the Minnesota Agricultural Inspectors (Bemidji), regional MnDOT meetings, and several lake associations.

### **Effectiveness of public awareness efforts**

The DNR and Minnesota Sea Grant have conducted surveys to help assess the effectiveness of public awareness efforts conducted in Minnesota. In 1994, Minnesota Sea Grant conducted a survey of boaters in Minnesota, Wisconsin, and Ohio to evaluate and compare regional differences in educational and awareness programs.

Results of the survey suggested that Minnesota's exotic species education and information programs are having an impact on boater awareness and behavior toward the spread of exotic species. According to the survey reports,

***"More effort has been expended and a greater variety of techniques have been used in getting the exotic species message out in Minnesota than in the other two states surveyed. Survey results indicate Minnesota boaters are more knowledgeable about exotic species issues and have already changed their behavior to a greater extent (to prevent the spread of exotics) than boaters in the other two states. This suggests that educational programs are effective."***

In 1996, the DNR funded a follow-up survey of boaters in the Minneapolis/St. Paul metro area (MDNR 1996). The survey indicates that awareness about exotics has continued to increase. Watercraft inspectors (see Watercraft Inspections) also continue to find high levels of exotic awareness throughout Minnesota. Information from surveys will continue to be used to guide development of annual public awareness efforts and maximize their effectiveness.

### **Participation of others in public awareness activities**

Other agencies have been cooperatively involved with public awareness activities in the state for several years. Our most widely used public awareness pamphlet, *A Field Guide to Aquatic Exotic Plants and Animals* continues to be distributed by the National Park Service, MN Sea Grant, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers, as well as numerous Midwestern states and Provinces.

The University of Minnesota Sea Grant Exotic Species Information Center works on collaborative initiatives and projects with the DNR's Exotic Species Program. The Center serves as a contact for public information on invasive aquatic nuisance species (ANS) and educates water users on how to prevent and slow the spread of ANS.

During 1998, Center staff regularly attended DNR Exotic Species Program meetings to coordinate activities, and share information and new publications. The Center also participated in the Program's strategic planning retreat, and on the committee that developed the MnDNR Nonindigenous Fish Emergency Response Plan.

### **1998 Highlights of Minnesota Sea Grant's education activities in Minnesota:**

- Before the 1998 walleye fishing opener, Center staff delivered over 15,000 Ruffe WATCH and Round Goby WATCH ID cards from Cloquet to Grand Portage to locations where angling licenses are sold such as, convenience and bait stores, marinas, resorts and campgrounds, and DNR offices.

- Center staff provided ANS awareness presentations at 16 conferences, workshops, meetings, and festivals to Minnesotans, including a training session at a Minnesota Conservation Corps training meeting in June.
- The Center worked to positively confirm over 30 reports of ANS in Minnesota waters by the public. Sea Grant discovered a major zebra mussel and round goby infestation in the Duluth Superior harbor, including the first zebra mussels on the hulls of recreational boats moored in the harbor.
- Sea Grant sponsored a University of Wisconsin researcher to conduct zebra mussel research dives in the Duluth-Superior harbor to assess the extent of the infestation and to determine if the young will over-winter in the harbor. The Center issued letters to 62 entities on the harbor to raise awareness of the growing problem and to urge raw water operations to take immediate action to mitigate potential impacts.
- The Center hosted a special Exotic Species Day Camp, which was attended by teachers and educators (formal and non-formal) from Minnesota and northern Wisconsin. Co-hosted by the Great Lakes Aquarium at Lake Superior Center and the UMD Department of Education, the one-day camp featured many teaching resources for youth and helped develop lesson plans on aquatic exotics.
- As a collaborative effort with the DNR, the Exotic Aquatics youth education traveling trunk project was again expanded. In addition to the original 15 trunks created in 1996 and another five in 1997, a third production run of two more trunks was facilitated by Sea Grant. Now, 23 trunks are available from 14 lending centers. Trunks available from the Center have been used by over 104 teachers, who have taught over 7,600 students (primarily grades 4-7).
- Sea Grant continues to provide technical support to the Great Lakes Sea Grant Network's web site at "<http://www.ansc.purdue.edu/sgnis/>". In 1998, Minnesota Sea Grant led production of a compact disk (CD) for those audiences without Internet capabilities. The site and CD contains a comprehensive collection of research and outreach publications and materials on zebra mussels and other ANS produced by Sea Grant and other agencies and programs across the country.

In 1999, Minnesota Sea Grant will host the 9th International Zebra Mussel and Aquatic Nuisance Species Conference, April 26-30, 1999, in Duluth. Sponsored, in part by the DNR, the conference will feature over 115 presentations on ANS from eight countries, including several presentations by DNR staff. Over 400 delegates are expected to attend this important four-day conference.

### **Future needs for public awareness**

- Continue to prioritize public awareness of zebra mussels in southeast Minnesota near the Mississippi and St. Croix rivers.
- Develop public awareness efforts cooperatively with specific groups that have not received significant attention in previous years, such as the aquaculture industry, live bait dealers, water garden and horticulture industry, and aquarium trade.
- Enhance interagency communication on the status and progress of exotic species management efforts for resource professionals.
- Seek increased funding for public awareness activities including outreach to lake communities and roving watercraft inspection crews at non-infested waters.
- Increase public awareness efforts with lake communities outside the Metro Area.
- Cost share with local public awareness efforts.
- Increase the information about harmful exotic species available through the DNR web site.

### **Reference Cited**

Minnesota Sea Grant. 1994. Exotic Species and Freshwater Boating Survey. University of Minnesota, Duluth, Minnesota.

Minnesota Department of Natural Resources. December 1996. 1996 Metro Boating Survey. An unpublished survey and report prepared for Minnesota Department of Natural Resources by Thom Tech Design Company.

## **Watercraft Inspections**

### **1998 Highlights**

- During the 1998 boating season, 38,419 boater contacts were made to educate the public about harmful aquatic exotic species.
- Watercraft inspectors conducted inspections at Mille Lacs Lake in an effort to build awareness of exotics in outstate areas.

### **Background**

The potential for boaters to accidentally move aquatic exotic species from one lake to another is a clear threat to Minnesota's aquatic ecosystems. For this reason, the 1991 Minnesota Legislature mandated that DNR conservation officers conduct inspections of trailered boats on Minnesota highways. The purpose of these inspections was to look for Eurasian watermilfoil, issue citations to violators, and to inform the public about the potential spread of harmful aquatic exotic species. In 1992, the DNR, the Minnesota Lakes Association and angling groups proposed and supported legislation (adopted as M.S. 18.317, Subd. 3a, and recodified as 84D.02 subd. 4, see Appendix A) calling for 10,000 hours of inspections of watercraft leaving "infested" water bodies containing harmful aquatic exotic species such as Eurasian watermilfoil, spiny water flea, and zebra mussels. Subsequently, a watercraft inspection program was established by the DNR in 1992 to accomplish this mandate. In 1993, legislation was passed increasing the number of inspection hours to 20,000 starting with the 1994 boating season.

Watercraft Inspectors, employed through the DNR's Minnesota Conservation Corps, conduct inspections at public water access sites on infested waters (see Appendix B and C for lists of infested waters). The goal of their effort is to promote actions by boaters that will reduce the risk of transporting harmful aquatic exotic species throughout the state. Their objectives are to increase public awareness of the threats posed by exotic species, inform boaters of the laws regarding exotic species transportation, and to show individuals how to inspect and remove exotics and aquatic vegetation from their boating equipment before leaving an access. Twenty thousand hours of inspection activities are targeted at high use accesses and during high use periods.

### **Progress in Watercraft Inspections - 1998**

Inspections begin on May 1 and end on October 15 as prescribed in state statute. In 1998, within this 24 week period, 19,641 inspection hours were logged and 38,419 watercraft/trailer units were inspected. An additional 400 hours were completed by the Enforcement Division to meet the 20,000 hour mandate (see Enforcement section).

Accomplishments and responsibilities of MCC Watercraft Inspectors:

- Assisted the Division of Enforcement with five road checks,



- Answered questions at the Exotic Species display during each day of the 1998 Minnesota State Fair,
- Conducted inspections at 42 different fishing tournaments throughout the state,
- Conducted inspections for sailing regattas at the Aquatennial festival in Minneapolis,
- Conducted inspections for waterfowl hunters during the first two weekends of the waterfowl hunting season,
- Conducted over 1,100 surveys along the Mississippi River to gather information on issues of major concern about the river for boaters and anglers.
- Distributed Exotic Alert Tags on 7,610 vehicles with trailers at access points on infested waters, and
- Cleared aquatic plant fragments from public water accesses as encouraged in M.S. 84D.02, subd. 3, (8) (Appendix A). Removing vegetation fragments from the access sites helps to reduce the amount of Eurasian watermilfoil and other aquatic plants adhering to watercraft and trailer units exiting infested waters.

A total of 29 inspectors worked through the summer of 1998 providing information to the public on watercraft inspections and exotic species (Table 5 and Figure 1). Inspection effort was distributed across the state in rough proportion to the number of public water accesses (PWA) on infested water bodies. The actual distribution of time for each region reflects both the number of PWAs on infested water bodies and the level of public use at those accesses. For example, as shown in Table 5, the metro area received 64% of the hours but has only 44% of the PWAs. However, the metro area includes some of the most heavily used recreation lakes in the state, thus requiring the additional inspection time.

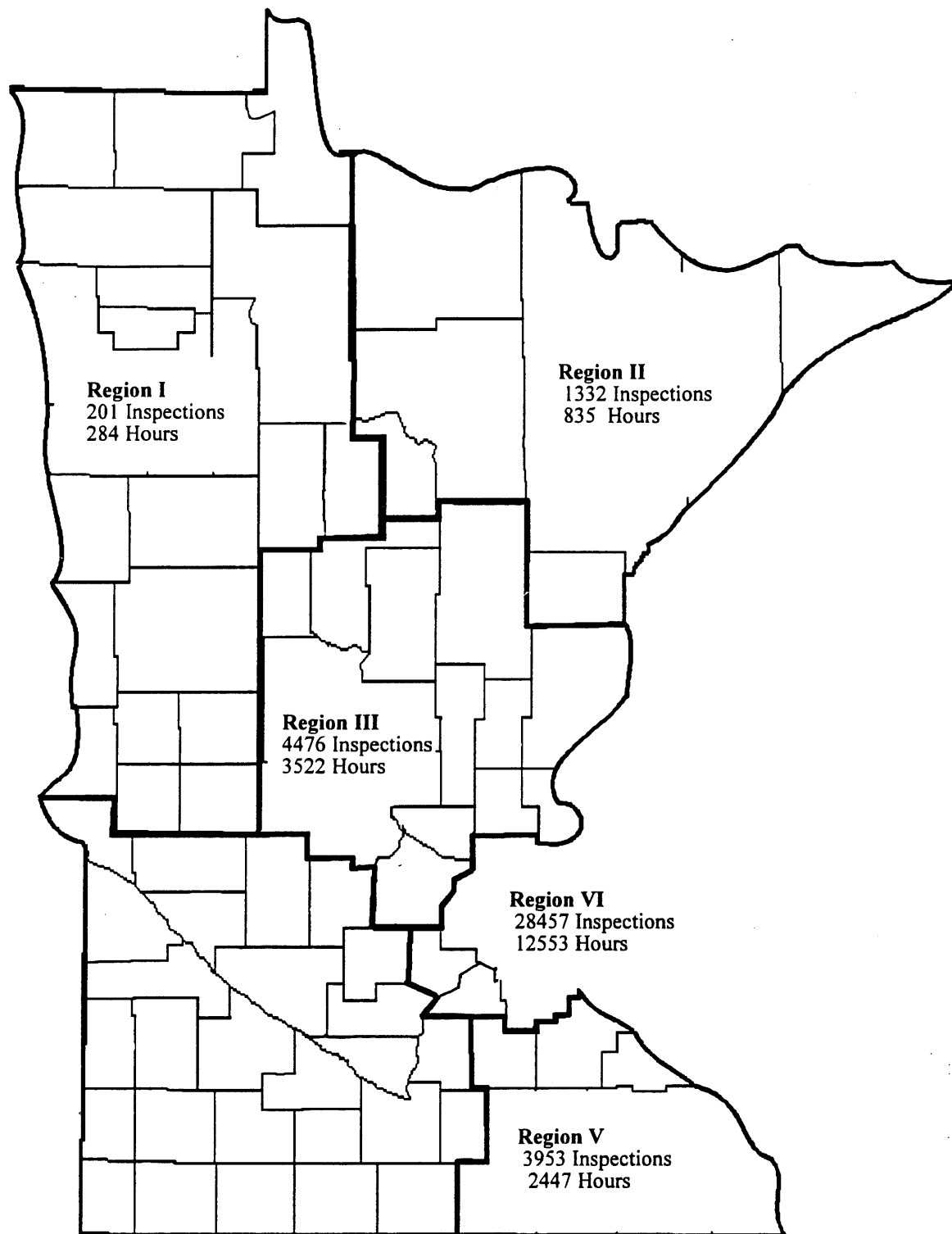
The number of inspections conducted per day varies due to weather conditions and boater activity. Overall the number of inspections conducted in 1997 and 1998 were very similar (Table 6). There were fewer inspections conducted in 1998 when compared to 1997, both in the Metro area and along the Mississippi River.

**Table 5. Number of public water accesses on infested waters and inspection hours by region for 1998.**

| Area                         | Number of PWA's<br>(% of total PWA's) | Hours Accomplished<br>(% of total hours) |
|------------------------------|---------------------------------------|--|
| Region I - Northwest         | 7 (4%)                                | 284 (1%)                                 |
| Region II - Duluth/Superior  | 20 (11%)                              | 835 (4%)                                 |
| Region III - Central         | 33 (18%)                              | 3,522 (18%)                              |
| Region V - Mississippi River | 42 (23%)                              | 2,447 (13%)                              |
| Region VI - Metro            | 80 (44%)                              | 12,553 (64%)                             |
| State-wide Total             | 182 (100%)                            | 19,641 (100%)                            |

**Table 6. Number of watercraft inspections at infested waters conducted by MCC Watercraft Inspectors in 1997 and 1998.**

| Area                         | Number of Watercraft Inspected |        | Percentage of All Inspections |      |
|------------------------------|--------------------------------|--------|-------------------------------|------|
|                              | 1997                           | 1998   | 1997                          | 1998 |
| Region I - Northwest         | 39                             | 201    | <1%                           | 1%   |
| Region II - Duluth/Superior  | 499                            | 1,332  | 1%                            | 3%   |
| Region III - Central         | 4,207                          | 4,476  | 10%                           | 12%  |
| Region V - Mississippi River | 4,890                          | 3,953  | 11%                           | 10%  |
| Region VI - Metro            | 34,088                         | 28,457 | 78%                           | 74%  |
| State-wide Total             | 43,723                         | 38,419 | 100%                          | 100% |



**Figure 1. 1998 MCC Watercraft Inspections at Public Water Accesses on Infested Waters.**

## **Effectiveness**

The goal of the watercraft inspection program is to promote actions by boaters that will reduce the risk of transporting harmful aquatic exotic species. The objectives are to increase awareness of aquatic exotic species issues and laws, and to reduce the number of boats and trailers carrying vegetation as they enter a water body.

Surveys conducted by Watercraft Inspectors provide important information on the public's awareness of exotic species laws and help identify high risk areas, i.e. accesses where many watercraft pick up plant fragments. According to survey information collected by Watercraft Inspectors, awareness of exotic species laws remains very high among Minnesota boaters, (Table 7). The exotic species program continues to use a variety of media (print, radio, and TV) to keep exotic species awareness high, (see Education/Public Awareness Activities).

## **Transportation of Vegetation**

The percentage of boats/trailers carrying vegetation as they exited an infested water body varied widely by county (Table 8). These variations may be caused by several variables including the amount and type of vegetation in the water body, its proximity to the public water access, and amount of recreational boating traffic. The results summarized in Table 8 show that an average of 32% of the boats exiting infested waters were found with vegetation. This rate demonstrates the clear risk that boaters will transport aquatic vegetation (and exotics) from lake to lake if boats are not properly inspected and cleaned. The percentage of boats and trailers carrying vegetation as they enter public accesses on infested waters is 6%. This is a good indication that the majority of boaters using infested waters are inspecting and cleaning their boats and trailers.

The above information was collected from public water accesses on waters infested with Eurasian watermilfoil, zebra mussels, or spiny water flea. These figures do not represent boaters throughout the state. During the 1998 exotic species road checks, the violation rate for transportation of vegetation was 20%. The road checks are more representative of the state as a whole. Enforcement of exotic species law continues in an effort to reduce the transportation of vegetation and harmful exotics (see Enforcement section).

When comparing the rate of vegetation transportation between boaters using infested waters (6%) and boaters from the road checks (20%), it is clear that those using infested waters, and perhaps those who have spoken to watercraft inspectors, are making a better effort to clean off their boats and trailers.

## **Mille Lacs**

The watercraft inspection program has primarily focused on water bodies with infestations of harmful exotic species. The purpose of spending time on infested water bodies is to reduce the transportation of exotics out of those lakes. Although it is important to contact boaters leaving water bodies infested with harmful exotic species, we feel that it is also important to inform boaters on other popular recreation lakes in

Minnesota such as Mille Lacs. Before it was known to contain EWM, we conducted an awareness building weekend on Mille Lacs. Eight watercraft inspectors spent the last weekend in July talking to Mille Lacs boaters and showing boaters how to inspect and clean aquatic plants and harmful exotic species from their boats and trailers.

The program was generally well received by Mille Lacs boaters. Awareness was fairly high with 92% of the boaters answering "yes" when they were asked whether they were aware of exotic species laws. The percentage of boats entering the public access with vegetation present (7%) is close to the state average of 6%.

### **Spiny Water Flea**

In the Duluth area we noticed an increase in the number of watercraft exiting the St. Louis River with what appeared to be spiny water flea attached. They were most commonly found on down rigger cables and fishing lines. Spiny water flea were found on 43 watercraft exiting the St. Louis River. Many boaters commented on what they thought was an increase in the number of spiny water flea in the St. Louis River.

**Table 7. Awareness of exotic species laws in Minnesota in 1997 and 1998.**

| Counties with<br>Exotic Species<br>Infestations   | Percent of Individuals who<br>answered "yes" when asked<br>whether they were aware of<br>Exotic Species Laws |      | Number of Individuals who<br>were asked whether they<br>were aware of Exotic<br>Species Laws |        |
|---|--|------|--|--------|
|   | 1997   | 1998 | 1997   | 1998   |
| <b>Region I -<br/>Northwest</b><br>Douglas<br>Pope  | 95%  | 97%  | 39   | 201    |
| <b>Region II -<br/>Duluth/Superior</b><br>Carlton<br>Cook<br>Lake<br>St. Louis                                | 93%  | 83%  | 499  | 1,332  |
| <b>Region III -<br/>Central</b><br>Chisago<br>Crow Wing<br>Kanabec<br>Mille Lacs<br>Stearns<br>Todd<br>Wright | 98%  | 95%  | 4,207  | 4,476  |
| <b>Region V -<br/>Mississippi<br/>River</b><br>Goodhue<br>Houston<br>Wabasha<br>Winona                        | 93%  | 92%  | 4,890  | 3,953  |
| <b>Region VI -<br/>Metro</b><br>Anoka<br>Carver<br>Dakota<br>Hennepin<br>Ramsey<br>Scott<br>Washington        | 98%  | 97%  | 34,088   | 28,457 |
| <b>State-wide<br/>Total</b>   | 97%  | 96%  | 43,723   | 38,419 |



**Table 8. Vegetation found on boats and trailers exiting infested waters in 1998 (these amounts are determined at the access before watercraft have been cleaned).**

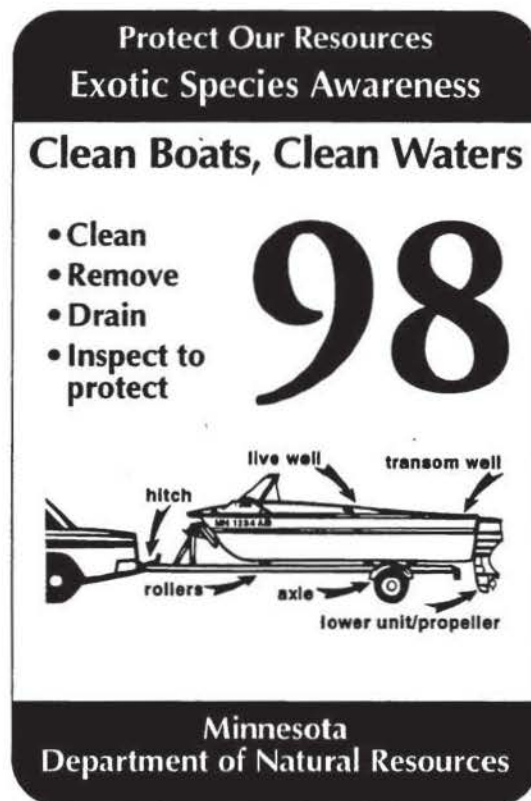
| Counties                            | Percent of Watercraft & Trailers exiting with Vegetation (%) | Number of Watercraft & Trailers Exiting |
|-------------------------------------|--|---|
| <b>Region I - Northwest</b>         |  |   |
| Douglas                             | 50%  | 8                                       |
| Pope                                | 33%  | 64                                      |
| <b>Region II - Duluth/Superior</b>  |  |   |
| Carlton                             | 50%  | 2                                       |
| Cook                                | 0%   | 9                                       |
| Lake                                | 8%   | 26                                      |
| St. Louis                           | 17%  | 741                                     |
| <b>Region III - Central</b>         |  |   |
| Chisago                             | 42%  | 527                                     |
| Crow Wing                           | 39%  | 99                                      |
| Kanabec                             | 34%  | 113                                     |
| Mille Lacs                          | 30%  | 255                                     |
| Stearns                             | 39%  | 367                                     |
| Wright                              | 46%  | 618                                     |
| <b>Region V - Mississippi River</b> |  |   |
| Goodhue                             | 4%   | 242                                     |
| Houston                             | 8%   | 75                                      |
| Wabasha                             | 4%   | 966                                     |
| Winona                              | 12%  | 1,029                                   |
| <b>Region VI - Metro</b>            |  |   |
| Anoka                               | 68%  | 766                                     |
| Carver                              | 41%  | 1,092                                   |
| Dakota                              | 13%  | 1,094                                   |
| Hennepin                            | 42%  | 6,607                                   |
| Ramsey                              | 34%  | 3,025                                   |
| Scott                               | 15%  | 632                                     |
| Washington                          | 11%  | 1,118                                   |
| <b>State Total</b>                  | <b>32%</b>   | <b>19,475</b>                           |

**St. Croix River**

Watercraft inspectors continued to conduct inspections at several public water accesses along the St. Croix River (see: Management of Zebra Mussels). Increased public awareness and education is necessary due to the increased zebra mussel infestation risk for the St. Croix River. Watercraft inspectors spent 1049 hours on the St. Croix River educating boaters on steps to take to prevent the spread of zebra mussels. Approximately 300 hours were spent at accesses north of Stillwater as directed by the St. Croix interstate plan.

## Decal Program for trailered watercraft

During the 1994 boating season, several boaters expressed frustration over being approached by inspectors several times each week throughout the summer. To respond to boater's concerns and to reduce the duplication of education efforts, a decal was developed and distributed to boaters whose watercraft had been inspected for exotic species (see decal below). Boaters are instructed to (voluntarily) affix the decal to the winch post of their trailer. This allows inspectors to identify the boaters who inspectors have already spoken with during the summer. Return boaters with a decal are given a brief reminder to drain water and remove vegetation from their boats. The decals have been used for four years now and have been well received by the public. The 25,000 decals distributed during the 1998 boating season also remind boaters to inspect their boat when inspectors are not present.



### **Future needs/recommendations for watercraft inspections**

- Conduct 20,000 hours of inspections during the 1999 boating season.
- Pending availability of additional funding and/or statute changes, conduct watercraft inspections at non-infested waters with high boater use.

## **Enforcement**

### **1998 Highlights**

- Five road checks for trailered boats were held. Along with day-to-day enforcement action, road checks continue to be used to increase public awareness of exotic species laws and to gather information on violation rates of the law prohibiting transportation of aquatic vegetation. Aquatic vegetation was found in or on an average of 20% of all watercraft inspected.
- Conservation Officers spent 1,242 hours enforcing the exotic species laws and rules. One third of this activity was at infested water accesses.
- Civil citations or warnings were issued to 120 individuals for violations.

### **Background**

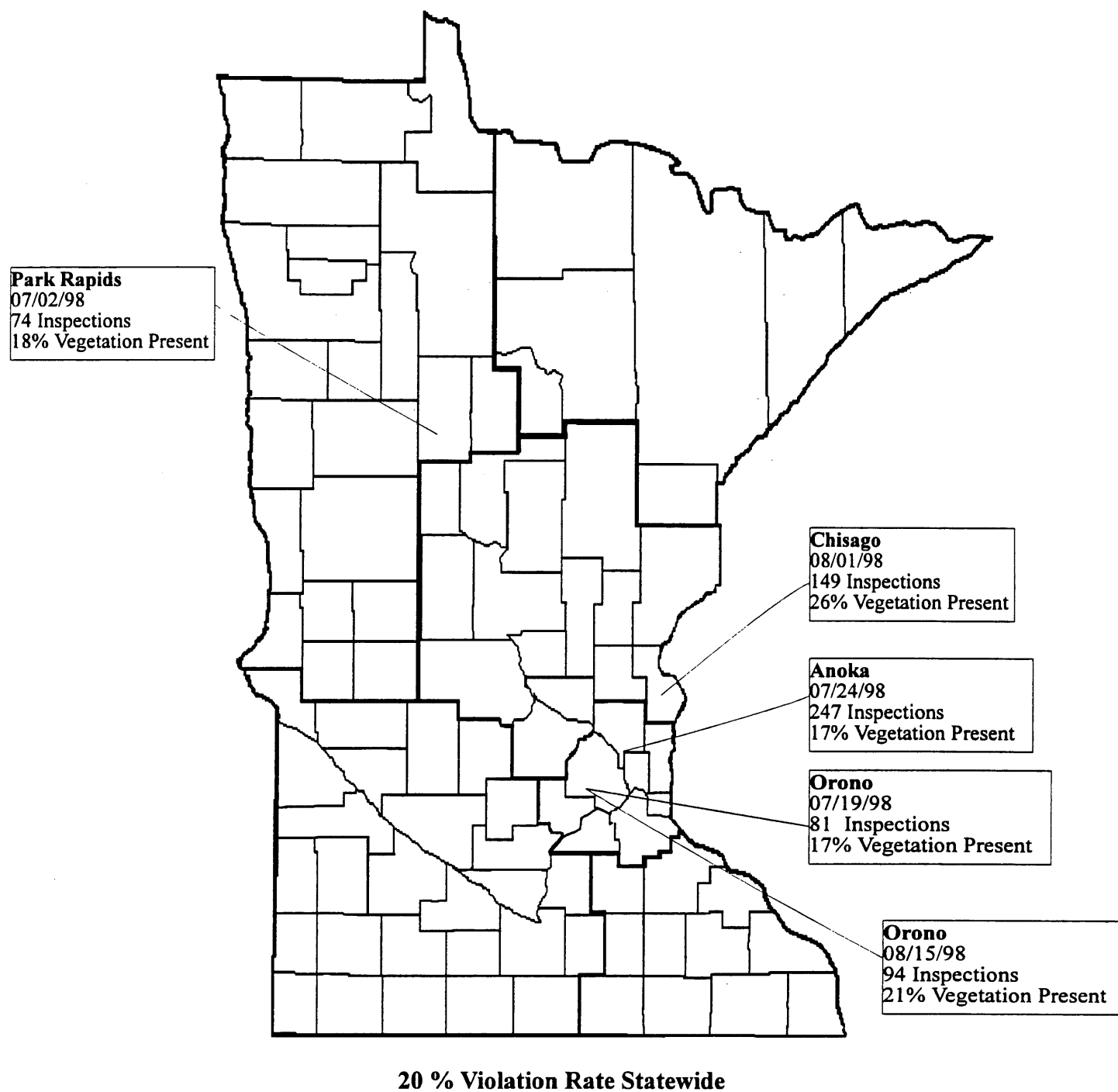
In 1991, the Minnesota Legislature directed the DNR Commissioner to establish a two year program designed to check trailered boats for the presence of Eurasian watermilfoil (milfoil). These requirements became effective August 1, 1991. Road checks were initially designed to inspect boats and trailers for the presence of milfoil fragments and to educate and inform boaters about milfoil. As additional harmful exotic species have become established in Minnesota, road checks have been expanded to detect illegal transportation of these organisms, including zebra mussels, and ruffe.

The Department of Natural Resources (DNR) supported changes in statute passed during the 1996 Legislative Session that prohibited the transport of all aquatic vegetation (rather than Eurasian watermilfoil exclusively). The new law went into effect for the 1996 boating season. This action removed the major enforcement barrier (plant identification difficulties) to effective enforcement of laws banning the transportation of harmful exotic plants (like milfoil) and reduced the chances of zebra mussels being inadvertently spread along with aquatic vegetation. During 1996, road checks were used primarily as an educational tool.

### **Progress in Enforcement - 1998**

Passage of the 1996 law prohibiting transport of aquatic plants enabled Enforcement to increase efforts during the 1997 and 1998 boating and waterfowl seasons. The number of road checks was increased from three in 1996 to seven in 1997. Road checks were cut back to five in 1998 (see Figure 2). The number of warnings, both verbal and written, increased in 1997 as did the number of citations. A review of the 1997 road check results suggests that the percentage of watercraft with aquatic vegetation was higher in the Metro Area than in greater Minnesota (see Table 9), the highest rates were observed in Chisago and Hennepin Counties in 1997.

**Figure 2. Results of 1998 Road Checks conducted by DNR Enforcement Officers.**



In 1998 the highest rates were in Chisago and Hubbard Counties. It is the Department's goal to lower the vegetation transportation rates in the Metro area and throughout greater Minnesota as well. To accomplish this goal, road checks may need to continue to change from an educational activity to one of increased enforcement. In 1998 total contacts of verbal and written warnings and citations were 120. In 1997 and in 1998 many more officers became actively involved in exotics enforcement because of increased personnel needs at these road checks.

Road checks can be a very effective method of drawing public attention to an issue. Nevertheless, based on recent court decisions, the violation rates observed at the road checks need to be high enough to justify the public inconvenience and expense of the checks. During the 1996 road checks the Department gathered information on the violation rates for transporting aquatic vegetation. The rates ranged from 8% to 54%. During the 1997 road checks the same information was gathered and the rates ranged from 17% to 44% (mean of 25%).

During the 1998 road checks the same information was gathered and the rates ranged from 17% to 26% (mean of 19.8%). It is important to note that often only a small amount of aquatic vegetation was found in the watercraft or on the trailer. This information will be evaluated and used to justify proceeding with future road checks.

The road check at Chisago U.S. Route 8 exhibited the highest percentage of watercraft carrying vegetation (Table 9) and (Figure 2). Over half the vegetation was found inside the boats. The Anoka road check continued to have the highest volume of traffic. Chisago Co. had the second largest volume of traffic. The Hubbard Co. (Park Rapids) road check had the lowest volume of traffic. These latter three road checks have been the longest running and will be continued to track boater compliance with exotic species laws.



**Table 9. Summary of the numbers of trailered watercraft inspected by the DNR during the educational road checks conducted in 1997 and 1998.**

| Location                                  | Number of watercraft inspected | Number of watercraft with aquatic plants | Number of verbal warnings | Number of written warnings | Number of written citations |
|---|--------------------------------|--|---------------------------|----------------------------|-----------------------------|
| <b>1997</b>                               |                                |  |                           |                            |                             |
| Hwy. 8, Chisago Co.                       | 169                            | 62(37%)                                  | 55                        | 7                          | 0                           |
| U.S. Rt. 10, Anoka Co.                    | 230                            | 41(18%)                                  | 38                        | 1                          | 2                           |
| Hwy. 71, Hubbard Co.                      | 83                             | 18(22%)                                  | 18                        | 0                          | 0                           |
| Willmar U.S. 71                           | 47                             | 11(23%)                                  | 5                         | 1                          | 0                           |
| Grand Rapids Hwy 6                        | 23                             | 4(17%)                                   | 2                         | 1                          | 0                           |
| Lake City U.S. 61                         | 50                             | 9(18%)                                   | 9                         | 3                          | 0                           |
| Orono Co. Road 51 Hennepin Co.            | 36                             | 16(44%)                                  | 8                         | 4                          | 0                           |
| <b>TOTALS</b>                             | <b>638</b>                     | <b>161(25%)</b>                          | <b>135</b>                | <b>17</b>                  | <b>2</b>                    |
| <b>1998</b>                               |                                |  |                           |                            |                             |
| Hwy. 8 Chisago Co.                        | 149                            | 39(26%)                                  | 22                        | 11                         | 0                           |
| U.S. Rt. 10 Anoka Co.                     | 247                            | 41(17%)                                  | 21                        | 19                         | 1                           |
| Hwy. 71 Hubbard Co.                       | 74                             | 13(18%)                                  | 5                         | 7                          | 0                           |
| Orono Co. Rd. 51                          | 81                             | 14(17%)                                  | 1                         | 11                         | 2                           |
| Orono Co. Rd. 51 Maxwell Bay Hennepin Co. | 94                             | 20(21%)                                  | 11                        | 9                          | 0                           |
| <b>TOTALS</b>                             | <b>645</b>                     | <b>127(19.8%)</b>                        | <b>60</b>                 | <b>57</b>                  | <b>3</b>                    |

## **Public water access and other exotics enforcement activities**

### **Mississippi River**

Conservation Officers conducted exotics enforcement activities along the Mississippi River focusing on the transportation of zebra mussels and infested waters. Boaters using the Mississippi River south of the Twin Cities must empty bilges, live wells, and bait buckets so that they do not transport zebra mussel infested water from the Mississippi. During 1998 officers spent about 50 hours of enforcement time over the summer along the Mississippi River including accesses near Hastings, Red Wing, Lake City, Kellog, Winona, and La Cresent. Many contacts were made with some verbal warnings issued for live well and bait container draining.

### **Waterfowl Hunting Season**

Conservation officers conducted exotics enforcement activities during the waterfowl hunting season to inform hunters about the laws prohibiting transportation of aquatic vegetation. Hunters must remove vegetation from their boats, decoys, and anchors before leaving the boat access. There is an exception for the transport of shooting blinds, emergent vegetation cut above the water line can be transported. Conservation officers contacted hunters during the waterfowl hunting season at the following accesses along the Mississippi River: Verchota (Winona County), North lake (Goodhue County), Dresbach (Houston County), Wilcox and Halfmoon (Wabasha County). Additional time was spent in Freeborn County at several lakes frequented by waterfowl hunters.

### **Fishing Tournaments**

Conservation Officers participated in public education and enforcement efforts at Lake Minnetonka public water accesses during several fishing tournaments. This year no serious violations were observed and cooperation with the tournament groups was excellent. During the actual tournament there was a high level of compliance among all tournament participants. No citations were issued to tournament anglers.

### **St. Croix River**

Divers continued to be employed for underwater inspection of both commercial and recreational vessels in the St. Croix River and again, in 1998, Conservation Officers ordered the removal and cleaning of six boats found with attached zebra mussels. The discovery of zebra mussels in 1997 on a sampler collected above Taylors Falls cast doubt on the future of these efforts. However, intensive monitoring did not confirm that zebra mussels have colonized the river and enforcement actions will continue in 1998. Conservation Officers also issued a civil citation to a boat owner on the St. Croix - which was the third time zebra mussels were found attached to that boat. In 1998 Conservation Officers also met with the WI DNR and NPS several times to ensure interagency cooperation on this issue.

## **Effectiveness**

The DNR believes that Enforcement plays a critical role in reducing the spread of harmful exotic species. In order for the regulations on harmful exotic species to be effective in reducing their spread, there must be a balanced mix of public education and awareness efforts, voluntary compliance from the general public, and enforcement of the regulations.

An ideal measure of the effectiveness of enforcement efforts would be a long-term decrease in the percentage of boats carrying vegetation. The number of hours of enforcement effort may have to increase to achieve this goal. The DNR's ability to reduce the transportation of aquatic vegetation on public roads will be evaluated after several more seasons under the current statutes.

**Future plans and needs regarding enforcement:**

- Road checks will continue to be conducted next summer. Our goal is to conduct 5-10 major road checks between June and August. Three annual road checks (Anoka, Hubbard, & Chisago Counties) will continue to be used to track boater compliance. Timing and locations of some of the other road checks may be altered.
- Focus additional enforcement activity near lakes with Eurasian watermilfoil infestations. Eurasian watermilfoil was found on some larger outstate lakes (Minnewaska and Mille Lacs) and some of the enforcement focus will be moved outstate.
- Exotics information will continue to be included in "Resort Packets" that Conservation Officers deliver to Minnesota resorts.
- Conduct inspections, public education, and enforcement efforts at public accesses (including fishing tournaments, sailing regattas, and other special events) throughout the summer. Also, include some assistance to inspectors at access checks.

## Management of Eurasian Watermilfoil

### 1998 Highlights

- Eurasian watermilfoil was discovered in nine additional Minnesota lakes and rivers during 1998, including Mille Lacs Lake in central Minnesota and Lake Minnewaska near Alexandria. There now are 96 Minnesota waterbodies known to contain Eurasian watermilfoil.
- The DNR Exotic Species and Aquatic Plant Management programs worked with cooperators on 34 Minnesota lakes during 1998 to manage Eurasian watermilfoil.
- The DNR Exotic Species Program continued to support and conduct research to improve management of Eurasian watermilfoil.

### Background

Eurasian watermilfoil (*Myriophyllum spicatum*) is an exotic plant that was inadvertently introduced to Minnesota. Milfoil was first discovered in Lake Minnetonka during the fall of 1987. The Exotic Species Program manages milfoil because it can limit recreational activities on water bodies and alter aquatic ecosystems by displacing native plants. This report describes the Exotic Species Program's efforts in 1998 to manage this exotic plant and limit its spread in Minnesota.

### Progress in management of Eurasian watermilfoil

#### Spread of Eurasian watermilfoil in Minnesota

Eurasian watermilfoil is now known to occur in 96 bodies of water in Minnesota. In the Twin Cities area, the presence of Eurasian watermilfoil in five new lakes was confirmed by the Exotic Species Program during 1998. These lakes are Bass (Hennepin County), George (Anoka County), Gleason (Hennepin County), Marion (Dakota County), and Powers (Washington County). Outside the Twin Cities area the presence of Eurasian watermilfoil was confirmed in four new bodies of water during 1998, Mille Lacs Lake (Mille Lacs and Aitkin Counties), Minnewaska Lake (Pope Co.), and Weigand Lake and the Clearwater River (both in Wright County). The section of the Clearwater River in which milfoil was discovered includes a small wetland, which has a separate Division of Waters number, and so has been added separately to the list of known milfoil infestations. The infested section of the Clearwater River and Weigand Lake are directly downstream of Clearwater Lake, which has been infested with milfoil since 1989. It is believed that milfoil flowed downstream from Clearwater Lake to infest these new waterbodies. Two waterbodies, Spoon Creek (Ramsey County), and Ellen Lake (Chisago County) have also been added to the list of infested waters in 1998, although milfoil was discovered in these water bodies prior to 1998. These waterbodies were originally left off of the list because they were considered part of other, already listed, infested waterbodies. They have been added because they have unique DNR, Division of Waters inventory numbers. (Table 10 and Figure 3).

**Table 10. Numbers of lakes or rivers and creeks in which Eurasian watermilfoil was discovered in Minnesota as of October 1998.**

| Year | Number of Lakes in which milfoil was discovered | Number of Creeks and Rivers in which milfoil was discovered | Cumulative number of water bodies with milfoil |
|------|---|---|--|
| 1987 | 1   | 0   | 1  |
| 1988 | 6   | 0   | 7  |
| 1989 | 14  | 1   | 22   |
| 1990 | 12 <sup>1</sup>                                 | 1   | 35 <sup>1</sup>                                |
| 1991 | 14  | 0   | 49   |
| 1992 | 10  | 2   | 61   |
| 1993 | 5   | 0   | 66   |
| 1994 | 2   | 0   | 68   |
| 1995 | 7   | 0   | 75   |
| 1996 | 5   | 0   | 80   |
| 1997 | 5   | 1 <sup>2</sup>  | 86 <sup>2</sup>                                |
| 1998 | 8   | 1   | 96 <sup>3</sup>                                |

<sup>1</sup> This total includes Ellen Lake which was added to the list in 1998, although milfoil was found in Ellen Lake in 1990.

<sup>2</sup> This total includes Spoon Creek which was added to the list in 1998, although milfoil was found in Spoon Creek in 1997.

<sup>3</sup> This total includes a small wetland which is part of the section of the Clearwater River in which milfoil was discovered in 1998 which has a separate Division of Waters number, and so has been added separately to the list of known milfoil infestations.

During 1998 milfoil was found growing in two large lakes outside of the Twin Cities area. Milfoil was discovered growing in Lake Mille Lacs in central Minnesota, and in Lake Minnewaska in Pope County (Figure 3). In June, the DNR discovered milfoil in Lake Minnewaska, a large heavily used lake south of Alexandria. The exotic aquatic plant was found in a marina in the town of Starbuck at the lake's west end. In September of 1998 the DNR discovered milfoil at one site near Malmo on the northeast shore Lake Mille Lacs. Subsequent efforts led to the discovery of milfoil in five additional sites along the northeast shore and in one site along the southwest shore of the lake. Since most of the lake supports few, if any, submerged aquatic plants, it's likely that the milfoil will take hold only in those parts of the lake where native aquatic plants are already growing. Currently, in both Mille Lacs Lake and Lake Minnewaska native plants are generally limited to protected bays, harbors, and certain drop-offs between shallow and deep water.



The total of eight lakes discovered to have milfoil in 1998 was greater than the number discovered annually since 1993, but still lower than the number found in any of the four years from 1989 to 1992 (Table 10). There may well be additional Minnesota lakes with milfoil that have not yet been discovered. The participation of the public in reporting new occurrences of milfoil remains critical. As in previous years, most reports received in 1998 of suspected occurrences of milfoil turned out to be another plant species. The Exotic Species Program continues to investigate likely reports as soon as possible because early detection and treatment of milfoil is the key to limiting the spread of milfoil to other bodies of water.

### **Effectiveness of efforts to limit the spread of Eurasian watermilfoil**

Efforts to limit the spread of milfoil in Minnesota appear to be succeeding. The total of eight lakes and one river discovered to have milfoil in 1998 continues the pattern observed since 1993 of discovery of a low number of new infestations annually. We attribute the apparent slow rate of spread to efforts to educate users of Minnesota's lakes and rivers about milfoil, along with other exotics, and actions that people can take to prevent the spread of exotics (see sections on Regulations, Public Awareness, Watercraft Inspections, and Enforcement). The higher number of infestations found this summer compared to the past five years may be attributable to the long growing season for watermilfoil. A long growing season for milfoil combined with a long boating season provided more opportunities to discover infestations of milfoil.

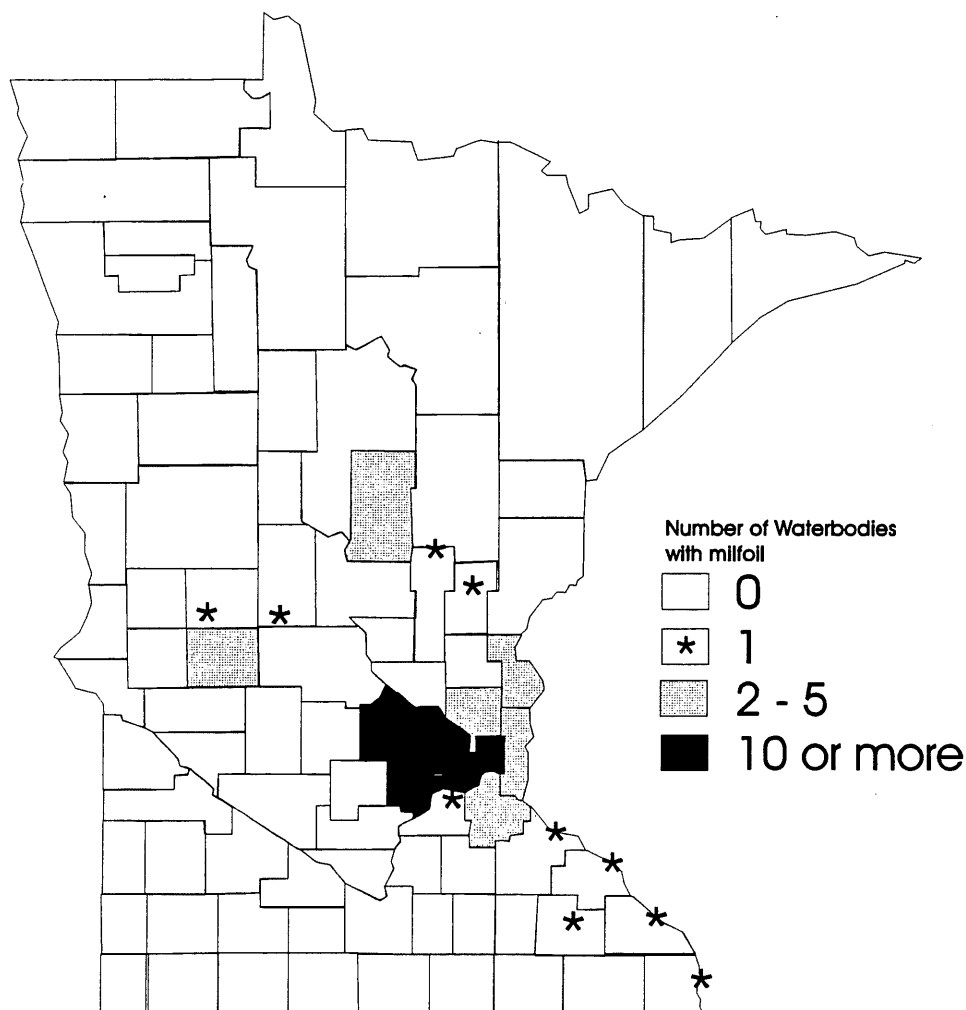
## **Management of Eurasian watermilfoil in Minnesota lakes**

### **Classification of water-bodies for management of Eurasian watermilfoil**

Management of Eurasian watermilfoil by the Exotic Species Program is begun by classification of water-bodies known to have the exotic. In the spring of 1998, the Exotic Species Program classified the 84 bodies of water known to have milfoil on the basis of surveys done in 1997. Sixty-five lakes were determined to be eligible for management with State funds (Table 11). Another 15 lakes were determined to be ineligible for management with State funds because they do not have public water accesses. Lastly, four bodies of water with milfoil are flowing waters (water courses) where management of this exotic is not usually attempted. The nine water bodies that were discovered during 1998 to have milfoil included three lakes classified for high-intensity management, one lake classified for maintenance management, one flowing water body (which included a small wetland), and four lakes determined to be ineligible for management with state funds. During the summer of 1998, two lakes in the high-intensity management class were reclassified as maintenance management lakes. In addition, two lakes that were classified as reference lakes for the fluridone herbicide study were reclassified as maintenance management lakes (Table 11).



**Figure 3. Distribution in Minnesota of water bodies infested with Eurasian watermilfoil in 1998.**



### High-intensity management of Eurasian watermilfoil

The goals of high-intensity management are to reduce the abundance of a milfoil within a lake and slow the spread of the exotic to other lakes. Based on our past experiences attempting to eradicate Eurasian watermilfoil, the Exotic Species Program believes that eradication of the exotic from Minnesota lakes is not a realistic goal.

During 1998 the Exotic Species Program conducted high-intensity management on 15 lakes with Eurasian watermilfoil (Table 11). High-intensity management began with surveys of lakes by staff of the Exotic Species Program. Following these surveys, applications of herbicide were made to seven of these lakes by commercial applicators under contract to the DNR. The eight lakes that were not treated by the DNR are: Sauk Lake in Todd County and Sugar Lake in Wright county which were not treated because no milfoil plants were found; Ann Lake in Carver County and Gilchrist Lake in Pope county which were not treated because milfoil was found to be widespread and sparse; Oscar Lake in Douglas County, which was not treated because milfoil was sparse by the access; and Whaletail and Round

**Table 11. Classification of bodies of water in Minnesota with Eurasian watermilfoil during 1998.**

| Classification                                    | Spring    | Changes to the list          | New in Summer         | Fall      |
|---|-----------|------------------------------|-----------------------|-----------|
| <b>Eligible for management with State funds</b>   |           |                              |                       |           |
| High-intensity management (HI)                    | 12        | - 2 to MAIN                  | 3                     | 13        |
| Maintenance management (MAIN)                     | 51        | + 2 REF, and<br>+ 2 HI       | 1                     | 56        |
| Fluridone herbicide study (REF)                   | 2         | - 2 to MAIN                  | 0                     | 0         |
| <b>Ineligible for management with State funds</b> | 11        | + 1 found in a previous year | 4                     | 16        |
| Public water but no public access                 |           |                              |                       |           |
| Not public water                                  | 4         | 0                            | 0                     | 4         |
| <b>Other</b>                                      | 4         | + 1 found in a previous year | 2 <sup>1</sup>        | 7         |
| Flowing water (water courses)                     |           |                              |                       |           |
| <b>Total</b>                                      | <b>84</b> | <b>2</b>                     | <b>10<sup>1</sup></b> | <b>96</b> |

<sup>1</sup>This total includes a small wetland which is part of the section of the Clearwater River in which milfoil was discovered in 1998 which has a separate Division of Waters number, and so has been added separately to the list of known milfoil infestations.

lakes in Hennepin County, which were not treated because they were found to have extensive milfoil and so reclassified as a "maintenance management" lakes. The eighth lake, Christmas Lake in Hennepin County, that was not treated by the DNR was treated by a local cooperator who may apply for reimbursement at a later date.

#### **Maintenance management of Eurasian watermilfoil**

The goals of maintenance management are to manage nuisances caused by milfoil, but not necessarily reduce the abundance of the plant lake-wide, and slow the spread of the exotic to other lakes. Maintenance management done with State funds usually involves control of milfoil in areas which are located either off-shore or near public water accesses. These areas are commonly used by the general public, as opposed to near shore areas adjacent to privately owned property, which are used primarily, if not exclusively, by owners of that property. Control of milfoil in near shore areas adjacent to privately owned property, if any is done, is usually undertaken by the owners of the property.

During 1998 State funding and technical assistance were available from the Exotic Species Program to 48 potential cooperators for management on 56 lakes with Eurasian watermilfoil in the maintenance management classification. The number of lakes exceeds the number of cooperators because we seek one cooperator for connected lakes. This offer of assistance is described in document that is mailed to potential cooperators (DNR 1998).

As of December 15, 1998, we have reimbursed 16 cooperators on 23 lakes for costs of management of milfoil. We expect to reimburse an additional eight cooperators on 11 lakes for costs of milfoil management (Table 12). These efforts ranged from a survey of milfoil at a cost of \$500 to a mechanical harvesting program on Lake Minnetonka for which the DNR made \$24,500 available. The amount of State funds available for eligible lakes varied according to the extent of the potential habitat for milfoil, the size of the littoral zone in each lake. The littoral zone is that portion of a lake where submersed plants can grow and is legally defined as the portion of the lake with water depths of up to 15 feet. In addition, the Exotic Species Program initiated treatment of milfoil in the immediate vicinity of public water accesses operated by the DNR on three lakes in the maintenance management class.

Before discussing the amount of State funds spent on maintenance management of milfoil during 1998, it is helpful to review levels of spending in previous years (Table 12). The maintenance management program began in 1994 and it took time for potential cooperators to become familiar with it. Before 1994, all lakes where the DNR managed milfoil were approached according to the High Intensity Management method.

The amount of funds spent during 1996 on maintenance management of milfoil was higher than that spent in either of the preceding two years for the following reason. In some cases, cooperators learned about the availability of funds late in the season when it often is preferable to defer management with herbicide or harvesting until the following spring. Before 1996, the Exotic Species Program allowed potential cooperators to defer spending of funds allocated for management during one year to a following year or years. This resulted in large accumulations of available funds for a number of lakes. In 1996 the Exotic Species Program informed potential cooperators that accumulated funds would not be carried beyond 1996. Consequently, during 1996 a number of cooperators spent accumulated funds, which were substantially greater than the allocation for a single year.

The amounts of State funds spent on maintenance management of milfoil in Minnesota lakes during both 1997 and 1998 were less than the amounts spent annually between 1994 and 1995 (Tables 12). During 1996 and 1997 the majority of cooperators chose to spend State funds on treatment of milfoil with herbicide (Table 13). It is important to note that the numbers of lakes treated with herbicide and the amount of area treated, as reflected in the cost of the work done, were much less in 1997 and 1998 than in 1996. The amount of management by mechanical harvesting of milfoil was essentially the same in the two years. Beginning in 1996, cooperators were offered the opportunity to spend State funds on development by contractors of plans for management of milfoil on individual lakes. Cooperators on ten lakes chose this approach in 1996, but none chose it in 1997 or 1998. In 1997 and 1998, cooperators on seven lakes chose to have contractors survey milfoil, though none chose this option in 1996.

**Table 12. Summary of the numbers of Minnesota lakes with Eurasian watermilfoil where management of this exotic species was done with State funds provided through the Minnesota Department of Natural Resources.**

| Year              | Maintenance Management |                     | High Intensity Management |                     |  | Total           |                     |
|-------------------|------------------------|---------------------|---------------------------|---------------------|--|-----------------|---------------------|
|                   | Number of lakes        | Funds from DNR (\$) | Number of lakes           | Funds from DNR (\$) | Additional funds from cooperators (\$) | Number of lakes | Funds from DNR (\$) |
| 1988              |                        |                     |                           |                     |  | 0               | 0                   |
| 1989              |                        |                     |                           |                     |  | 4               | 32,000              |
| 1990              |                        |                     |                           |                     |  | 20              | 49,000              |
| 1991              |                        |                     |                           |                     |  | 22              | 77,000              |
| 1992              |                        |                     | 23                        | 64,000              | 62,000                                 | 23              | 64,000              |
| 1993              |                        |                     | 23                        | 95,000              | 62,000                                 | 23              | 95,000              |
| 1994 <sup>1</sup> | 13                     | 76,000              | 14                        | 42,000              | 37,000                                 | 27              | 118,000             |
| 1995              | 24                     | 76,000              | 11                        | 33,000              | 15,000                                 | 35              | 109,000             |
| 1996              | 39                     | 120,000             | 9                         | 26,000              | 2,000                                  | 48              | 146,000             |
| 1997              | 31                     | 60,000 <sup>2</sup> | 9                         | 28,000              | 6,000                                  | 40              | 88,000              |
| 1998              | 34                     | 56,000 <sup>3</sup> | 7                         | 23,000              | 7,700                                  | 41              | 79,000              |

<sup>1</sup> The maintenance management program began in 1994.

<sup>2</sup> This amount includes \$2,000 spent on treatment of milfoil adjacent to Public Water Accesses operated by the DNR on four lakes in the Maintenance Management class. This money was spent in addition to funding offered to potential cooperators.

<sup>3</sup> This is an estimate of the amount of DNR funds that will be spent for 1998 because some of the projects eligible for reimbursement have not been completed as of December 15, 1998.

**Table 13. Numbers of lakes and amounts of state funds used for various management activities on lakes with Eurasian watermilfoil in the Maintenance Management class during 1996 - 1998.**

| Year | Number of lakes and funds spent on management | Application of herbicide   | Mechanical harvesting     | Survey of milfoil         | Development by contractors of plans for management |
|------|---|----------------------------|---------------------------|---------------------------|--|
| 1996 | 41 (46) <sup>1</sup> \$122,000                | 21 - \$60,000              | 8 - \$30,000              | 0 - \$0                   | 9 - \$32,000                                       |
| 1997 | 28 (50) <sup>1</sup> \$55,000                 | 14 - \$18,000              | 7 - \$25,000              | 7 - \$11,000              | 0 - \$0  |
| 1998 | 34 (59) <sup>1</sup> \$56,000 <sup>2</sup>    | 20 - \$19,000 <sup>2</sup> | 7 - \$25,000 <sup>2</sup> | 7 - \$12,000 <sup>2</sup> | 0 - \$0  |

<sup>1</sup> Total number lakes in the Maintenance Management class during each year.

<sup>2</sup> This is an estimate of the amount of DNR funds that will be spent for 1998 because some of the projects eligible for reimbursement have not been completed as of December 15, 1998.

### **Effectiveness of management of Eurasian watermilfoil in Minnesota lakes**

The main goals of the milfoil management carried out by the Exotic Species Program are to slow the spread of the exotic to other lakes and to manage nuisances caused by milfoil. Management of nuisances caused by milfoil done with State funds usually involves control of milfoil in areas which are used by the general public.

Efforts to limit the spread of milfoil in Minnesota appear to be helping. The total of eight lakes and one river discovered to have milfoil in 1998 continues the pattern observed since 1993 of discovery of a relatively low number of new infestations annually (Table 10). We attribute the apparent slow rate of spread to efforts to educate users of Minnesota's waters about milfoil and the users cooperation (see sections on Regulations, Public Awareness, Watercraft Inspections, and Enforcement), and to our efforts to manage existing milfoil populations.

The relatively low amount of State funds spent on maintenance management of Eurasian watermilfoil by use of herbicide in 1997 and 1998 as compared to 1996 suggests that the extent and severity of problems caused by milfoil in some Minnesota lakes were less in those years than in previous years, at least in the public use areas of lakes, which are the areas eligible for reimbursement on maintenance management lakes. This is likely due both to management activities and to overall weather conditions which effect milfoil growth.

It is likely that in the future we will experience years when the amount of spring runoff will be low and spring and summer weather will be hot and sunny, that is, drought conditions. Under such conditions, the growth of milfoil and the costs of management are likely to be greater than they were during recent years.

## **Participation in control efforts by other state agencies, local units of government, and interested groups**

The success achieved in management of Eurasian watermilfoil and the problems it causes in Minnesota is due in large part to cooperation between the Exotic Species Program and organizations outside the DNR such as lake associations, and various local units of government, hereafter called cooperators. The Exotic Species Program also received valuable assistance in management of Eurasian watermilfoil from staff of the DNR's Aquatic Plant Management Program in the sections of Fisheries and Ecological Services, particularly the Brainerd, Glenwood, and Metro offices.

The DNR also benefitted from participation by representatives of various outside organizations in an evaluation of the potential to use fluridone herbicide for selective control of Eurasian watermilfoil. These organizations included the Minnesota Sportfishing Congress, the Minnesota Lakes Association, the Minnesota Aquatic Management Society, and a number of local units of government.

## **Research on Eurasian watermilfoil in Minnesota**

The Exotic Species Program either supports or conducts a number of research projects designed to improve management of Eurasian watermilfoil. Each of these projects has produced one or more detailed reports. In this section, we will briefly summarize the most important or interesting results of recent efforts by researchers. The continued progress in research designed to improve management of milfoil depends on the efforts of organizations outside the DNR including the University of Minnesota, the Aquatic Plant Control Research Program (APCRP) of the Army Corps of Engineers, and the Suburban Hennepin Regional Park District. The efforts of these outside organizations are strongly supported by the Exotic Species Program.

### **Potential for biological control of Eurasian watermilfoil**

- Evidence of possible declines in milfoil in Minnesota study sites was collected and is being evaluated.

Evaluation of potential biological control agents for Eurasian watermilfoil by researchers at the University of Minnesota is primarily focused on a weevil (*Euhrychiopsis lecontei*), which is a native insect. This research was initiated in 1992; the State of Minnesota has invested over \$700,000 in these efforts over the past seven years. Declines in milfoil in some lakes have been associated with weevils. Unfortunately, other lakes with weevils have not experienced declines in Eurasian watermilfoil. Current and proposed future research is focused on attempts to determine what factors or conditions limit the abundance of weevils and prevents the insects from controlling milfoil.

In 1998 researchers at the University of Minnesota continued long-term sampling of plants and insects in 14 sites. They also completed a number of manipulative experiments, both in lakes and in the laboratory.

Minnesota researchers conducting the weevil studies are making good progress, including publication of results in peer-reviewed journals. During 1998 one paper was

published in a peer-reviewed journal (Valley and Newman 1998), two manuscripts were submitted to peer-reviewed journal (Mazzei et al. 1998; Newman and Biesboer 1998), and a review of biological control was published as a chapter in a book (Newman et al. 1998).

Experience has shown that development of biological controls may require research conducted over a period of ten years or more. Consequently, the Exotic Species Program's evaluation of the potential for biological control of Eurasian watermilfoil is considered to be a long-term effort, the outcome of which cannot be guaranteed.

The research described above was supported by funding provided through the MNDNR with appropriations made in 1992, 1993, 1995, and 1997 by the Minnesota Legislature as recommended by the Legislative Commission on Minnesota Resources (LCMR). The MNDNR submitted a proposal to the LCMR for continued funding for research on the potential for biological control of milfoil and loosestrife during the next biennium (FY 2000-2001).

The appropriation made in 1993 required a match of \$200,000. Most of the match was provided as 'in-kind' services by APCRP. The research by APCRP included a project designed to predict the possible spread of milfoil in Minnesota and the susceptibility of different classes of lakes to dominance by this exotic. The primary results of this study were published (Madsen 1998a). A complete presentation of the results of this study was submitted to the DNR as a 'letter' report from APCRP (Madsen 1998b).

#### **Evaluation of fluridone herbicide for control of Eurasian watermilfoil**

Most problems caused by milfoil or other aquatic plants in Minnesota are currently managed with methods such as use of herbicides, mechanical harvesting, or manual removal, which control plants in limited, specific parts of bays or lakes where nuisances occur. Operational treatment of whole bays or lakes with herbicide is not allowed in Minnesota because this destroys more vegetation than is necessary to give users access to lakes. Unnecessary destruction of vegetation in Minnesota waters is not permitted because plants provide many benefits to lake ecosystems.

Fluridone herbicide, which is formulated as Sonar®, is usually applied to whole bays or lakes to control submersed aquatic plants, including the exotic Eurasian watermilfoil. The DNR initiated this study to determine whether application of fluridone to whole bays or lakes can control Eurasian watermilfoil and have minimal effects on native vegetation. The results of this study (Welling et al 1997) and other available information indicate that application of fluridone to whole lakes or bays causes high levels of unavoidable damage to native vegetation and has the potential to affect other aspects of lake ecosystems. Consequently, the DNR is not likely to permit application of this herbicide to whole lakes or bays except in a very few, unique cases. Because every lake is unique, the DNR plans to make decisions about variances that are requested for whole-lake treatment with fluridone on a case by case basis. None of the public waters in Minnesota that were known to have milfoil at the end of 1998 is considered to be a reasonable candidate for whole-lake treatment with fluridone.



**Evaluation of triclopyr herbicide for control of Eurasian watermilfoil**

Researchers from the US Army Corps of Engineers Waterways Experiment Station (ACOE) evaluated the effectiveness of triclopyr (Renovate) herbicide for selectively controlling milfoil. This research was conducted in cooperation with the DNR Exotic Species Program, the Lake Minnetonka Conservation District, the Lake Minnetonka Association, and the Aquatic Ecosystem Restoration Foundation. With the help of Exotic Species Program staff four experimental plots were set up in Lake Minnewashta (Carver, County) ; and eight plots were set up in Lake Minnetonka. Treatment rates of 0.0 ppm, 0.5 ppm., 1.0 ppm, and 1.5 ppm were tested. Initial visits to several of the treated sites showed good control compared to untreated reference sites. A full report on this evaluation should be available from the ACOE early in 1999.

**Management of Eurasian watermilfoil in other states****Wisconsin**

Eurasian watermilfoil has been known to occur in Wisconsin since the 1950's and has spread to over half of the counties in the state (Bode et al 1992). The Wisconsin DNR does not have a specific program to control milfoil but is involved in the management, research, and public education efforts for this exotic.

**Iowa**

During 1996 the Iowa legislature passed a law prohibiting the transport of Eurasian watermilfoil and has initiated a program to limit further spread of the exotic in that state. This program includes public awareness, water access monitoring, and monitoring aquatic vegetation to determine the distribution and abundance of milfoil (IaDNR 1997a, IaDNR 1997b).

**Washington**

Eurasian watermilfoil is known to occur in 86 of the 7,000 lakes in Washington. The Washington Department of Ecology has an annual budget of \$600,000 for management of Eurasian watermilfoil. These funds support two positions and \$400,000 worth of cost-share. Cost-share work consists of high concentration treatments of whole lakes with fluridone to eliminate milfoil. Treatments are followed by extensive SCUBA diving efforts to locate and remove milfoil plants that survive treatment. Follow-up control included use of bottom barriers and dredging if needed. Costs were estimated at \$100,000 or more for each of the seven 100-300 acre lakes where such management has been done.

**Future plans and needs of the Eurasian watermilfoil program:**

Priorities for the Eurasian Watermilfoil Program include:

- Keep the public informed about Eurasian watermilfoil and the problems that it can cause;
- Contain the plant's spread by targeting access inspection and enforcement efforts in areas of the state where infestations currently occur;
- Monitor the distribution of milfoil in the state with emphasis on verification of reports of new occurrences of milfoil;
- Attempt to control milfoil in Minnesota lakes, especially new populations in areas of the state without other milfoil infestations; and
- Support research on the potential for biological control of milfoil, including support of the proposal submitted to the LCMR for continued funding, as well as research on the biology of this species.

**References Cited**

- Bode, J., S. Borman, S. Engel, D. Helsel, R. Korth, F. Koshere, S. Nichols. Eurasian Water milfoil in Wisconsin: a report to the legislature. 5<sup>th</sup> draft, Dec. 1992. Wisconsin Department of Natural Resources.
- Iowa Department of Natural Resources (IaDNR). 1997a. Iowa Eurasian Watermilfoil Program: Annual Report 1997. Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, IA 50319-0034. [32 pp.]
- Iowa Department of Natural Resources (IaDNR). 1997b. Comprehensive Plan for the Management of Eurasian Watermilfoil in Iowa. Iowa Department of Natural Resources, Wallace State Office Building, Des Moines, IA 50319-0034. [53 pp.]
- Madsen, J.D. 1998a. Predicting invasion success of Eurasian watermilfoil. *Journal of Aquatic Plant Management* 36:28-32.
- Madsen, J.D. 1998b. Predicting the invasion of Eurasian watermilfoil into northern lakes. Unpublished 'letter' report submitted on 29 October to the Minnesota Department of Natural Resources, Section of Ecological Services, 500 Lafayette Rd., St. Paul, MN 55155 by the U.S. Army Engineer Waterways Experiment Station, CEWES-ER-A, Aquatic Plant Control Research Program, 3909 Halls Ferry Rd., Vicksburg, MS 39180.
- Mazzei, K.C., R.M. Newman, Alyson Loos, and D.W. Ragsdale. 1998. Developmental rates on and damage to Eurasian watermilfoil by the milfoil weevil, *Euhrychiopsis lecontei*, at constant temperature. Manuscript submitted to *Biological Control* [received 9 June]

- Minnesota Department of Natural Resources (MnDNR). 1998. Announcement of availability of funds from the Minnesota Department of Natural Resources for management of Eurasian watermilfoil in 1998. Unpublished document by the MnDNR, Section of Ecological Services, Box 25, 500 Lafayette Rd., St. Paul, MN 55155-4025.
- Newman, R.M., and D.B. Biesboer. 1998. A decline of Eurasian watermilfoil in Minnesota associated with the milfoil weevil, *Euhrychiopsis lecontei*. Manuscript to be submitted to the Journal of Aquatic Plant Management as part of a session entitled "Native Insects and Eurasian watermilfoil - Interactions" to be held at the annual meeting of the Aquatic Plant Management Society in Memphis Tennessee on 14 July 1998.
- Newman, R.M., D.C. Thompson, and D.B. Richman. 1998. Conservation strategies for the biological control of weeds. Pages 371-396 IN: Barbosa, P., Editor. Conservation Biological Control. Academic Press, NY, NY.
- Valley, R.D., and R.M. Newman. 1998. Competitive interactions between Eurasian watermilfoil and northern watermilfoil in experimental tanks. Manuscript submitted to the Journal of Aquatic Plant Management 36: \_\_-\_\_. [page proofs received on 14 December 1998].
- Welling, C., W. Crowell, and D. Perleberg. 1997. Evaluation of fluridone herbicide for selective control of Eurasian watermilfoil: Final Report. Unpublished report dated 15 April by the Minnesota Department of Natural Resources, Ecological Services Section, 500 Lafayette Road, Box 25, St. Paul MN 55155-4025.

## Management of Purple Loosestrife

### 1998 Highlights

- Biological control insects significantly damaged several loosestrife infestations statewide reducing most plants from 6-8 ft. in height to 1-3 ft. in height. A 30-acre infestation at Circle Lake in Rice County was dramatically reduced from 1996 to 1998.
- Approximately 1.2 million purple loosestrife leaf-eating beetles were released at more than 180 sites statewide.
- Over 80 percent of insect releases made for biological control of purple loosestrife between 1992 and 1997 have become established.
- 117 high priority purple loosestrife infestations were treated with herbicide.
- No purple loosestrife was found at 10 sites where purple loosestrife plants were treated with herbicide in 1997. This control success is limited to small infestations that are treated soon after loosestrife invades an area.
- 12 sites that were treated with herbicide in 1997 had a 75% reduction in the quantity of herbicide needed to control those infestations in 1998. This is directly due to reductions in infestation size from previous treatments.

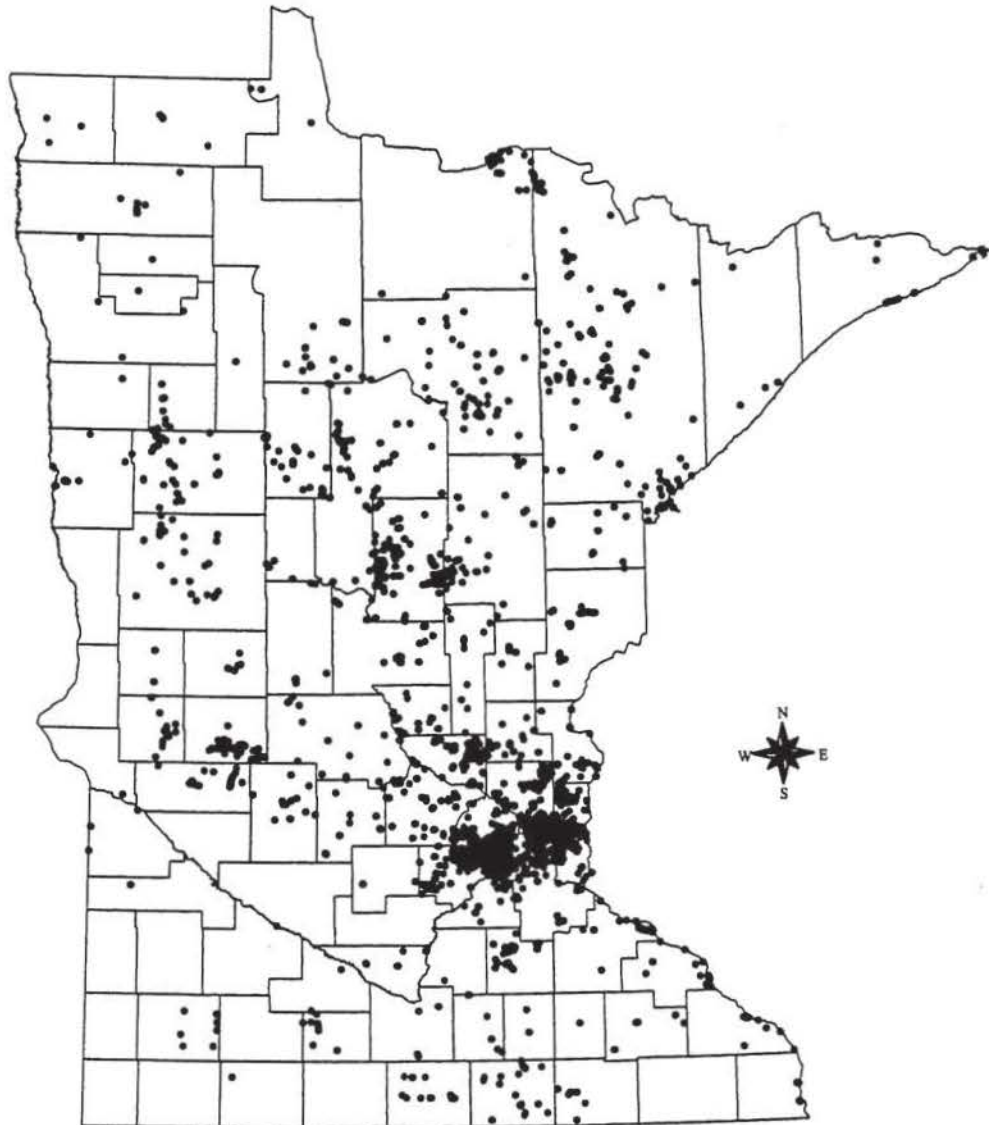
### Background

Purple loosestrife (*Lythrum salicaria*, *L. virgatum* and their hybrids) is a wetland plant from Europe and Asia that invades marshes and lakeshores, replacing cattails and other wetland plants. The DNR and other agencies manage purple loosestrife because it harms ecosystems and reduces biodiversity. The Purple Loosestrife Program was established in the DNR in 1987. State statutes direct the DNR to coordinate a control program to curb the growth of purple loosestrife (see M.S. 84D.02, Subd. 2 in Appendix A) and a significant amount of progress has been made toward the development of a sound approach to manage this harmful exotic. This management program integrates chemical and biological control approaches and cooperates closely with local, state and federal groups involved in purple loosestrife management.

### Statewide inventory of purple loosestrife

In 1987, the DNR began to inventory sites in Minnesota where purple loosestrife was established. DNR Area Wildlife Managers, county agricultural inspectors, local weed inspectors, personnel of the Minnesota Department of Transportation, and the general public report purple loosestrife sites to the DNR. The DNR maintains a computerized list or database of sites that includes the observer's name, location, type of site and number of loosestrife plants present (see Figure 4).

In 1998, 39 new purple loosestrife infestations were identified in Minnesota. There are now 1,880 purple loosestrife infestations recorded statewide (Table 14). Of those sites the majority (70%) are lakes, rivers, or wetlands. Inventory totals indicate that MN presently has over 50,000 acres infested with purple loosestrife.



**Figure 4. Purple loosestrife infestations in Minnesota as of December, 1998.**

**Table 14. Purple Loosestrife infestations recorded by the Minnesota Department of Natural Resources in 1997 and 1998.**

| Site Type             | Total sites -1997 | New sites - 1998 | Total sites 1998 |
|-----------------------|-------------------|------------------|------------------|
| Lake                  | 559               | 7                | 566              |
| River                 | 152               | 5                | 157              |
| Wetland               | 583               | 18               | 601              |
| Roadsides and Ditches | 399               | 8                | 407              |
| Other <sup>1</sup>    | 148               | 1                | 149              |
| <b>Total</b>          | <b>1841</b>       | <b>39</b>        | <b>1880</b>      |

<sup>1</sup> Includes gardens and other misc. sites.

## **Progress in Management of Purple Loosestrife - 1998**

### **Chemical control of purple loosestrife**

Attempts by the DNR to control purple loosestrife have relied mainly on the use of herbicides. The most effective herbicide is Rodeo, or glyphosate, which is a broad spectrum herbicide that is also toxic to desirable, native plants. To allow maximum survival of native plants, Rodeo is most frequently applied by backpack sprayer as a 'spot-treatment' to individual loosestrife plants. A second herbicide, 2,4-D, or 2,4-dichlorophenoxyacetic acid, is less frequently used. Although the use of 2,4-D has some advantages, it is more selective than Rodeo because it affects primarily broad-leaved or dicotyledonous plants, it is less effective than Rodeo. A third herbicide, Renovate, or triclopyr, has been applied to purple loosestrife on a trial basis to test its effectiveness and selectivity. If Renovate is registered for aquatic use in the U.S., it will be the herbicide of choice for loosestrife control. Renovate has proven to be very effective and is more selective than Rodeo (i.e., it is less harmful to non-target plants). Renovate is also less expensive than Rodeo. Renovate was applied to wetland sites under an Experimental Use Permit obtained from the Environmental Protection Agency by SEPRO, the manufacture of renovate.

Beginning in 1991, a prioritization plan was developed for selecting control sites in public waters and wetlands. This was done because there are insufficient resources to apply herbicides to all 1,880 known purple loosestrife sites in Minnesota. In addition, DNR personnel observed that herbicides do not result in long lasting reductions of loosestrife when applied to large populations that have been established for a number of years. This is due to the plant's ability to reestablish through recruitment of seedlings from the seed bank. Research done by the University of Minnesota, under contract to the DNR, demonstrated that long-established stands of loosestrife develop very large and persistent seed banks. Consequently, small and recently established populations of

loosestrife, which are likely to have small seed banks, are given the highest priority for treatment. In addition, because seeds of this species are dispersed by water movements, the DNR tries to keep loosestrife from infesting downstream lakes. Sites located in the upper reaches of watersheds with little loosestrife are treated before those located in watersheds with large amounts of loosestrife. Implementation of the prioritization scheme in 1991 resulted in fewer large sites ( $\geq 1000$  plants) being treated (Table 15).

Between 1990 and 1998, herbicides were applied to an average of 156 sites per year (Table 15). This summary includes applications made by DNR personnel, commercial applicators working under contract to DNR, and various cooperators; it is not a complete listing of all herbicide applications made in Minnesota. During the summer of 1998, the DNR or contractors visited 146 purple loosestrife stands for herbicide control work. At 27 sites workers found no loosestrife plants to treat. One site had loosestrife plants which were hand pulled. At one site workers could not get to the loosestrife plants (Tables 15 and 16). A total of 117 sites were treated with herbicides. Most of the sites were very small, 56% had less than 100 plants (Table 15). In total these site visits used 9.6 gallons of Rodeo, 1.4 gallons of Renovate, took 1,193 worker hours, and cost \$40,510 (Table 16).

**Table 15. Number of purple loosestrife infestations treated in 1998 by the Purple Loosestrife Program classified by infestation size.**

| Year | <20 plants | 20 - 99 plants | 100 - 1,000 plants | >1,000 plants | Total number of sites treated | Number of sites visited where no herbicide was used because no plants were found |
|------|------------|----------------|--------------------|---------------|-------------------------------|--|
| 1990 | 29         | 45             | 48                 | 72            | 194                           | 0  |
| 1991 | 64         | 45             | 50                 | 8             | 167                           | 33   |
| 1992 | 67         | 43             | 56                 | 21            | 187                           | 40   |
| 1993 | 49         | 47             | 52                 | 27            | 175                           | 19   |
| 1994 | 41         | 40             | 49                 | 32            | 162                           | 26   |
| 1995 | 55         | 47             | 38                 | 25            | 165                           | 38   |
| 1996 | 38         | 36             | 36                 | 20            | 130                           | 23   |
| 1997 | 30         | 25             | 36                 | 19            | 110                           | 22   |
| 1998 | 35         | 31             | 36                 | 15            | 117                           | 27   |



**Table 16. Summary of herbicide applications to purple loosestrife infestations in 1998 by the Purple Loosestrife Program, Minnesota Department of Natural Resources.**

| DNR Region          | Total number of sites visited | Number of sites treated with Rodeo | Number of sites treated with Renovate | Number of sites requiring no treatment | Hours of Labor | Total Cost    |
|---------------------|-------------------------------|------------------------------------|---------------------------------------|--|----------------|---------------|
| I - Northwest       | 27                            | 12                                 | 6                                     | 9                                      | 165            | \$7,750       |
| II- Northeast       | 65                            | 46                                 | 7                                     | 12                                     | 495            | \$11,260      |
| III - North Central | 29                            | 24                                 | 1                                     | 4                                      | 341            | \$11,972      |
| IV - Southwest      | 16                            | 14                                 | 0                                     | 2                                      | 146            | \$8,000       |
| V- Southeast        | 9                             | 1                                  | 6                                     | 2                                      | 46             | \$1,528       |
| VI- Metro           | 0                             | 0                                  | 0                                     | 0                                      | 0              | \$0           |
| <b>Total</b>        | <b>146</b>                    | <b>97</b>                          | <b>20</b>                             | <b>29</b>                              | <b>1193</b>    | <b>40,510</b> |

### Biological control of purple loosestrife

Insects for biological control of purple loosestrife were first released at one research site by DNR staff in 1992. This initial release occurred after years of testing to make sure the insects were purple loosestrife specific and would not damage other native plants or agricultural crops. Once the insects were approved for release by the United States Department of Agriculture, insects were provided by Cornell University for release in Minnesota. This research was expanded in 1993, 1995 and 1997 through funding appropriated by the Legislature as recommended by the Legislative Commission on Minnesota Resources. Four species of insects, two leaf-eating beetles, *Galerucella californiensis* and *G. pusilla*; a root-boring weevil, *Hylobius transversovittatus*; and a flower-feeding weevil, *Nanophyes marmoratus*, are now being released as potential biological controls for loosestrife in Minnesota.

Biocontrol insects released between 1992 and 1997 have established at more than 80 percent of the sites. Insect populations increased significantly at a several locations and damage to loosestrife plants is pronounced in several areas. Several loosestrife infestations, including one site in the City of Winona, Circle Lake in Rice County, and one site near Mille Lacs Lake in Mille Lacs County, were substantially impacted by the leaf eating beetles during the summer of 1998. These three infestations saw complete defoliation of plants in certain areas, a reduction in plant height from 6-8 ft. in height to 1-3 ft. in height, 80-95% reduction in flowering (100% reduction within 200 meters of initial release point). The loosestrife infestation at Circle Lake, which is 30 acres in size, was the impacted the heaviest. This infestation is over a mile long and the entire area was impacted by the insects with over 90% reduction in flowering plants. A three-acre area adjacent to the original release point was completely defoliated in late August.

During 1998, rearing efforts were increased through recruiting more partners to rear insects statewide. Insect rearing "starter kits" were provided to rearing partners including County Agricultural Inspectors, Minnesota Department of Agriculture staff, Minnesota Department of Transportation staff, DNR Area Wildlife Managers, Nature Centers, 4-H and Garden clubs.

A starter kit composed of pots, potting soil, insect cages, leaf eating beetles, and other materials necessary to rear 20,000 to 40,000 leaf-eating beetles (*Galerucella* spp.). The insects were then released on high priority areas. Rearing partners statewide reared and release more than one million leaf-eating beetles. All insect rearing was completed outdoors for ease of production and to produce hardier insects. Leaf-eating beetles were also provided to the U.S. Fish and Wildlife Service (USFWS) at Sherburne National Wildlife Refuge for large-scale outdoor rearing. Approximately 1.2 million leaf-eating beetles were produced and released on more than 180 sites statewide. As of December 1998, insects have been released at more than 330 sites statewide (see Figure 5).

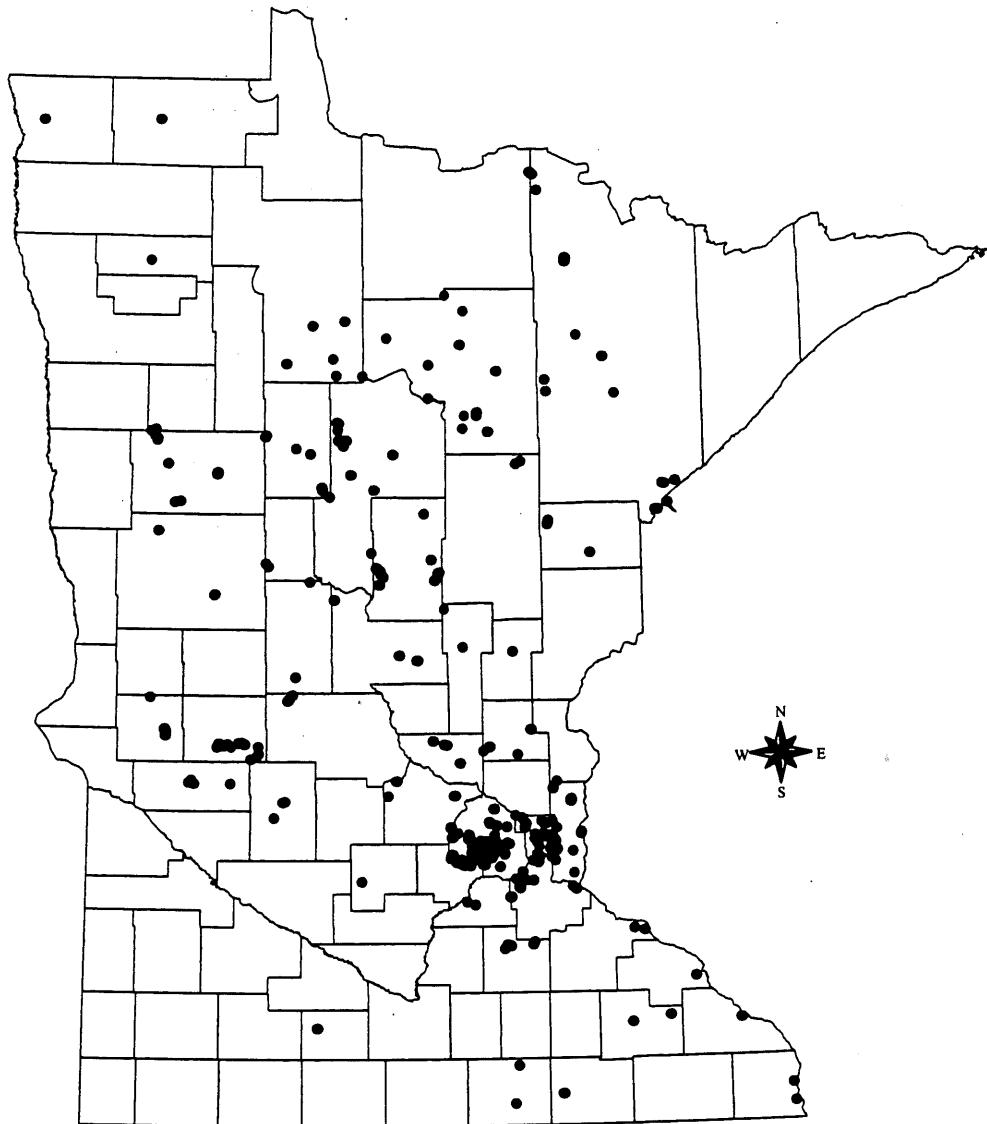
Because there are only a small number of root-boring weevils brought to Minnesota, the adult weevils were kept in the lab to maximize egg production. Nearly one thousand eggs were produced from these adults in 1994 and were relocated to seven different field sites around the metro area. Adult root-boring weevils were found in 1995 at all seven release sites. Although their populations are still small, the root-boring weevils survived the winter and are reproducing. In 1995, more root-boring weevils eggs were received from Cornell University for release into loosestrife infested Minnesota wetlands.

Distribution of the root-boring weevil continued in 1997. Cornell University provided 3,850 root-boring weevil eggs during the summer. These eggs were inoculated into loosestrife plants in the field at one location. Because of the weevils slow growth, it will take many years to build up populations in Minnesota wetlands. Cornell University is developing new rearing methods for the weevils which may significantly speed up the production efforts. The new techniques will be implemented in Minnesota as soon as they are available.

## Research

### Insects as biological control agents

Funding from the Minnesota legislature, as recommended by the LCMR, was used to continue efforts to monitor impacts to loosestrife populations by the all insects used as purple loosestrife biological control agents. In particular, the leaf-eating beetles, *Galerucella* spp., were monitored at several locations to assess their impacts on loosestrife seed production, seed germination and carbohydrate stores in roots. The study has shown that *Galerucella* feeding on shoot tips resulted in dramatically fewer seed capsules and shorter inflorescences compared with control plants. Germination



**Figure 5. Leaf-eating beetle, *Galerucella* spp. releases in Minnesota as of December, 1998.**

percentages and seed numbers per capsule were not significantly different from control plants if the flowers were not impacted by the feeding of the leaf beetles. The study also showed that *Galerucella* feeding, with complete defoliation, will not kill the plant. It will require more than two years of successive *Galerucella* feeding to kill purple loosestrife plants, even when high amounts of defoliation occur. However, *Galerucella* feeding of shoot tips does result in shorter loosestrife plants and reduces seed production. This will reduce the competitiveness of purple loosestrife in wetlands and should help to increase abundance of native plant species.

Research was also sponsored at Cornell University to develop an artificial diet to rear the root-boring weevil, *Hylobius transversovittatus*. In nature, it takes one to two years for the root-boring weevil to go from egg to adult. The artificial diet fed to larvae and reared in temperature controlled growth chambers will speed up this time to three or four months. Once this diet becomes available, the root-boring weevil will be reared at the University of Minnesota, under contract to the Department of Natural Resources. This work is projected to begin in January, 1999.

### **Fungal Pathogens as biological control agents**

In 1991 and 1992, the DNR funded research to isolate fungal pathogens that can cause damage to purple loosestrife plants. This research is continuing with funding appropriated by the Legislature as recommended by the LCMR. Several pathogens have been isolated that show promise as fungal herbicides. However, field testing of the fungal pathogens in 1995 was unsuccessful at controlling purple loosestrife. A new pathogen was isolated and tested in 1996 with some success. The new pathogen was tested at one field site in 1997. The results showed that this new pathogen has the potential to kill loosestrife plants and will be tested more in 1999.

### **Management of purple loosestrife in other states**

In 1997, the DNR received two federal grants to rear and distribute insects for purple loosestrife control nationwide. A total of \$312,000 was received from two USFWS programs (Federal Aid program-\$212,000; North American Wetlands Conservation Act-\$100,000). The Minnesota DNR contracted with Cornell University to rear and distribute the insects to states and federal agencies involved with loosestrife control. To date, over 500,000 leaf-eating beetles and 30,000 root-boring weevil eggs were reared and distributed to 30 states and 4 Federal agencies (States include: AL, CA, CT, DE, IA, ID, IL, IN, MD, MA, MI, MN, MT, NE, NH, NJ, NY, OH, OR, PA, RI, SD, TN, UT, VT, WA, WI). Among the recipients were: Universities; State Departments of Natural Resources, Environmental Conservation, Fish and Game or Agriculture; National Wildlife Refuges; Bureau of Reclamation; USDA-APHIS; and the Tennessee Valley Authority.

Many states continue to increase their control efforts by rearing and releasing insects in their prospective states. Many states are now starting to see impacts by the leaf-eating beetles on loosestrife infestations nationwide.

### **Effectiveness**

Effectiveness of control efforts will be based on short-term and long-term objectives. Control or eradication of small infestations statewide with herbicides is the primary short-term objective. Each year, a small number of purple loosestrife infestations (ten in 1998) are eradicated with herbicides. This is critical because these infestations are in watersheds that have very few infestations of loosestrife. This effort helps prevent the spread of purple loosestrife into uninfested wetlands and lakeshores.

A long-term objective is to utilize biological controls to reduce loosestrife infestations within wetlands statewide. Biological controls, if effective, will reduce the impact loosestrife has on wetland flora and fauna communities. DNR's goal is to reduce

loosestrife populations in Minnesota by at least 70% within 15-20 years. Purple loosestrife likely will not be eradicated from most wetlands where it presently occurs, but its abundance will be significantly reduced so that it is only one of many plant species in the community, and not a dominant one.

### **Participation of others in purple loosestrife control efforts**

In 1998, the DNR worked with a variety of local governments and other organizations to control purple loosestrife in Minnesota (Table 17). Control information and technical assistance was provided to landowners and local units of government.

The DNR initiated a insect rearing program providing county agricultural inspectors and MDA field staff with a starter for rearing their own leaf-eating beetles (described above in the biological control section). There were 42 rearing partners, in the 31 counties who reared an estimated 1 million leaf beetles for release in the participating counties (Table 17).

### **Future needs for managing purple loosestrife**

- Continue research on biological controls of purple loosestrife. This includes the development of insect rearing and release strategies. Implementation strategies will be needed for actual distribution in the field and subsequent monitoring of the insects.
- Continue funding herbicide control efforts on small infestations of loosestrife.
- Increased coordination to control loosestrife on other state agency managed areas.
- Continue to develop new in-state partners (e.g., County Ag. Inspectors, DOT, DNR Area Wildlife Managers, Nature Centers) to expand scale of rearing efforts.

**Table 17. List of cooperators participating in purple loosestrife control efforts and the type of participation.**

| <b>Government/Organization</b>  | <b>Type of Cooperation</b>   |
|---|--|
| University of Minnesota   | Partner with DNR in statewide biological control efforts, including rearing, releasing and monitoring of insects.                                    |
| Leech Lake Indian Reservation, Dept. Of Resource Management   | Partner with DNR in biological control efforts, including rearing, releasing and monitoring of insects on or near the Reservation                    |
| Mille Lacs Band Ojibwe, Natural Resource Department   | Partner with DNR in biological control efforts, including rearing, releasing and monitoring of insects on the Reservation                            |
| USFWS, Sherburne NWR  | DNR provided biocontrol insects, large cages and expertise for rearing and distribution  |
| Ramsey County   | Cooperative agreement to allow Ramsey Co. to utilize state contract to hire commercial applicators. Start new effort for biocontrol.                 |
| City of Sunfish Lake  | DNR provided equipment and herbicide for loosestrife control   |
| Birch Lake Association, Ramsey Co.  | DNR provided equipment and herbicide for loosestrife control   |
| Cornell University, Ithaca NY   | Working under contract to the MN DNR to develop an artificial diet for rearing the root-boring weevil.   |
| MN Department of Agriculture  | Partner with DNR in statewide biological control efforts including releasing and monitoring insects.   |
| Becker, Beltrami, Carlton, Carver, Cass, Crow Wing, Dakota, Freeborn, Hennepin, Hubbard, Itasca, Kandiyohi, Koochiching, Mcleod, Mille Lacs, Mower, Ottertail, Pope, Ramsey, Rice, Scott, Sherburne, St. Louis, Stearns, Stevens, Swift, Todd, Wadena, Washington, Watonwan, Winona | Counties where insects were reared and released by County Agricultural Inspectors, MDA field staff, MDOT Field Staff and DNR Area Wildlife Managers. |



## Management of Flowering Rush

### 1998 Highlights

- DNR Fisheries located a new site of flowering rush in Forest Lake, Washington County.
- Researchers from Queen's University, Ontario, conducted a population assessment of North American flowering rush populations, including sites in Minnesota.
- MDNR Exotic Species Program coordinated and assisted with the control of flowering rush at a public swim beach in Twin Lakes, Itasca County.
- MDNR Exotic Species Program continued control activities in Becker County through a cooperative project with Becker County Sentence to Service (STS) program and the Pelican River Watershed District.

### Background

Flowering rush (*Butomus umbellatus* L.) is a perennial aquatic plant, native to Europe and Asia. Along lake and river shores, it grows as an emergent plant with three-angled fleshy leaves and may produce an umbel-shaped cluster of pink flowers. Flowering rush may also grow as a non-flowering submersed plant with limp, ribbon like leaves.

Flowering rush spreads vegetatively from thick rhizomes, from small tubers that break off the rhizome, and from small bulblets that form in the inflorescence. Water currents, ice movement (Haber 1997) and muskrats (Gaiser 1949) can easily move these reproductive structures to new locations within a waterbody. Sexual reproduction by seed is probably not common and therefore this exotic may be limited in its long-distance dispersal ability (see Research discussion below).

Flowering rush was likely brought to North America in the late 1800's in ship ballast and has also been repeatedly introduced as an ornamental plant. Although flowering rush occurs in Canada and every U.S. state bordering Canada from Vermont to Idaho (Haber 1997), its distribution is disjunct. Resource managers and researchers have expressed concern that flowering rush may grow more aggressively in North America than in its native Europe and may become an aggressive competitor with native wetland vegetation (Anderson 1974, Staniforth and Frego 1980).

### Flowering rush in Minnesota

Flowering rush was first recorded in Anoka County, Minnesota in 1968 (Moyle 1968) and has since been located in five other counties (Table 18). Despite its 30 year presence in the state, the distribution of flowering rush remains disjunct. New introductions are likely the result of intentional plantings from horticultural sales.

The abundance of flowering rush varies greatly within and between waterbodies. Dense stands occur in areas of Detroit Lakes and Twin Lakes that lack native vegetation, but flowering rush is sparse within stands of native bulrush. The MDNR has looked for and not found the three populations of flowering rush in Anoka County, although the populations were originally reported by reputable sources. These populations are likely still present but may have declined due to water level changes of the water bodies. Haber (1997) also describes three sites in Canada where flowering rush was introduced, survived for several years and then died.

**Table 18. Recorded locations of flowering rush in Minnesota.**

| County     | Water body    | DOW #   | Year identified | Source                                  |
|------------|---------------|---------|-----------------|---|
| Anoka      | Amelia Lake   | 02-0014 | 1968            | MDNR survey                             |
|            | Bass Lake     | 02-0135 | 1968            | MDNR survey                             |
|            | Reshanau Lake | 02-0009 | 1970            | MDNR survey                             |
| Becker     | Detroit Lakes | 03-0381 | 1976            | Univ MN herbarium collection            |
|            | Pelican River | -----   | 1987            | Pelican River Watershed District (PRWD) |
|            | Muskrat Lake  | 03-0360 | 1987            | PRWD                                    |
|            | Sallie Lake   | 03-0359 | 1989            | PRWD                                    |
|            | Melissa Lake  | 03-0475 | 1993            | PRWD                                    |
| Itasca     | Twin Lakes    | 31-0191 | 1995            | MDNR survey                             |
| Rice       | Cannon Lake   | 66-0008 | 1972            | Univ MN herbarium collection            |
|            | Cannon River  | -----   | 1977            | Univ MN herbarium collection            |
| Todd       | Sauk River    | -----   | 1997            | MDNR survey                             |
| Washington | Forest Lake   | 82-0159 | 1998            | MDNR survey                             |

### Management of Flowering Rush

Flowering rush is a prohibited exotic plant in Minnesota because horticultural sales are the most likely means of introduction into a new area. It is unlawful to possess, purchase, or sell this exotic in Minnesota.

Flowering rush often grows in stands with native vegetation, making it difficult to control this exotic without harming the native plants. Mechanical control by cutting appears the most effective method of reducing dense stands of flowering rush. Cutting is most effective if repeated several times during the growing season. Disadvantages of cutting include that it is not selective, is labor intensive, and does not eliminate the exotic. Digging flowering rush may increase its spread if the entire rhizome is not removed.

Herbicide applications, particularly in water, have been ineffective because herbicide is quickly washed away from the plant.

The DNR's goals for flowering rush management include: 1) Stop the sale of flowering rush in Minnesota 2) Monitor sites to assess population changes and 3) Support research to develop and implement better management methods.

### **Research on flowering rush**

The DNR conducted a preliminary investigation to determine possible sources for the sale of flowering rush. Ten of thirty U.S. and foreign businesses surveyed sold flowering rush (Perleberg 1998).

Researchers from Queen's University in Ontario conducted field surveys of flowering rush populations in Canada and central US, including all existing Minnesota populations. Preliminary results indicate that most Minnesota populations are sexually sterile (Eckert pers comm. 1998). Sterile populations of flowering rush do not spread over a long distance because their vegetative propagules (such as rhizomes) are susceptible to desiccation. The researchers found one fertile population of flowering rush in Forest Lake, Washington County. They predict that seeds from plants at Forest Lake may be capable of long distance dispersal and may increase the rate of spread of this exotic in Minnesota.

### **Management in other countries and states**

Few states recognize flowering rush as a harmful species. An exception is Vermont, which recently listed flowering rush as "Category One" exotic species, defined as having a demonstrated ability to be highly invasive on a localized or widespread scale and currently having an economic and/or ecological impact in that state (Vermont Agency of Natural Resources 1998). In Connecticut, flowering rush is on a "watch list" because its aggressive invasiveness into natural habitats may be questionable (Merhoff 1997). In some states flowering rush is promoted as a desirable plant for landscaping wet sites and for wetland restoration (Ranney et al 1994, Feedback no date).

Wisconsin Department of Natural Resources recommends that lake residents control small areas of flowering rush by cutting or digging, based on information they received from the Minnesota DNR. Canada has prepared a nine-page fact sheet that gives detailed information on the history of spread, biology, and impacts of this exotic (Haber 1997).

### **Effectiveness of management - 1998**

Although Minnesota has designated flowering rush as prohibited, the DNR has not effectively stopped the sale of flowering rush in Minnesota. The DNR contacted these businesses and notified them that it is illegal to buy or sell flowering rush in Minnesota. Several of these businesses now note this restriction in their catalogs. However, flowering rush continues to be sold as an ornamental plant and is now widely advertised through the INTERNET as a desirable, hardy plant for water gardens.

Hand-cutting appears to be the most successful method to seasonally reduce dense stands of emergent flowering rush. The MDNR Exotic Species Program again coordinated a flowering rush hand-cutting project at several sites in Detroit Lakes, Becker County, and initiated a hand-cutting project at a public swim beach in Twin Lakes, Itasca County. In 1998, flowering rush grew more abundantly at both sites, probably due to an early spring and lower than average water levels. Cut plants appeared to grow back more quickly in 1998 than in previous years.

### Participation by other groups

Others involved in flowering rush management in Minnesota in 1998 include: MDNR Fisheries, MDNR Minnesota Conservation Corps (MCC), Pelican River Watershed District, Becker County Sentence to Service Program (STS), Greenway Township in Itasca County, and Queen's University, Ontario.

### Future needs for flowering rush management

- Continue efforts to limit introductions of flowering rush in Minnesota. Inform the public and the nursery industry of the problems associated with this plant and the existing laws against its possession and sale in Minnesota.
- More information is needed on the distribution, reproductive biology, and potential impacts of flowering rush in Minnesota. The MDNR will continue to encourage research in these areas.

### References Cited

- Anderson, L.C., C.D. Zeis and S.F. Alam. 1974. Phytogeography and possible origins of *Butomus* in North America. *Bulletin of the Torrey Botanical Club* 101:292-296.
- Eckert, C. October 1998. Personal communication. Queen's University, Dept. of Biology, Kingston, Ontario, Canada K7L 3N6. (612) 545-6160. (eckertc@biology.queesu.ca)
- Feedback, D. no date. Wetlands for homes. Fact sheet found on website of Zabel Environmental Technology. <http://www.abel.com/magspring97/wforhomes.htm>.
- Gaiser, L.O. 1949. Further distribution of *Butomus umbellatus* in the Great Lakes Region. *Rhodora* 51:385-390.
- Haber, E. 1997. Invasive exotic plants of Canada, fact sheet no. 5, flowering rush. Prepared March 1997 for Invasive Plants of Canada Project by E. Haber of National Botanical Services, Ottawa, ON, Canada. <http://infoweb.magi.com/-ehaber/factrush.html>.
- Merhoff, L.J. 1997. Non-native invasive plant species occurring in Connecticut. University of Connecticut. George Saffort Torrey Herbarium. Revised edition, October 1997. Available on the Internet: <http://darwin.eeb.uconn.edu.ccb.publications/publication-1.html>. 14 pgs.

- Moyle, J. 1968. Flowering rush in Minnesota. *The Latest Word* 57 (5). Minnesota Department of Conservation, Division of Fish and Wildlife. 500 Lafayette Rd. St. Paul, Minnesota, 56501.
- Perleberg, D.J. 1998. Evaluation of aquatic plant trade in Minnesota. Draft report 2, 16 Nov. 1998. Minnesota DNR Exotic Species Program, Brainerd, MN.
- Ranney, T.G., R.E. Bir, M.A. Powell, T. Bilderback. 1994. Qualifiers for quagmires. Leaflet No. 646. North Carolina Coop. Ext. Service.  
<http://www.ces.ncsu.edu/depts/hort/hil/hil-646.html>.
- Staniforth, R.J. and K.A. Frego. 1980. Flowering rush (*Butomus umbellatus*) in the Canadian Prairies. *Canadian Field-Naturalist* 94:333-336.
- Vermont Agency of Natural Resources. 1998. Non-native plant and animal species of concern in aquatic and wetland habitats in Vermont. Vermont Department of Environmental Conservation, Water Quality Division. 103 S. Main St. 10 N., Waterbury, VT 05671-0408. Also available on Internet:  
<http://www.ans.state.vt.us.dec.waterq.ans.anslist.htm>.



## Management of Curly-Leaf Pondweed

### 1998 Highlights

- Information about curly-leaf pondweed and its management was provided to the public through literature, public presentations, public meetings, and watercraft inspections.
- Exotic Species Staff provided technical assistance to various groups studying new curly-leaf management techniques. In particular, staff designed and helped implement studies to evaluate the effectiveness of various curly-leaf control projects.
- Funding was provided to the Army Corps of Engineers to study the effectiveness of the contact herbicides diquat and endothall against curly-leaf pondweed as a function of water temperature. They observed good control with both herbicides at 59F and 68F. Treatments done in 50F water gave some control, but significantly less than those done in the warmer water. Treatments at all water temperatures significantly reduced turion production.
- DNR Exotic Species Program staff completed a review of all DNR Fisheries survey records to determine which lakes in Minnesota have at least one Fisheries record of curly-leaf pondweed. Staff found records of curly-leaf in 543 MN lakes.

### Background

Curly-leaf pondweed (*Potamogeton crispus* L) is an exotic perennial, rooted, submersed aquatic vascular plant which was first noted in Minnesota about 1910 (Moyle and Hotchkiss, 1945). Native to Eurasia, Africa, and Australia, this species has been found in most of the United States since 1950, and is currently found in most parts of the world (Catling and Dobson, 1985).

Curly-leaf pondweed has a unique life cycle which gives it competitive advantages over many native aquatic plants. Unlike most native plants, curly-leaf pondweed may be in a photosynthetically active state even under thick ice and snow cover (Wehrmeister and Stuckey, 1978). Therefore, it is often the first plant to appear after ice-out. By late spring it can form dense mats which may interfere with recreation and limit the growth of native aquatic plants (Catling and Dobson, 1985). Curly-leaf plants usually die back in early summer in response to increasing water temperatures, but they first form vegetative propagules called turions (hardened stem tips) (Catling and Dobson, 1985). These turions disperse throughout a water body by water movement. Turions lay dormant during the summer when native plants are growing, and germinate in the fall when most native vegetation has senesced. Thus curly-leaf pondweed is able to use turions to invade new areas of a water body. Curly-leaf will also spread within a water body by producing rhizomes and sending up new shoots from buried stems (Kunii, 1989).

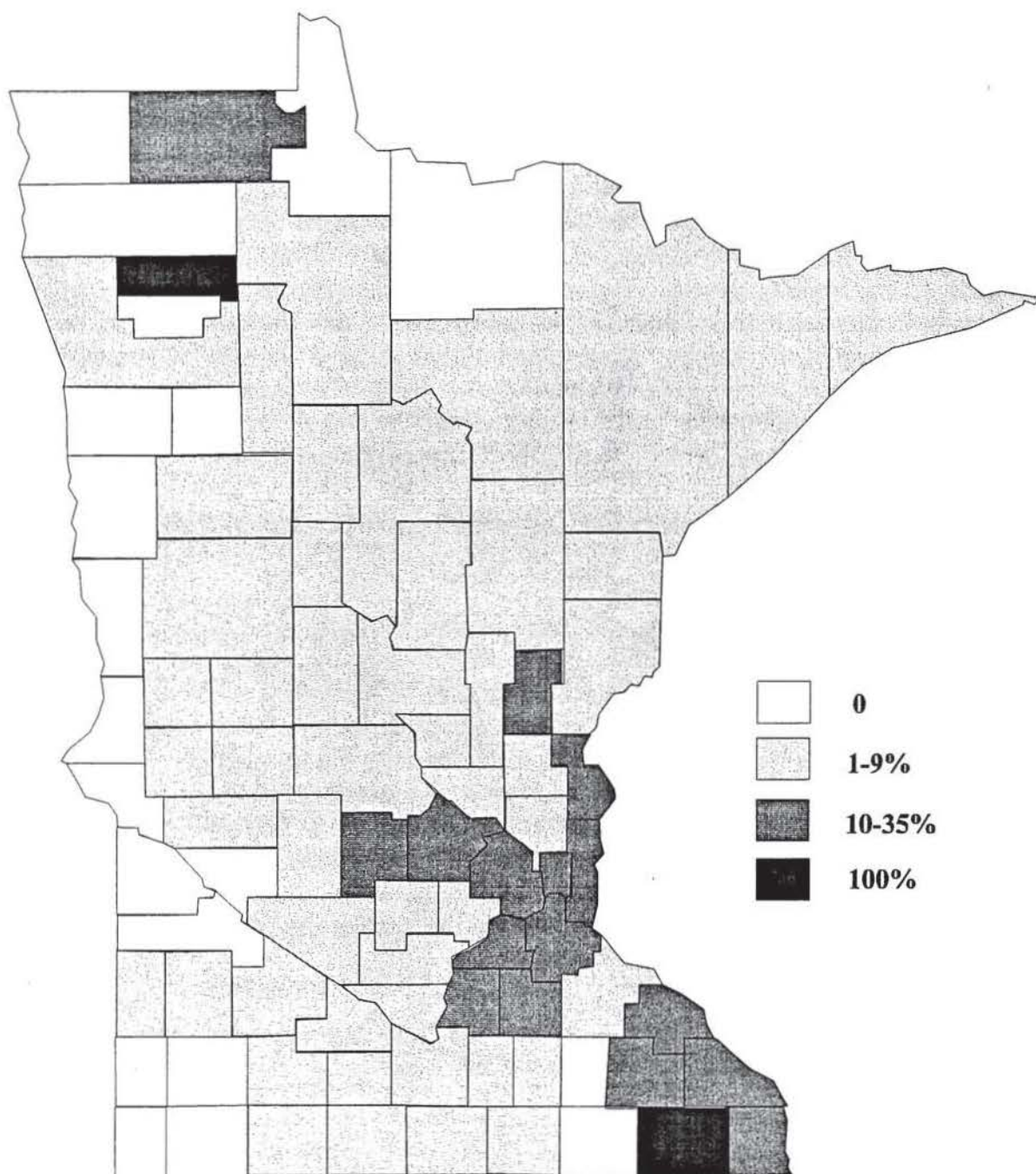


Lake associations and DNR Fisheries staff have been managing curly-leaf problems in Minnesota lakes for many years using both mechanical harvesting and contact herbicides such as diquat and endothall. Curly-leaf pondweed is a monocot, biologically very similar to numerous valuable and common native aquatic plants, such as all of the native pondweeds (*Potamogeton* spp.), wild celery (*Vallisneria americana*), and duckweeds (*Lemnaceae*). Thus, selective chemical control of curly-leaf pondweed is not possible (i.e., killing curly-leaf without harming adjacent native vegetation) unless it is the only aquatic plant species growing in a treated area. Relief from curly-leaf pondweed nuisances can be achieved with both herbicides and by mechanical harvesting. The herbicides used are of the non-selective, contact type, usually diquat formulations such as Reward or endothall formulations such as Aquathol or Hydrothol 191. It is not possible to eradicate curly-leaf pondweed turions with herbicides. Because curly-leaf pondweed produces turions which can remain viable in lake sediments for years (like a seed bank), long term reduction of curly-leaf pondweed in a water body is unlikely given current control technology. Lake associations and DNR Fisheries staff have expressed interest in improving current management approaches. They are particularly interested in management strategies which could interrupt turion production.

## **Progress in Management of Curly-leaf pondweed in 1998**

### **Inventory of curly-leaf pondweed**

During 1997 and 1998 the Exotic Species Program conducted a review of every lake file in the DNR Fisheries lake database. Approximately 3,000 lakes have been visited by DNR Fisheries staff and are included in database. The purpose of this review was to determine which lakes in Minnesota have at least one report of curly-leaf pondweed from DNR Fisheries staff, and probably underestimates the number of lakes with curly-leaf pondweed in the state. Because curly-leaf pondweed dies back by mid summer it may be missed and go unreported if a lake survey is done in late summer. Staff found records of curly-leaf pondweed in 543 Minnesota lakes. Most of the counties in Minnesota have at least one lake with curly-leaf pondweed, however in many counties the number of lakes with curly-leaf is still less than 10% of the total number of public waters in that county (Figure 6).



**Figure 6. Percent of lakes in the DNR public water inventory with DNR records of curly-leaf pondweed in 1998, by county.**

## **Control of curly-leaf pondweed**

- In 1997 the DNR issued 2,346 permits to control aquatic plants, algae, or snails to control swimmers itch. 118 of those permits (14%) were issued at least in part, to control curly-leaf pondweed. Under those 118 permits herbicide was applied to 653 acres and 436 acres were mechanically harvested. Most of the permits to control curly-leaf pondweed issued in 1997 were in the Twin Cities metropolitan area (47%), with an additional 33% issued in north central Minnesota, and 14% issued in southwest Minnesota. This information comes from aquatic plant management permittee reports and may underestimate the actual amount of curly-leaf pondweed control conducted. These figures are not yet available for 1997.
- DNR Exotic Species Program staff met with several groups to discuss their options for curly-leaf control.

## **Research on curly-leaf pondweed**

- DNR Exotic Species Program staff assisted in the design of an experimental protocol to evaluate the effectiveness of iron filings for control of curly-leaf pondweed.
- Exotic Species Program staff worked closely with Blue Water Science to studying the effects of mechanically harvesting curly-leaf using a boat - towed cutter in late spring. Specifically we helped design and implement a study to determine the effects of early summer cutting on winter turion densities in cut areas. For the second summer in a row DNR Exotic Species Program staff surveyed the aquatic plants in French Lake (Rice County) and Weaver Lake (Hennepin County) where experimental cutting of curly-leaf pondweed is being conducted. We will be assisting Steve McComas of Blue Water Science again this winter to sample curly-leaf pondweed turions from various lakes. Further sampling next summer will be needed in order to determine the effectiveness of the cutting. More detailed information about this project can be found in the 1996 annual report and in status reports from Blue Water Science (Exotic Species Programs 1996:64, McComas and Stuckert 1996a, McComas and Stuckert 1996b)
- Because the efficacy of the herbicides used to control curly-leaf at water temperatures below 70 F has not been documented, the DNR asked the Army Corps of Engineers (ACOE) to evaluate both the efficacy of herbicides to control curly-leaf pondweed at low water temperatures, and the efficacy of those herbicides to reduce turion production. The ACOE tested both diquat and endothall formulations at 50 F, 59F, and 68 F under controlled conditions. They observed good control with both herbicides at 59F and 68F. Treatments done in 50F water gave some control, but significantly less than those done in the warmer water. Treatments at all water temperatures significantly reduced turion production. The DNR chose (ACOE) to conduct this research project because the Aquatic Plant Control Research Program at WES has more than 35 years of

experience conducting research on management of aquatic plants. The final report from this project should be available early in 1999.

### **Effectiveness**

The DNR Exotic Species Program has three main goals for curly-leaf pondweed management: 1) to inventory the distribution of curly-leaf pondweed in Minnesota; 2) to support, conduct, and communicate research to improve the management of curly-leaf pondweed; and 3) to reduce the intentional and unintentional introduction of curly-leaf pondweed into noninfested water bodies in Minnesota. During 1998 we have completed a survey of the DNR Fisheries records for known curly-leaf pondweed infestations and we have supported and helped conduct research on new curly-leaf pondweed control methods. In addition we have communicated information to many people and organizations interested in curly-leaf pondweed management.

The DNR Exotic Species Program has ongoing programs to educate the public about the transportation of exotic species (see the Watercraft Inspection and Enforcement sections). These programs teach the public to help prevent the movement of any aquatic plant from one water body to another and are very useful in preventing the spread of curly-leaf pondweed. During 1998 we reviewed articles for publication about curly-leaf pondweed control, and DNR Exotic Species Program staff wrote a short article for Focus 10,00 magazine about curly-leaf.

### **Future needs for curly-leaf management**

- Continue to gather information about the extent of ecological and recreational problems caused by curly-leaf pondweed in Minnesota.
- Continue public awareness efforts focused on containing curly-leaf pondweed to where it is already found. Opportunities include our watercraft inspection program, literature, and public speaking engagements.
- Continue to provide information on the current state of curly-leaf pondweed in Minnesota and existing management technology through the preparation of a fact sheet, a report on the current state of curly-leaf control, speaking engagements, articles, and work with individual lake managers.
- Continue to provide technical assistance to researchers working on curly-leaf control, and the relationships between curly-leaf populations and lake water quality in Minnesota.
- Explore opportunities for cooperative research on curly-leaf pondweed management with Universities and other government agencies.

## References Cited

- Catling, P.M. and I. Dobson. 1985. The biology of Canadian weeds. 69. *Potamogeton crispus* L. Canadian Journal of Plant Science. 65:655-668.
- Exotic Species Programs. 1996. Ecologically harmful aquatic plant and wild animal species in Minnesota: Annual Report for 1996. Minnesota Department of Natural Resources, St. Paul, MN. 99 pp.
- Kunii, H. 1989. Continuous growth and clump maintenance of *Potamogeton crispus* L. in Narutoh River, Japan. Aquatic Botany. 33:13-26.
- McComas, S. and J. Stuckert. 1996a French Lake (Rice County) curly-leaf pondweed control using a boat-towed cutter, 1996: status report. Blue Water Science, 550 S. Snelling Av., St. Paul, MN 55116. 22 pp.
- McComas, S. and J. Stuckert. 1996b Curlyleaf Pondweed Control Using Boat-Towed Bottom Cutters: 1996 Summary of Four Lake Projects. Blue Water Science, 550 S. Snelling Av., St. Paul, MN 55116.
- Moyle, J.B. and N. Hotchkiss. 1945. The aquatic and marsh vegetation of Minnesota and its value to waterfowl. MN Dept. Conservation. Tech. Bulletin 3. 122 pp.
- Wehrmeister and Stuckey. 1978. The life history of *Potamogeton crispus* with emphasis on its reproductive biology. Ohio Journal of Science. 78 (April program and abstract) supplement: 16.

## Management of Zebra Mussels

### 1998 Highlights

- Divers discovered eight boats with attached zebra mussels in Minnesota waters in the St. Croix River and MDNR Conservation Officers ordered the boats removed and cleaned. One boater was issued a civil citation for having attached zebra mussels on his boat for the third consecutive year.
- No infestations of zebra mussel were recorded from inland waters in Minnesota.
- Watercraft inspections and public awareness efforts continued and increased in areas near zebra mussel infested waters (see Education & Watercraft Inspections).
- The Minnesota Department of Natural Resources (DNR) continued to work with the Wisconsin Department of Natural Resources (WDNR), National Park Service (NPS) and U.S. Fish & Wildlife Service (USFWS) on efforts aimed against this exotic in the St. Croix River.

### Background

The zebra mussel (*Dreissena polymorpha*) is a small striped exotic bivalve brought to North America in the ballast waters of trans-Atlantic freighters in the late 1980's. Unlike our native mussels, the zebra mussel secretes sticky threads which it uses to firmly attach itself to any hard surface in the water. The bio-fouling nature of this exotic has created numerous problems, such as clogging water pipes for industry and killing native species of molluscs. Attachment to recreational boats or to aquatic vegetation which may be transported by boaters can both serve to move mussels to other waters. The high reproductive capacity and free-floating microscopic larval life stage of the zebra mussel allows rapid dispersal of this exotic within a water body. The zebra mussel has established populations throughout most of the eastern United States and its eventual distribution is projected to include most of the U.S. and southern Canada.

### Progress on management of zebra mussels - 1998

Progress was made in the following areas that were identified as future needs for 1998:

- Veliger sampling was continued in Lake Pepin.
- Exotic Species Program staff attended the 1998 International Zebra Mussel Research Conference.



## **Current distribution/inventory of zebra mussels**

Zebra mussel population levels in the Mississippi River continued to increase in 1998 and native mussels in Lake Pepin and elsewhere in the river show increases in infestation by zebra mussels. Zebra mussels have not yet been documented above Lock and Dam 1 on the Mississippi River (Figure 7). Zebra mussels continue to be found in the Duluth Harbor, with some recent evidence suggesting that some reproduction is occurring.

The DNR provided financial assistance for dive searches for zebra mussels on the St. Croix River in cooperation with other resource agencies and provided technical advice and laboratory expertise for monitoring activities. DNR Aquatic Invertebrate Biology Laboratory staff also provided assistance to the United States Fish and Wildlife Service and the National Park Service for laboratory work on samples from the St. Croix River.

## **Public Awareness**

Watercraft access inspectors conducted over 300 hours of access inspections at public access sites north of Stillwater, where the National Park Service restricts boat traffic. Additionally, over 700 hours of inspections were conducted at access sites south of the Federal zone in the river. Over 2600 watercraft were inspected, with these boaters given information on exotics.

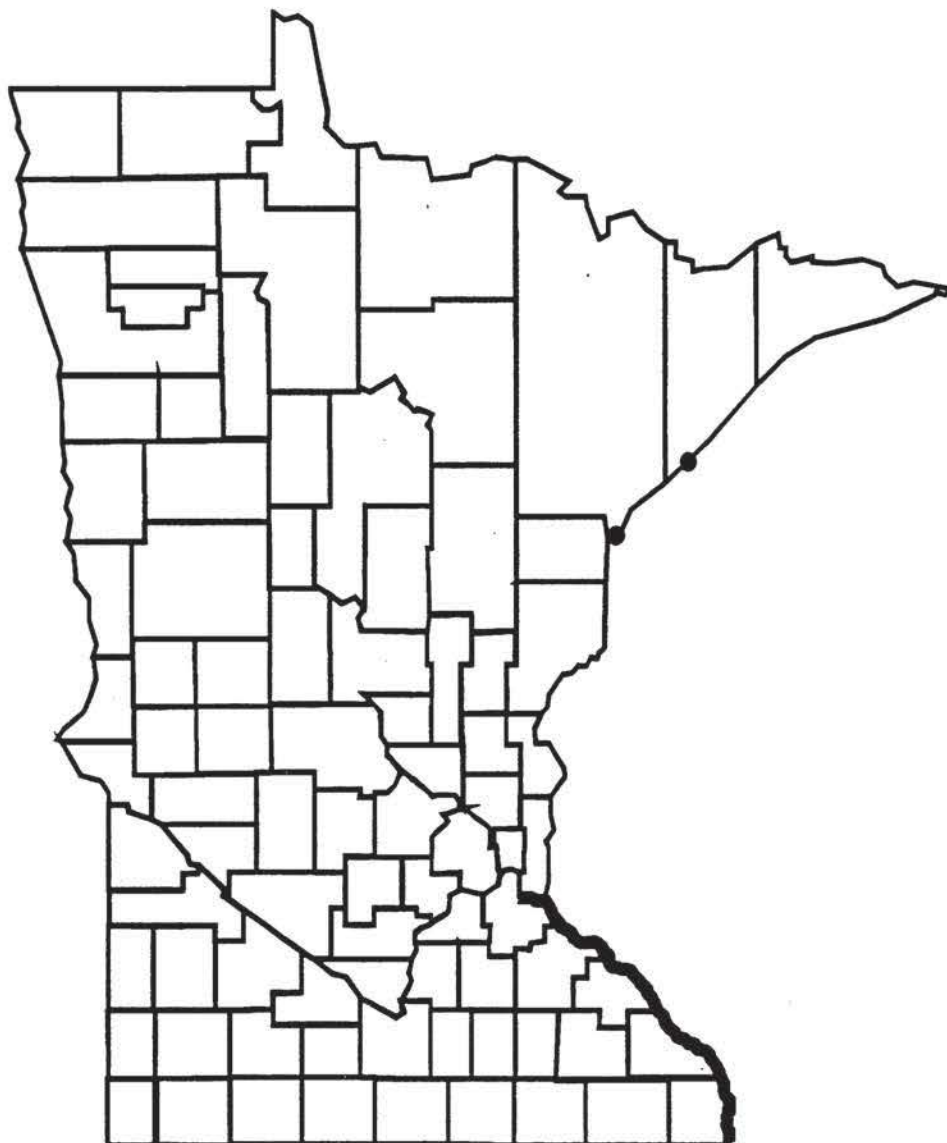
## **Control of zebra mussels**

There was no control of zebra mussels within natural ecosystems conducted in 1998 and the DNR does not anticipate undertaking control activities at any time in the near future. There are still no environmentally safe control methods available for natural systems. Because control is not a viable option once the zebra mussel becomes established in a lake or river, it is essential that a strong effort remain focused on public education and awareness to prevent spread. Boat checks, access inspections and talks/displays all serve to make the public aware of this exotic and how to prevent its spread (see Education and Watercraft Inspections sections).

## **Research on zebra mussels**

DNR biologists collected plankton tows from Lake Pepin to examine veliger densities in the Mississippi River. Results from previous years indicate very high densities of veligers in the southern end of Lake Pepin from early July through mid-September. While this period represents the highest risk for zebra mussel attachment, veligers were found in the lake as early as June and continue to be present in low numbers through early October. Staff biologists also examined slides set out on settling plate samplers collected by NPS and USFWS personnel from the St. Croix River. All samples from the St. Croix River were negative. DNR staff also attended the Eighth International Zebra Mussel Research Conference to gather current information on research being conducted in the United States and Canada. The DNR Invertebrate Biologist was also asked to help plan the Ninth Zebra Mussel Research Conference, to be held in Minnesota in April 1999.

**Figure 7. Zebra mussel distribution in Minnesota, December 1998.** (Heavy line indicates Mississippi River from St. Paul downstream - zebra mussel populations along entire river length)



## **Management of zebra mussels in other states**

Management efforts in other states vary according to funding and priorities. With no control options available, management focuses mainly on public awareness to prevent or slow the spread of the zebra mussel. The phrase "management of zebra mussels" must be viewed realistically. Because this organism can withstand a lack of water for extended periods, has no environmentally acceptable control options for natural waters, spreads rapidly once established in a lake or river, and has microscopic life stages, few management options are available. It is highly likely that management of zebra mussels will remain focused on identifying and minimizing vectors which would spread this exotic and developing targeted regulatory, public awareness, and educational efforts.

## **Effectiveness**

The primary goals of DNR's zebra mussel management efforts are to contain zebra mussels to water bodies where they presently occur and to support research to track their impacts and improve control methods. Targeted public awareness and enforcement activities will be used to reduce the spread of zebra mussels by trailered watercraft. No inland lakes in Minnesota are known to be infested with zebra mussels.

## **Participation with other groups**

An interagency workgroup for the St. Croix River Zebra Mussel Response Plan continues to meet and coordinate efforts to try and prevent the zebra mussel from spreading into the St. Croix River. Wisconsin has a law similar to that in Minnesota prohibiting boats from having attached zebra mussels in the St. Croix River, making enforcement similar for the entire boating community of the St. Croix River. Both states required boat owners on the St. Croix River to remove and clean their boats this year when zebra mussels were found attached during routine monitoring dives.

The Minnesota DNR, Wisconsin DNR and Great Lakes Indian Fish and Wildlife Commission submitted an interstate management plan for coordinated actions against the zebra mussel for the St. Croix River to the Federal agencies involved in exotics efforts. The plan was approved and funding assistance for zebra mussel activities on the St. Croix River was given to the three agencies.

Public awareness and education efforts have benefitted from cooperation from the many groups involved in the zebra mussel issue: federal and state agencies, National Sea Grant program and private industry. These efforts are covered more fully in the Education section.

Minnesota Sea Grant continued the Minnesota Volunteer Zebra Mussel Detection Program. This early detection program provides sampling kits on loan to shoreline property owners, lake associations, and other organizations to monitor for the presence of zebra mussels in inland lakes and rivers. Currently, the program has 35 volunteers.

### **Future needs for management of zebra mussels**

- Continue coordinated monitoring and prevention efforts on the St. Croix River with other resource agencies and seek continued federal funds for the St. Croix Riverway Interstate Management Plan for aquatic nuisance species.
- Monitor findings of international research efforts including the 1999 International Zebra Mussel Conference.

## Management of Rusty Crayfish

### Background

The rusty crayfish (*Orconectes rusticus*) is native to streams and rivers in Illinois, Indiana and western Ohio. Through human activities over the past thirty years its distribution has expanded so that it is now found in states throughout the northeast and central United States, as far west as New Mexico, north into Ontario, Canada and is widely distributed in Minnesota. The rusty crayfish lives in permanent water bodies and can grow slightly larger than Minnesota's native crayfish species. It is more aggressive than native species of crayfish, and in many lakes where it was introduced, it has displaced other species of crayfish or altered the community composition of this group. While its activities may also reduce diversity and abundance of native vegetation when rusty crayfish occurs at high densities, this reduction has also been seen in some lakes with native crayfish. It is more active than our native species during the day, and thus tends to be more visible to the lake user. To defend itself from fish during daytime activity, the rusty crayfish has somewhat larger claws than native species, and is more prone to aggressive displays towards predators, rather than evasion. While this makes it more difficult for some fish to eat, other fish such as walleye and bass in some lakes were reported to feed heavily on rusty crayfish.

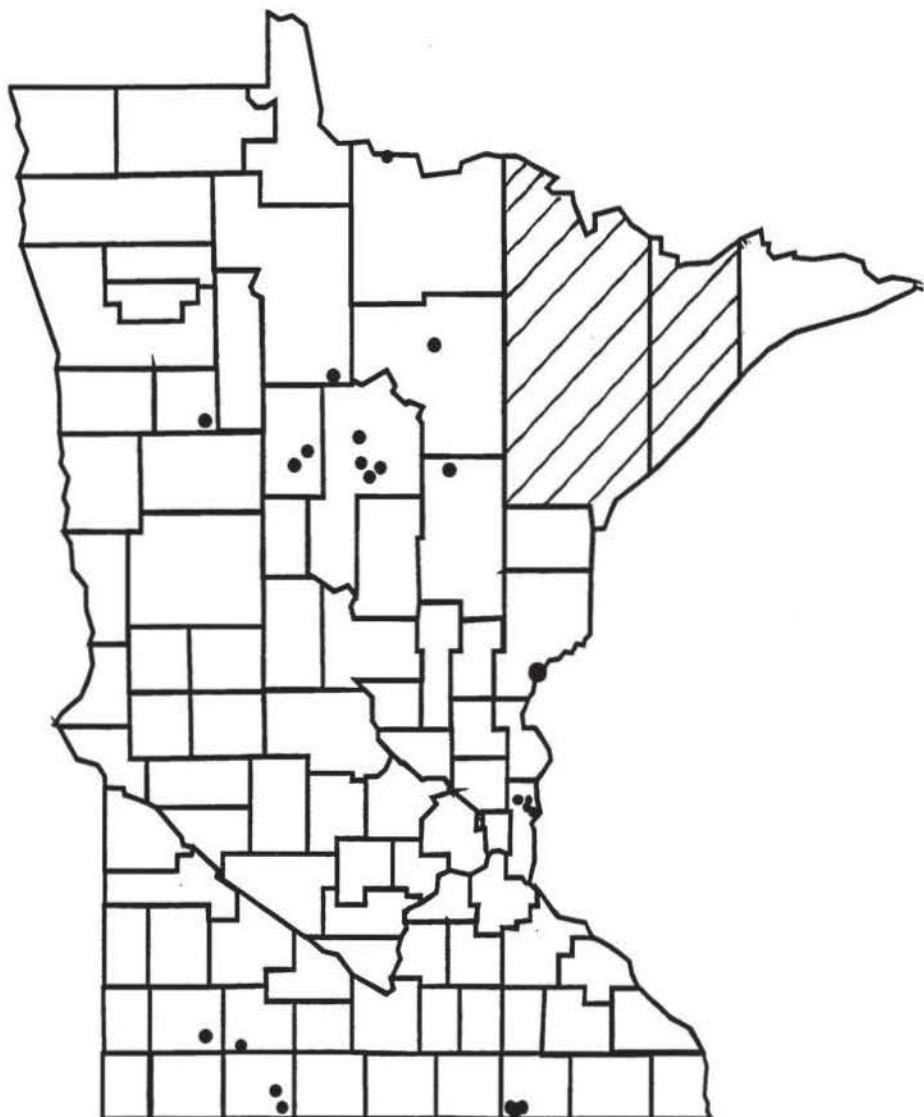
### Progress in management of rusty crayfish - 1998

The Minnesota Department of Natural Resources (DNR) Exotic Species Program does not currently conduct management of rusty crayfish and the Department is not aware of any other management activities within the state. In 1998, rusty crayfish were reclassified from the *prohibited* to the *regulated* exotic species category. This change was done because pre-existing regulations conflicted with the *prohibited* status and evidence suggests native species can cause harm similar to this exotic. Minnesota Rules prohibit the live sale of crayfish as bait, but allow their use for bait in the body of water where they are captured. Individuals can take and possess up to 25 pounds of crayfish for personal use. DNR Fisheries also requires a permit for importing live crayfish or eggs, transfer between water bodies or commercial harvest.

### Current distribution of rusty crayfish

In 1990, the rusty crayfish was reported from 16 water bodies in 12 counties scattered widely throughout the state from the northeast to the southwest (Helgen 1990). Specimens collected by DNR field personnel have documented it in two border rivers (St. Croix River in Pine County and Rainy River in Koochiching County), as well as several lakes in Lake, St. Louis, Cass and Washington counties. The proximity of the lakes to other recorded occurrences suggests that these locations are not new movements, but were simply not collected in the initial surveys. Judging from this widespread distribution, rusty crayfish are likely present in more Minnesota waters. The majority of the lakes found in St. Louis and Lake counties are often interconnected, presenting no barriers to the spread of the rusty crayfish. It is likely that as more lakes are more closely examined, they will also be found to contain this exotic.

**Figure 8. Rusty crayfish distribution in Minnesota, December 1998. Data from Helgen (1990) and DNR field surveys. (Cross hatched counties have more than 9 reported waters)**





## **Control of rusty crayfish**

There are no environmentally safe control methods available for the rusty crayfish that can be used in natural systems. While trapping has been suggested as a control option, this action removes mainly large male rusty crayfish which has no effect on population density. A study of trapping in small ponds by the U. S. Fish and Wildlife Service (Bills and Marking 1988) found that while trapping may harvest adults, it was doubtful that it could be used as a successful control method. Additionally, trapping efforts are labor intensive, both in terms of numbers of traps needed and the daily removal and rebaiting of the traps. Finally, intensive commercial trapping efforts often result in creating a crayfish population that is larger in numbers and smaller in body size. Thus, in any large lake setting, trapping is not likely to succeed in reducing the population or problem.

## **Management of rusty crayfish in other states**

There are no states that have management activities specifically for the rusty crayfish. Wisconsin prohibits the use of live crayfish for bait, and prohibits their release in natural waters. A draft management plan was written for one lake district (Long Lake, Wisconsin) in 1980 at the request of the Long Lake Inland Lake District members. However, no activities were ever initiated from this management plan, with the exception of annual trapping at set sites to monitor population levels. Discussions with fisheries managers from the Long Lake area indicated that the problems with rusty crayfish have declined to a minimal or non-existent level, aquatic vegetation has re-established in some of the lake, and a thriving fisheries is present.

### **Future needs for management of rusty crayfish**

- Survey crayfish through a variety of methods throughout Minnesota waters to better establish extent of rusty crayfish distribution.

## **References Cited**

- Bills, J.D. and L.L. Marking. 1988. Control of Nuisance Populations of Crayfish with Traps and Toxicants. *The Progressive Fish Culturist* 50:103-106.
- Helgen, J.C. 1990. The Distribution of Crayfishes in Minnesota. Section of Fisheries Investigational Report, No. 405, Division of Fish and Wildlife, Minn. DNR.

## Management of Ruffe

### 1998 Highlights

- No ruffe have been discovered in inland waters of Minnesota.
- A Nonindigenous Fish Response Plan has been developed for the state.
- The ruffe population in the St. Louis River estuary declined in 1998.

### Background

The ruffe (*Gymnocephalus cernuus*) a Eurasian fish of the perch family, was introduced into Minnesota in the mid-1980s. Its likely source of introduction was from ballast water discharge by transoceanic ships. Since the discovery of the ruffe in the St. Louis River near Duluth in 1987, many agencies from Minnesota, Wisconsin, and Ontario as well as the U.S. Fish and Wildlife Service (USFWS) and U.S. Geological Survey, Biological Resources Division (USGS-BRD) have been studying this exotic fish to better understand its impacts on North American fish communities. The rapid increase in the ruffe population, the replacement of fish biomass by ruffe, its continued spread to more locations in the Great Lakes, and its potential spread to inland waters concern many fish management agencies and sportfishing interests.

### Progress in management of ruffe - 1998

Many of the activities conducted by the DNR and other cooperating agencies in past years to prevent the spread of ruffe were continued in 1998. Information about the ruffe has been included in brochures, and in the state fishing regulations synopsis. Advisory signs remain posted in Wisconsin and Minnesota to alert boaters and anglers of the presence of ruffe in the St. Louis River estuary and watercraft inspections continue at public access points in Minnesota's ruffe infested waters. The Exotic Species Program and DNR fisheries biologists finalized and published a management plan for ruffe, round goby, and other exotic species of fish. Prior to publication, the plan was sent out for review by organizations such as the Minnesota Sea Grant, University of Minnesota, and the USFWS.

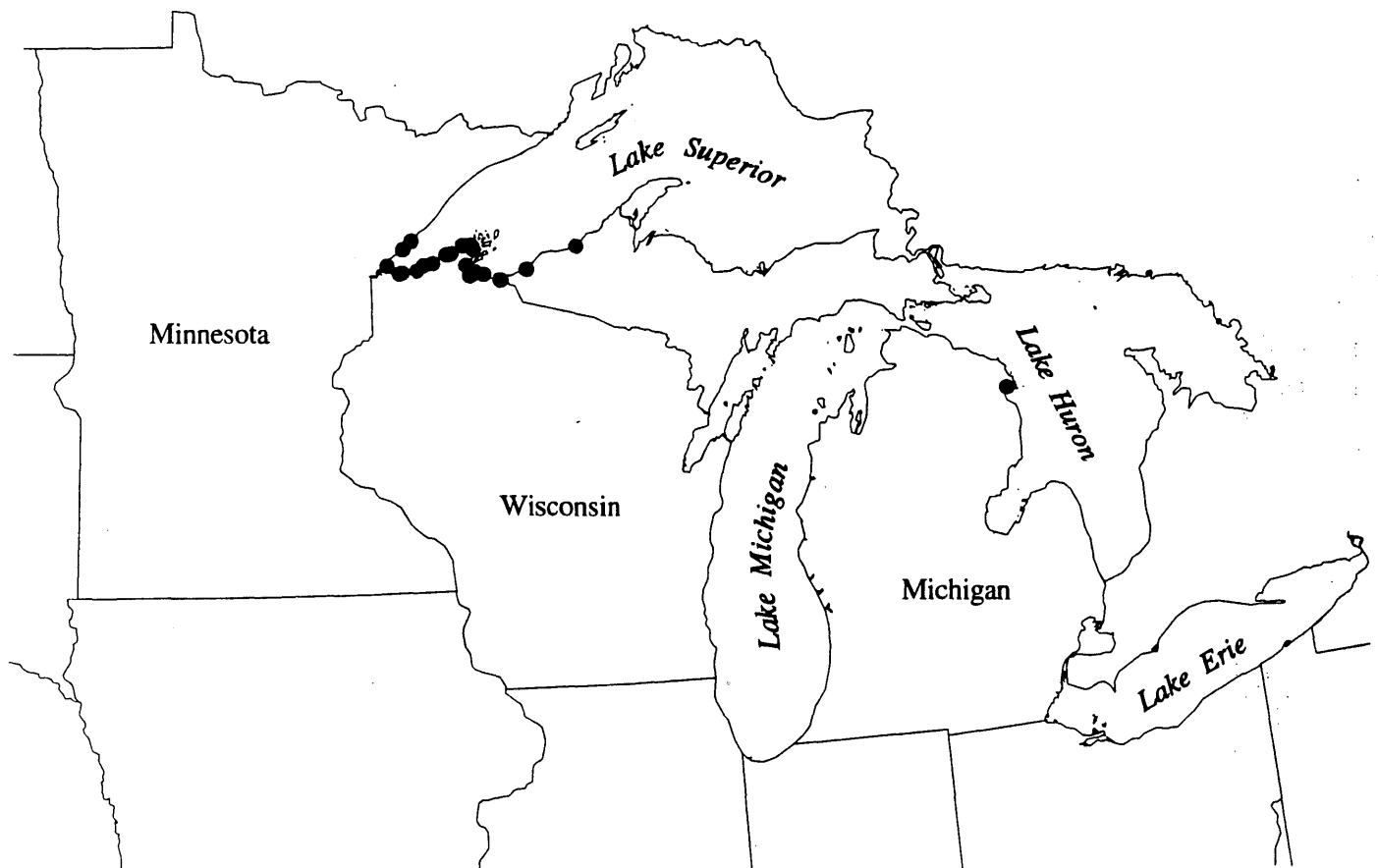
### Current distribution and inventory of ruffe

The USGS-BRD, Lake Superior Biological Station has taken the lead role in ruffe population investigations in the Great Lakes and their tributaries. According to their surveys, the density and biomass of ruffe in the St. Louis River estuary vary annually and in 1998 declined from their peak in 1997, although the ruffe population remains at a high level.

The USFWS Fishery Resources Offices continues to conduct and coordinate surveillance sampling in potential infestation areas in U.S. waters of the Great Lakes. The Ontario Ministry of Natural Resources will conduct surveillance in Canadian waters of Lake Superior and other Great Lakes. Ruffe have continued to expand their range

since the original discovery of the St. Louis River estuary population. They have been found in Lake Superior as far east as Ontonagan, Michigan, a reproducing population was discovered in Thunder Bay, Ontario in 1994, and ruffe were discovered in Lake Huron for the first time in 1995 (Figure 9). No new populations of ruffe populations were discovered in the Great lakes in 1998.

No ruffe were confirmed in Minnesota inland waters in 1998. The DNR is conducting no special surveillance surveys for ruffe in Minnesota inland waters. Section of Fisheries' lake surveys and angler reports will be the primary method of detecting movement of ruffe populations to inland waters. During routine fish population assessment netting, DNR's Section of Fisheries sets nets in inshore areas of Lake Superior. DNR Fisheries staff documented ruffe in Taconite Harbor for the first time in 1997.



**Figure 9. Confirmed Ruffe Sightings as of December 1998.**  
(Source: U.S. Geological Survey - Biological Resources Division)

## **Control of ruffe**

The Minnesota and Wisconsin DNR attempted to control ruffe in the Duluth area of Lake Superior and the St. Louis River beginning in 1988 using restrictive angling regulations and stocking of predator fish was to increase predation on ruffe by native fish. This tactic did not appear to check the ruffe population size or ruffe expansion.

The current goals and objectives of Federal Ruffe Control Program are available at <http://www.fws/fws.gov/> (search for "ruffe control program").

The USFWS and the U.S. Geological Survey, Biological Resources Division (USGS-BRD) are conducting research on ruffe. Their current research topics include: monitoring ruffe in the St. Louis River estuary, monitoring areas of future expansion, monitoring native populations after ruffe invade, and predator food habits on ruffe. The use of stationary nets to remove ruffe was determined to be ineffective as a control tool.

Minnesota Sea Grant received \$2 million in funding from the National Sea Grant Program to be used on ruffe research and education efforts. They funded research projects focused on describing the impacts of ruffe and their colonization and reproduction patterns in the Great Lakes. Researchers at the University of Minnesota found the pheromones trigger sexual attraction and alarm response in ruffe. These chemicals may have potential in future management efforts.

An International Symposium on Biology and Management of Ruffe took place in March 1997. An abstract booklet from the symposium and a recent reprint from the International Association for Great Lakes Research is available from Minnesota Sea Grant, includes a special section with 19 papers about ruffe (Marsden, J.E., et. Al. 1998).

Minnesota Sea Grant's Exotic Species Information Center has developed a searchable "Ruffe Database" located on Minnesota Sea Grant's Web Site (<http://www.d.umn.edu/seagr/>). Over 75 research references can be searched by author, title, or year.

## **Effectiveness of ruffe management**

The state's predator stocking and restrictive angler regulations appear to have had little effect in slowing the expansion of the ruffe in Lake Superior and the St. Louis estuary. Those activities were the only control strategies initially available. Regulations, inspections, and other and public awareness efforts to prevent the transportation of ruffe to inland waters have, to date, been effective.

## **Management in other states**

The Lake Superior waters of Wisconsin, Ontario, and Michigan, and Michigan waters of Lake Huron contain the only other known populations of ruffe. The fish have not been found in any inland waters of those states or provinces. Wisconsin DNR (WDNR) has established regulations to prohibit possession of ruffe and harvest of bait fish in Lake Superior and its tributaries up to the first fish barriers. Angling regulations, similar to

Minnesota's, in the St. Louis River estuary were also used in an attempt to increase predation on ruffe by native fish. WDNR has also prepared a plan to respond to nonindigenous fish introductions in inland lakes. This plan will help provide a decision making process in the event ruffe are found in inland waters of Wisconsin. To date, no state, federal entity, or the Indian tribes have used chemical control to manage ruffe in tributaries along the south shore of Lake Superior. Chemical control of ruffe had been proposed for Wisconsin or Michigan waters. Laboratory tests show that ruffe are vulnerable to available fish toxicants, but most information indicates that treatments would not be effective in preventing the spread of ruffe in open systems like the Great Lakes.

### **Participation of others in ruffe control efforts**

The USGS-Biological Resources Division has been involved in ruffe research and a USFWS biologist is the chairperson of the Ruffe Control Committee. Employees of provinces, tribes, and other Great Lakes states have been involved in development of reports and plans regarding ruffe.

### **Future needs for ruffe management**

If ruffe are to be contained in existing waters, continued efforts in the areas of public awareness, watercraft inspections, regulations, and enforcement will be necessary. The state and cooperators within the state should:

- Support national efforts to address the future potential for ruffe to enter the Mississippi River via outlets from Lake Michigan.
- Invest in and/or support research to develop environmentally sound control methods.
- Support continued biological assessment efforts by the DNR Section of Fisheries, USFWS, and USGS-BRD so that the impact of ruffe on native communities can be ascertained.
- Continue monitoring using routine fish sampling and angler reports.
- Expand efforts to increase public awareness of ruffe in areas of Minnesota where introduction of ruffe may occur.

### **References**

Marsden, J.E., et. 1998. International Association for Great Lakes Research 24,2:165-169. Eurasian Ruffe (*Gymnocephalus cernuus*) Biology, Impacts, and Control.



## Management of Round Goby

### 1998 Highlights

- Significant numbers of round gobies were reported and confirmed in the St. Louis River estuary during July, 1998.
- A Nonindigenous Fish Response Plan has been developed for the state and will guide future management efforts should round goby be found in inland waters.
- The U.S. Fish and Wildlife Service (USFWS) resurveyed the Illinois waterways in the summer of 1998 and located round gobies 3 miles further downstream in the waterways.
- Research was initiated to investigate potential management techniques that could be used to keep the round goby from entering the Mississippi River from the Illinois waterways. Funding was appropriated by Congress for the U.S. Army Corps of Engineers to test a barrier proposal.

### Background

The round goby (*Neogobius melanstomus*) is a small bottom-dwelling fish native to the Black and Caspian Seas. The first reported finding of round goby in the Great Lakes was in the St. Clair River, Michigan in 1990 (Jude et. al. 1992). This fish was likely introduced through transoceanic ballast water discharge. The first round gobies in Minnesota were discovered during the summer of 1995 in the Duluth-Superior harbor (St. Louis River estuary). There is documented harm to native fish populations, such as mottled sculpins, where round gobies have invaded (Marsen, et. al. 1996). Populations of other species such as logperch and lake sturgeon may be harmed as well. If round gobies enter the Mississippi River basin, there is concern about their impacts on darters, several of which are federally listed threatened and endangered species (Busiahn personal communication). Because round gobies eat zebra mussels, there is also concern about the potential for round gobies to pass contaminants from zebra mussels to game fish such as smallmouth bass.

The round goby was designated a prohibited exotic species in the Department's permanent rules (see Appendix B). Under Minnesota laws, it is illegal to possess, transport, sell, or import species in this regulatory classification (under Minnesota Statutes 84D.05 and 84D.13 in Appendix A). Preventing these actions can reduce the risk that gobies will be dispersed to inland waters of the state.

### Progress in management of round goby - 1998

An excellent review of literature, initially compiled by Charlebois, et. al. (1996) has been extended by Minnesota Sea Grant (Jensen 1998) and will be available at Sea Grant's SIGNIS web site in July 1999.



Round goby identification cards and fact sheets continue to be distributed to anglers and others in the state by DNR offices and by Minnesota Sea Grant. This information will help ensure that if, or when, round gobies are discovered in inland waters they will be reported to the DNR.

### Current distribution of the round goby

From its initial introduction into the St. Clair River, which connects Lake Huron and Lake St. Clair, the round goby has spread to the Detroit River, the Lake Erie basin, Lake Michigan basin, the Illinois waterways, and now to the Lake Superior watershed (see Figure 10). The first two specimens of the round goby were discovered in the Duluth-Superior harbor (St. Louis River estuary) during 1995 and another was found in 1996. During the summer of 1998, many round gobies were reported by anglers in the Duluth areas. Round goby have not been identified in any inland waters in the state. The presence of round gobes in Lake Michigan and the Illinois waterways poses risk of introduction of round gobies into the Mississippi River watershed through the connected waters. A survey conducted by the USFWS in 1998 found gobies located in the Little Calumet River portion of the Chicago waterways, about 15 river miles downstream of Lake Michigan.



**Figure 10. Confirmed round goby sightings as of December 1998.**  
(Source: U.S. Geological Survey - Biological Resources Division)

**Research on round goby**

Several research efforts regarding round goby began in the Great Lakes region before gobies were found in Minnesota. The primary research work has been done at the University of Michigan (Jude 1992 and 1995) and Illinois Natural History Survey. A Round Goby Conference was held in Chicago on February 21-22, 1996 to review the latest information on the biology, spread, population dynamics, and impacts of the round goby. A conference summary "The Round Goby *Neogobius melanostomus*: A Review of European and North American Literature" was prepared by Charlebois, et al. (1997) and includes research priorities established during a roundtable discussion. Minnesota Sea Grant has funded research at the University of Minnesota to determine if pheromones could be used as attractants for gobies.

**Participation of others**

Two other agencies have played a role in the discovery of round goby and subsequent education efforts to alert the public of the round goby's presence in the Duluth/Superior harbor. The USGS-Biological Resources Division discovered the species during its work in the Duluth area in 1995. Minnesota Sea Grant has been developing informational materials such as an identification card and issued press releases about the discovery of numerous gobies by anglers in the Duluth harbor during 1998. The press release led to considerable media coverage including coverage on the *Almanac* television show.

Within the Great Lakes region, Illinois Natural History Survey and Illinois/Indiana Sea Grant have been active in conducting research and preparing informational materials. Illinois/Indiana Sea Grant developed a round goby fact sheet titled *Round Gobies Invade North America*. The fact sheet is being distributed throughout the Great Lakes region.

The Army Corp of Engineers and the U.S. Fish and Wildlife Service are trying to block to movement of round gobies into the Illinois River (Mississippi River drainage). Various types of barrier devices are being considered for testing including electrical barriers on the channel bottom. Preliminary tests were conducted in 1998.

**Future needs for round goby management**State

- Distribute round goby identification cards and fact sheets as part of the ongoing exotic species public awareness activities in the state.

Regional/National

- Support management actions that can be taken in the Illinois waterways to limit round goby spread to the Mississippi River drainage.
- Invest in and/or support research of environmentally sound control methods and other priorities established at the 1996 Round Goby Conference.

## References Cited

- Charlebois, P.M., J.E. Marsden, R.G. Goettel, R.K. Wolfe, D.J. Jude, and S. Rudnika. 1997. The Round Goby, *Neogobius melanostomus*: A Review of European and North American Literature.
- Illinois-Indiana Sea Grant Program. 1995. *Round Gobies Invade North America*. A fact sheet produced cooperatively with Ohio and Michigan Sea Grant Programs.
- Jude, D.J., Janssen J., Crawford G. R., 1995. *Ecology, Distribution, & Impact of the Newly introduced Round & Tubenose Gobies on the Biota of the St. Clair & Detroit Rivers*.
- Jude, D. J., R. H. Reider, and G. R. Smith. 1992. Establishment of Gobiidae in the Great Lakes basin. *Can. J. Fish. Aquat. Sci.* 49: 416-421.
- Miller, P. J., 1986. Gobiidae. In P.J.P. Whitehead, M-L. Bauchot, J.-C. Hureau, J. Nielsen, E. Toronese (eds.), *Fishes of the North-east Atlantic and the Mediterranean*, Vol. III:1019-1095. UNESCO, Paris.
- Minnesota Sea Grant. 1995. *Round Goby Watch Card*.

## Management of Eurasian Swine

### 1998 Highlights

- The Minnesota Department of Agriculture (MDA) issued permits for the known, eligible Eurasian Swine herds in the state.
- No wild herds of Eurasian Swine are known to exist in Minnesota.
- DNR designated Eurasian Swine as a prohibited exotic species through amendments to Minnesota Rules 6216.

### Background

The Minnesota Department of Agriculture (MDA) is responsible for regulating Eurasian Swine in Minnesota. Information of this species is included in this report because of the potential harm these animals could cause to terrestrial ecosystems. Eurasian swine (*Sus scrofa* subspecies) and feral swine have escaped from captivity in a number of states and are causing significant problems. Until 1993, Eurasian swine were unregulated in Minnesota, except for testing for disease by the State Board of Animal Health. Many organizations in Minnesota called for Eurasian swine to be prohibited or closely regulated because of the potential ecological harm they could cause if wild populations became established. A Wild Hog Task Force, chaired by MDA conducted a survey of wildlife officials and chief veterinarians in other states to determine the degree of harm caused by wild hogs (Minnesota Department of Agriculture 1993). Many states indicated that free roaming swine damage streams, woodlands, croplands, and wildlife. According to the survey, 32 states consider free roaming wild hogs a liability.

Legislation in 1993 (see M.S. 17.457 in Appendix A) designated Eurasian swine as a restricted species. This designation was intended to keep Eurasian swine from escaping and becoming naturalized in the state. The legislation did the following:

- created a task force to conduct a study of Eurasian swine in the state and report to the legislature by January 1, 1995;
- made importation, possession, propagation, transportation and release of Eurasian swine unlawful in the state; except for herds that were in existence in the state on March 1, 1993;
- requires animals to be marked to identify ownership;
- requires that escaped animals must be reported to a DNR conservation officer within 24 hours of the escape.
- prescribes the penalty for violating the law as a misdemeanor;
- requires owners to file a bond with the state.

## Progress in 1998

MDA issued permits to the eligible known Eurasian Swine herds in the state. The DNR also adopted amendments to Minnesota Rules 6216 that designate Eurasian Swine as a prohibited exotic species. This designation is consistent with state statutes for Eurasian Swine.

## Current distribution of Eurasian swine

No wild populations of Eurasian swine are known to exist in the state. There are five known herds of Eurasian swine held in captivity in Minnesota and registered with the Board of Animal Health as required by 1993 legislation. There may be additional herds in captivity that have not been registered. Quick and inexpensive methods are not available to determine the genetics of swine, making it difficult to determine if swine herds in Minnesota are Eurasian or domestic (*Sus scrofa domesticus*).

## Management in other states

A survey conducted in 1993 by MDA revealed that:

- 12 states have organized control efforts to reduce the number of wild hogs;
- 19 states allow hunting of wild hogs, many with year round hunting and no limits;

## Participation of others

The MDA is responsible for regulating Eurasian swine in the state. DNR offers its assistance to MDA for control of this species and encourages MDA to fully implement the items identified in the Wild Hog Report (Wild Hog Task Force 1994).

## Future needs for Eurasian swine management

- The DNR will support efforts by MDA to identify non-registered herds.
- The DNR will support efforts by MDA to inspect facilities holding registered herds.
- The DNR will support efforts by MDA to develop methods to differentiate between domestic and Eurasian swine herds.

## References Cited

- Minnesota Department of Agriculture. 1993. Summary of a Survey on the Status of Wild Hogs in the United States. Unpublished Report.
- Wild Hog Task Force. February 1994. Wild Hog Report. Prepared for the 1994 Legislative Session, Minnesota Department of Agriculture.

## Management of Mute Swan

### 1998 Highlights

- The DNR designated the mute swan as a regulated exotic species through amendments to Minnesota Rules 6216.

### Background

Mute swans (*Cygnus olor*) are native to Europe and Asia and were introduced into the United States from the mid 1800s through the early 1900s (Lever 1987, Ciaranca et al 1997). Mute swans have escaped or been released from golf courses, avicultural and park settings occasionally in Minnesota. There have been documented wild nesting pairs in some locations of the state, such as the Cannon River in Rice County, and in Cass County. Ciaranca et al (1997:1) reports that all North American populations of mute swans originated from release or escape of individuals from captive flocks.

With increasing goose populations, more people may be interested in possessing and releasing mute swans to compete with Canada geese (Mr. Kent Solberg, pers. comm., June 1997). However, this management approach is unlikely to work.

The potential adverse impacts of mute swans is high because: 1) mute swans can be extremely aggressive during the spring and summer breeding season, excluding other wildlife from their breeding territories (Allin, Chasko, and Husband 1987). 2) there is evidence that mute swans have displaced loons on traditional loon nesting sites in Michigan (Johnson, pers. comm. 1991); 3) while Conover and McIvor (1993) did not find significant impacts from mute swans at low population densities, it is difficult to maintain low population levels once mute swans are established. Ciaranca, et. al. (1997) gave overgrazing of aquatic vegetation and displacement of native waterfowl as potential effects on native ecosystems. Delacour (1954) describes mute swans as "jealous and bad-tempered, sometimes persecuting and killing even ducks."

Mute swans are currently regulated in part by the state game farm statutes in M.S. 97A.105 (see Appendix A). It is illegal to release mute swans into the wild under those statutes.

### Progress in Management in 1998

During 1998, the DNR designated mutes swans as a "regulated exotic species" through amendments to Minnesota Rules 6216. This designation of the mute swan has the following implications:

- no mute swans may be released into a free-living state;
- any mute swans in captivity, whether on a licensed game farm or not, must be fenced and pinioned to prevent their release into a free living state.



- escaped mute swans must be reported to the DNR to help prevent the establishment of naturalized populations in the state.

### **Management in other States**

In Michigan, Ontario, Wisconsin, and eastern states from Maine to South Carolina, mute swan populations have naturalized and are expanding rapidly causing concern for native species and their habitat (Allin, Chasko, and Husband 1987, Ciaranca et al 1997:1).

Lever (1987:26) reports that at Chesapeake Bay where one or two pairs escaped or were released in 1962, they have multiplied to 500 individuals which may be competing with other water birds. Recent articles from The Maryland Sun quote a state biologist reporting "there are 2700 of the birds in Maryland ... they've been increasing at 15% a year." The same individual reports harmful impacts to reproduction of native waterbirds.

New York Dept. of Environmental Conservation is concerned about potential impacts of the growing naturalized population of mute swans. In New York, the mute swan is an introduced species that has proven to be troublesome in many ways. Control of the wild population is necessary to prevent and provide relief from potential problems. DEC believes that the public's desire to observe mute swans can be largely met with a smaller naturalized population and by controlled use of captive birds. Therefore, properly licensed individuals will be allowed to keep, raise, and display mute swans, as long as no birds are released or escape to the wild.

The USFWS endorses a mute swan policy adopted by the Atlantic Flyway Council. Among several recommendations are:

- Both state and federal wildlife species should institute programs to prevent the establishment and/or eliminate mute swans.
- States and provinces should seek to make mute swans an unprotected species if this is not already the case.

### **Future Management Needs**

- Verify occurrences of mute swans in the state and take appropriate actions to have the birds confined under game farm licenses or remove the naturalized birds from the wild.
- Develop and distribute informational materials about mute swans and related laws

## References Cited

- Allin, C. C., Chasko, G. G., and T. P. Husband. 1987. Mute swans in the Atlantic flyway: a review of the history, population growth, and management needs. Trans. NE Sect. Wildl. Soc. 44: 32-47.
- Ciaranca, M.A., C.C. Allin, and G.S. Jones. 1997. Mute Swan (*Cygnus olor*). In The Birds of North America, No. 273 (A. Poole and F. Gill, eds.) The Academy of Natural Sciences, Philadelphia, PA and The American Ornithologists' Union, Washington, D.C.
- Delacour, J. 1954. Waterfowl of the World - Volume One. Country Life Limited, London.
- Johnson, J. 1993. Kellogg Bird Sanctuary. Michigan State University.
- Lever, C. 1987. Naturalized Birds of the World. Longman Scientific & Technical, copublished in the the United States with John Wiley and Sons, Inc., New York, NY.
- New York State Department of Environmental Conservation. 1993. Mute Swans in New York: A Fact Sheet.

# The Potential Risk for Exotic Aquatic Plant Introductions

## 1998 Highlights

- Exotic Species Program staff conducted a study of aquatic plants available through mail order to determine the risk of new introductions into Minnesota.
- The Army Corps of Engineers completed an assessment of the potential for several exotic aquatic plants to infest Minnesota waters.

## Background

Aquatic plants represent the largest taxonomic group of aquatic exotics introduced into the Great Lakes Area (Mills *et al.* 1993). Major pathways of introduction include accidental escape of cultivated plants and dumping of aquarium waters. Today, new pathways are emerging as activities such as water gardening, wetland restoration projects, and shoreline plantings increase in popularity. The DNR Exotic Species Program recognizes the need to prevent exotic introductions because, once introduced, eradication is not usually feasible and management, if available, can be costly.

Experiences in Minnesota and other states has shown that proactive prevention efforts are more desirable than reactionary efforts to manage harmful exotic species. Being aware of the potential of new species to invade allows prevention efforts to be focused on high risk species and high risk pathways. The Exotic Species Program pursued two studies in 1998 to help identify potential sources of introduction and species of concern.

## Progress in 1998

Under contract with the DNR, the Army Corps of Engineers' Aquatic Plant Control Research Program completed a study, "Evaluating the Potential for Nonindigenous Aquatic Plant Species to Colonize Minnesota Water Resources." Madsen (1998) evaluated the potential for selected exotic aquatic plant species to be a nuisance within the State of Minnesota: fanwort (*Cabomba caroliniana*), Brazilian elodea (*Egeria densa*), hydrilla (*Hydrilla verticillata*), European frog-bit (*Hydrocharis morus-ranae*), water primrose (*Ludwigia uruguayensis*), four-leaf clover (*Marsilea quadrifolia*), variable milfoil (*Myriophyllum heterophyllum*), spiny naiad (*Najas marina*), minor naiad, (*Najas minor*), water snowflake (*Nymphoides peltata*), and water chestnut (*Trapa natans*). Exotic plants were selected for inclusion in this study either because they were a serious nuisance in other parts of U.S., currently grow in regions with a climate similar to MN's, and/or have shown a propensity to be moved from their native range. For comparative purposes, European watermilfoil (*Myriophyllum spicatum*), a nonnative species already naturalized in the state, was also evaluated to help validate the procedure.

The project involved two major phases. The first phase was a thorough literature review of these species, including life history and autecological characteristics. Information on home range and climatological barriers was also collected. The second phase involved determining the likelihood of establishment in Minnesota, and subsequent nuisance

development.

Three approaches to this question were implemented. The first was to compare home range or new range climatological parameters directly, to see if the similarity warrants concern. Secondly, a simulation model (CLIMEX) developed for analyzing species ranges was utilized to determine the climate compatibility of the species to Minnesota. Last, a detailed analysis of life history features (flowering or tuber set and germination requirements) not normally included in climatological models or home range considerations also was analyzed. Any one of these approaches alone would be open to significant error, but all three together lent support to the conclusions of potential threat to the State of Minnesota. The CLIMEX model was useful in identifying locations around the world with climates that are similar to the climate in Minnesota. This information, coupled with data on species native distribution, allowed assessment of whether Minnesota conditions were similar to those in a species' place of origin.

Six of the species surveyed, *C. caroliniana*, *H. verticillata* (monoecious biotype), *H. morsus-ranae*, *M. heterophyllum*, *N. peltata*, and *T. natans*, had a high probability of success in the state. Although the growth of any of these species could potentially become problematic, the growth of four species, *T. natans*, *M. heterophyllum*, *H. verticillata* (monoecious biotype) and *C. caroliniana*, was expected to be most severe. Only two of the selected species were of moderate concern for Minnesota, *N. marina* and *M. quadrifolia*.

In 1998, the Exotic Species Program initiated a study to evaluate the risk of exotic introductions associated with mail order shipments of aquatic plants into Minnesota (Perleberg 1998). Objectives of this study include: 1) Continue to identify exotic aquatic plant species that may be harmful to Minnesota resources; 2) Identify businesses that sell aquatic plants to Minnesotans and 3) Evaluate the risk of exotic introductions associated with the sale of aquatic plants.

Mail order catalogs from 30 U.S. and foreign businesses specializing in aquatic plants were reviewed to assess the potential for intentional exotic plant shipments to Minnesota. Aquatic plant orders were placed with three of these businesses to assess the potential for both intentional and accidental introductions of exotics. Results of this study include:

- More than 700 taxa of aquatic plants are available for sale into Minnesota and the majority (96%) of these taxa are exotics.
- At least 66% of the federal and state "restricted" aquatic plant taxa are available for sale into Minnesota.
- At least 31% of the "watch" species identified for this report are available for sale into Minnesota.

- Species prohibited for sale under federal and/or state regulations were intentionally shipped to Minnesota.
- Identification of many taxa is difficult because businesses do not use standardized nomenclature. Taxonomic problems will hinder education and enforcement efforts.

DNR's goal is to reduce the risk that undesirable exotic plants are introduced to Minnesota through the commercial sale of aquatic plants. Nevertheless, given the large numbers of businesses that sell aquatic plants the variety of purchasing options available, and the diverse group of Minnesotans who might order aquatic plants, this task will be challenging. The DNR Exotic Species Program will work with other outreach programs to provide buyers and sellers of aquatic plants with more information about the exotics issue, proper techniques to avoid exotic introductions during transplanting projects, and alternative methods such as native plants suitable for landscaping and restoration projects.

### **Future Management Needs**

- Cooperatively develop and distribute information about the top 10 aquatic plants to avoid selling, buying, and planting in Minnesota.
- Develop a database within DNR for general information about exotic aquatic plant species.
- Develop and maintain files with literature collected by DNR biologists about exotic aquatic plants.
- Continue research to assess aquatic exotic plants.
- The CLIMEX model, used by the USACOE, provides a quantitative mechanism to evaluate potential range extensions, but requires additional evaluation and parameterization. Currently, little is known of the environmental requirements and tolerance ranges of many of these species. Greenhouse studies to obtain additional data for species of concern, e.g., *C. caroliniana*, *T. natans*, *N. peltata*, *M. heterophyllum*, *H. verticillata* (monoecious) and *H. morsus-ranae* would improve our ability to predict their growth potential in Minnesota and elsewhere, particularly when using the CLIMEX model.

## **References Cited**

- Madsen<sup>1</sup> J. D., D. G. McFarland<sup>1</sup>, and A. G. Poovey<sup>2</sup>. 1998. Evaluating the Potential for Nonindigenous Aquatic Plant Species to Colonize Minnesota Water Resources. <sup>1</sup>US Army Engineer Waterways Experiment Station, CEWES-ES-P, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199; <sup>2</sup>ASCI Corporation, 3402 Wisconsin Avenue, Vicksburg, MS 39180
- Mills, E.L., J.H. Leach, J.T. Carlton, and C.L. Secor. 1993. Exotic species in the Great Lakes: a history of biotic crises and anthropogenic introductions. *J. Great Lakes Res.* 19(1): 1-54.
- Perleberg, D.J. 1998. Evaluation of aquatic plant trade in Minnesota. Draft report 2. Minnesota Dept. of Natural Resources, Exotic Species Program.



## Appendix A - Minnesota Statutes Regarding Exotic Species CONTENTS

| <b>MINNESOTA STATUTES - HARMFUL EXOTIC SPECIES</b>                          |   | <b>Page</b> |
|---|---|-------------|
| M.S. 84D.01   | DEFINITIONS. ....   | 104         |
| M.S. 84D.02   | HARMFUL EXOTIC SPECIES MANAGEMENT PROGRAM. ....   | 105         |
| M.S. 84D.03   | INFESTED WATERS; LIMITED INFESTATIONS OF<br>EURASIAN WATER MILFOIL. ....  | 106         |
| M.S. 84D.04   | CLASSIFICATION OF EXOTIC SPECIES. (Classes; Criteria) ....  | 106         |
| M.S. 84D.05   | PROHIBITED EXOTIC SPECIES. (Prohibited activities; Seizure) ....  | 106         |
| M.S. 84D.06   | UNLISTED EXOTIC SPECIES. (Process; Classification) ....   | 107         |
| M.S. 84D.07   | REGULATED EXOTIC SPECIES. ....  | 107         |
| M.S. 84D.08   | ESCAPE OF EXOTIC SPECIES. ....  | 107         |
| M.S. 84D.09   | AQUATIC MACROPHYTES. (Transportation prohibited; Exceptions) ....   | 107         |
| M.S. 84D.10   | PROHIBITED ACT; WATERCRAFT. ....  | 108         |
| M.S. 84D.11   | PERMITS. (Prohibited exotic species; Regulated exotic species) ....   | 108         |
| M.S. 84D.12   | RULES. (Required rules; Authorized rules; Expedited rules) ....   | 108         |
| M.S. 84D.13   | ENFORCEMENT; PENALTIES. (Criminal Penalties; Civil penalties) ....  | 108         |
| M.S. 84D.14   | CERTAIN SPECIES NOT SUBJECT TO CHAPTER. ....  | 109         |
| <br><b>SELECTED MINNESOTA STATUTES - DEPT. OF NATURAL RESOURCES</b>         |   |             |
| M.S. 84.027   | POWERS AND DUTIES. (Game and fish rules) ....   | 110         |
| M.S. 86B.415  | LICENSE FEES. (Watercraft surcharge) ....   | 110         |
| M.S. 97A.105  | GAME AND FUR FARMS. (License requirements - mute swan) ....   | 110         |
| M.S. 97A.205  | ENFORCEMENT OFFICER POWERS. ....  | 111         |
| M.S. 97A.221  | SEIZURE AND CONFISCATION OF PROPERTY. ....  | 111         |
| <br><b>SELECTED MINNESOTA STATUTES - NOXIOUS WEEDS</b>                      |   |             |
| M.S. 18.75  | PURPOSE ....  | 111         |
| M.S. 18.76  | CITATION ....   | 111         |
| M.S. 18.77  | DEFINITIONS. (Noxious weed) ....  | 111         |
| M.S. 18.78  | CONTROL OR ERADICATION OF NOXIOUS WEEDS. (Purple loosestrife) ....  | 111         |
| M.S. 18.79  | DUTIES OF THE COMMISSIONER (OF AGRICULTURE).<br>(Enforcement; Rules; Order For Control Or Eradication Of Noxious Weeds) . | 112         |
| <br><b>SELECTED MINNESOTA STATUTES - RESTRICTED SPECIES, EXOTIC SPECIES</b> |   |             |
| M.S. 17.457   | RESTRICTED SPECIES. (Eurasian wild pigs; Importation; Permits) ....   | 112         |

**MINNESOTA STATUTES - HARMFUL EXOTIC SPECIES**

(Note: Minnesota Statutes, chapter 84D became effective May 1, 1996.)

**M.S. 84D.01 DEFINITIONS.**

Subdivision 1. **Terms.** For the purposes of this chapter, the following terms have the meanings given them.

Subd. 2. **Aquatic macrophyte.** "Aquatic macrophyte" means a nonwoody plant, either a submerged, floating leafed, floating, or emergent plant that naturally grows in water or hydric soils.

Subd. 3. **Commissioner.** "Commissioner" means the commissioner of the department of natural resources.

Subd. 4. **Department.** "Department" means the department of natural resources.

Subd. 5. **Exotic species.** "Exotic species" means a wild animal species or aquatic plant species that is not a native species.

Subd. 6. **Eurasian watermilfoil.** "Eurasian watermilfoil" means *Myriophyllum spicatum*.

Subd. 7. **Harmful exotic species.** "Harmful exotic species" means an exotic species that can naturalize and either:

(1) causes or may cause displacement of, or otherwise threaten, native species in their natural communities; or

(2) threatens or may threaten natural resources or their use in the state.

Subd. 8. **Infested waters.** "Infested waters" means waters of the state designated by the commissioner under sections 84D.03, subdivision 1, and 84D.12.

Subd. 9. **Introduction.** "Introduction" means the release or escape of an exotic species into a free-living state.

Subd. 10. **Limited infestation of Eurasian watermilfoil.** "Limited infestation of Eurasian watermilfoil" means a body of water designated by the commissioner under sections 84D.03, subdivision 2, and 84D.12.

Subd. 11. **Native species.** "Native species" means an animal or plant species naturally present and reproducing within this state or that naturally expands from its historic range into this state.

Subd. 12. **Naturalize.** "Naturalize" means to establish a self-sustaining population of exotic species in the wild outside of its natural range.

Subd. 13. **Prohibited exotic species.** "Prohibited exotic species" means a harmful exotic species that has been designated as a prohibited exotic species in a rule adopted by the commissioner under section 84D.12.

Subd. 14. **Purple loosestrife.** "Purple loosestrife" means *Lythrum salicaria*, *Lythrum virgatum*, or combinations thereof.

Subd. 15. **Regulated exotic species.** "Regulated exotic species" means a harmful exotic species that has been designated as a regulated exotic species in a rule adopted by the commissioner under section 84D.12.

Subd. 16. **Transport.** "Transport" means to cause or attempt to cause a species to be carried or moved into or within the state, and includes accepting or receiving the species for transportation or shipment. Transport does not include the unintentional transport of a species within a water of the state or to a connected water of the state where the species being transported is already present.

Subd. 17. **Unlisted exotic species.** "Unlisted exotic species" means an exotic species that has not been designated as a prohibited exotic species, a regulated exotic species, or an unregulated exotic species in a rule adopted by the commissioner under section 84D.12.

Subd. 18. **Unregulated exotic species.** "Unregulated exotic species" means an exotic species that has been designated as an unregulated exotic species in a rule adopted by the commissioner under section 84D.12.

Subd. 19. **Watercraft.** "Watercraft" means a contrivance used or designed for navigation on water and includes seaplanes.

Subd. 20. **Waters of the state.** "Waters of the state" has the meaning given in section 97A.015, subdivision 54.

Subd. 21. **Wild animal.** "Wild animal" means a living creature, not human, wild by nature, endowed with sensation and power of voluntary motion.

Subd. 22. **Zebra mussel.** "Zebra mussel" means a species of the genus *Dreissena*.

**M.S. 84D.02 HARMFUL EXOTIC SPECIES MANAGEMENT PROGRAM.**

Subdivision 1. **Establishment.** The commissioner shall establish a statewide program to prevent and curb the spread of harmful exotic species. The program must provide for coordination among governmental entities and private organizations to the extent practicable. The commissioner shall seek available federal funding and grants for the program.

Subd. 2. **Purple loosestrife and Eurasian watermilfoil programs.** (a) The program required in subdivision 1 must include specific programs to curb the spread and manage the growth of purple loosestrife and Eurasian watermilfoil. These programs must include: (1) compiling inventories and monitoring the growth of purple loosestrife and Eurasian watermilfoil in the state, for which the commissioner may use volunteers;

(2) publication and distribution of informational materials to boaters and lakeshore owners;

(3) cooperative research with the University of Minnesota and other public and private research facilities to study the use of nonchemical control methods, including biological control methods; and

(4) managing the growth of Eurasian watermilfoil and purple loosestrife in coordination with appropriate local units of government, special purpose districts, and lakeshore associations, to include providing requested technical assistance.

(b) The commissioners of agriculture and transportation shall cooperate with the commissioner to establish, implement, and enforce the purple loosestrife program.

Subd. 3. **Management plan.** By July 1, 1997, the commissioner shall prepare a long-term plan, which may include specific plans for individual species, for the statewide management of harmful exotic species. The plan must address:

(1) coordinated detection and prevention of accidental introductions;

(2) coordinated dissemination of information about harmful exotic species among resource management agencies and organizations;

(3) a coordinated public education and awareness campaign;

(4) coordinated control of selected harmful exotic species on lands and public waters;

(5) participation by lake associations, local citizen groups, and local units of government in the development and implementation of local management efforts;

(6) a reasonable and workable inspection requirement for watercraft and equipment including those participating in organized events on the waters of the state;

(7) the closing of points of access to infested waters, if the commissioner determines it is necessary, for a total of not more than seven days during the open water season for control or eradication purposes;

(8) maintaining public accesses on infested waters to be reasonably free of aquatic macrophytes; and

(9) notice to travelers of the penalties for violation of laws relating to harmful exotic species.

Subd. 4. **Inspection of watercraft.** The commissioner shall authorize personnel to inspect, between May 1 and October 15 for a minimum of 20,000 hours, watercraft and associated equipment, including weed harvesters, that leave or are removed from infested waters.

Subd. 5. **Regional cooperation.** The commissioner shall seek cooperation with other states and Canadian provinces for the purposes of management and control of harmful exotic species.

Subd. 6. **Annual report.** By January 15 each year, the commissioner shall submit a report on harmful exotic species to the legislative committees having jurisdiction over environmental and natural resource issues. The report must include:

(1) detailed information on expenditures for administration, education, management, inspections, and research;

(2) an analysis of the effectiveness of management activities conducted in the state, including chemical control, harvesting, educational efforts, and inspections;

(3) information on the participation of other state agencies, local government units, and interest groups in control efforts;

(4) information on management efforts in other states;

(5) information on the progress made in the management of each species; and

(6) an assessment of future management needs.

**M.S. 84D.03 INFESTED WATERS; LIMITED INFESTATIONS OF EURASIAN WATERMILFOIL.**

Subdivision 1. **Infested waters.** The commissioner shall designate a water of the state as an infested water if the commissioner determines that the water contains a harmful exotic species that could spread to other waters if use of the water and related activities are not regulated to prevent this.

Subd. 2. **Limited infestations of Eurasian watermilfoil.**

(a) The commissioner shall designate a water of the state as a limited infestation of Eurasian watermilfoil if:

(1) the commissioner determines that Eurasian watermilfoil occupies less than 20 percent of the littoral area of the water, up to a maximum of ten acres;

(2) mechanical harvesting is not used to manage Eurasian watermilfoil in the water; and

(3) Eurasian watermilfoil control is planned for the water.

(b) The commissioner shall mark limited infestations of Eurasian watermilfoil in accordance with rules adopted by the commissioner under section 84D.12.

(c) Except as provided in rules adopted under section 84D.12, a person may not enter a marked area of a limited infestation of Eurasian watermilfoil.

**M.S. 84D.04 CLASSIFICATION OF EXOTIC SPECIES.**

Subdivision 1. **Classes.** The commissioner shall, as provided in this chapter, classify exotic species according to the following categories:

(1) prohibited exotic species, which may not be possessed, imported, purchased, sold, propagated, transported, or introduced except as provided in section 84D.05;

(2) regulated exotic species, which may not be introduced except as provided in section 84D.07;

(3) unlisted exotic species, which are subject to the classification procedure in section 84D.06; and

(4) unregulated exotic species, which are not subject to regulation under this chapter.

Subd. 2. **Criteria.** The commissioner shall consider the following criteria in classifying an exotic species under this chapter:

(1) the likelihood of introduction of the species if it is allowed to enter or exist in the state;

(2) the likelihood that the species would naturalize in the state were it introduced;

(3) the magnitude of potential adverse impacts of the species on native species and on outdoor recreation, commercial fishing, and other uses of natural resources in the state;

(4) the ability to eradicate or control the spread of the species once it is introduced in the state; and

(5) other criteria the commissioner deems appropriate.

**M.S. 84D.05 PROHIBITED EXOTIC SPECIES.**

Subdivision 1. **Prohibited activities.** A person may not possess, import, purchase, sell, propagate, transport, or introduce a prohibited exotic species, except:

(1) under a permit issued by the commissioner under section 84D.11;

(2) in the case of purple loosestrife, as provided by sections 18.75 to 18.88;

(3) under a restricted species permit issued under section 17.457;

(4) when being transported to the department, or another destination as the commissioner may direct, in a sealed container for purposes of identifying the species or reporting the presence of the species;

(5) when being transported for disposal as part of a harvest or control activity under a permit issued by the commissioner pursuant to section 103G.615, or as specified by the commissioner;

(6) when the specimen has been lawfully acquired dead and, in the case of plant species, all seeds are removed or are otherwise secured in a sealed container;

(7) in the form of herbaria or other preserved specimens;

(8) when being removed from watercraft and equipment, or caught while angling, and immediately returned to the water from which they came; or

(9) as the commissioner may otherwise prescribe by rule.

Subd. 2. **Seizure.** Under section 97A.221, the commissioner may seize or dispose of all specimens of prohibited exotic species unlawfully possessed, imported, purchased, sold, propagated, transported, or introduced in the state.

**M.S. 84D.06 UNLISTED EXOTIC SPECIES.**

Subdivision 1. **Process.** After the effective date of the rules adopted under section 84D.12, subdivision 1, clause (1), a person may not introduce an unlisted exotic species unless:

- (1) the person has notified the commissioner in a manner and form prescribed by the commissioner;
- (2) the commissioner has made the classification determination required in subdivision 2 and designated the species as appropriate; and
- (3) the introduction is allowed under the applicable provisions of this chapter.

Subd. 2. **Classification.** (a) If the commissioner determines that a species for which a notification is received under subdivision 1 should be classified as a prohibited exotic species, the commissioner shall:

- (1) adopt a rule under section 84D.12, subdivision 3, designating the species as a prohibited exotic species; and
- (2) notify the person from which the notification was received that the species is subject to section 84D.04.

(b) If the commissioner determines that a species for which a notification is received under subdivision 1 should be classified as an unregulated exotic species, the commissioner shall:

- (1) adopt a rule under section 84D.12, subdivision 3, designating the species as an unregulated species; and
- (2) notify the person from which the notification was received that the species is not subject to regulation under this chapter.

(c) If the commissioner determines that a species for which a notification is received under subdivision 1 should be classified as a regulated exotic species, the commissioner shall notify the applicant that the species is subject to the requirements in section 84D.07.

**M.S. 84D.07 REGULATED EXOTIC SPECIES.**

Except as provided in rules adopted under section 84D.12, subdivision 2, clause (1), a person may not introduce a regulated exotic species without a permit issued by the commissioner.

**M.S. 84D.08 ESCAPE OF EXOTIC SPECIES.**

(a) A person that allows or causes the introduction of an animal that is a prohibited, regulated, or unlisted exotic species shall, within 48 hours after learning of the introduction, notify the commissioner, a conservation officer, or another person designated by the commissioner. The person shall make every reasonable attempt to recapture or destroy the introduced animal. If the animal is a prohibited exotic species, the person is liable for the actual costs incurred by the department in capturing or controlling, or attempting to capture or control, the animal and its progeny. If the animal is a regulated exotic species, the person is liable for these costs if the introduction was in violation of the person's permit issued under section 84D.11.

(b) A person that complies with this section is not subject to criminal penalties under section 84D.13 for the introduction.

**M.S. 84D.09 AQUATIC MACROPHYTES.**

Subdivision 1. **Transportation prohibited.** A person may not transport aquatic macrophytes on any state forest road as defined by section 89.001, subdivision 14, any road or highway as defined in section 160.02, subdivision 7, or any other public road, except as provided in this section.

Subd. 2. **Exceptions.** Unless otherwise prohibited by law, a person may transport aquatic macrophytes:

- (1) that are duckweeds in the family Lemnaceae;
- (2) for disposal as part of a harvest or control activity conducted under an aquatic plant management permit pursuant to section 103G.615, under permit pursuant to section 84D.11, or as specified by the commissioner;
- (3) for purposes of constructing shooting or observation blinds in amounts sufficient for that purpose, provided that the aquatic macrophytes are emergent and cut above the waterline;
- (4) when legally purchased or traded by or from commercial or hobbyist sources for aquarium or ornamental purposes;
- (5) when harvested for personal use if in a motor vehicle;
- (6) to the department, or another destination as the commissioner may direct, in a sealed container

for purposes of identifying a species or reporting the presence of a species;

(7) when transporting a commercial aquatic plant harvester to a suitable location for purposes of cleaning any remaining aquatic macrophytes;

(8) that are wild rice harvested under section 84.091; or

(9) in the form of fragments of emergent aquatic macrophytes incidentally transported in or on watercraft or decoys used for waterfowl hunting during the waterfowl season.

#### **M.S. 84D.10 PROHIBITED ACT; WATERCRAFT.**

A person may not place or attempt to place into waters of the state a watercraft, a trailer, or plant harvesting equipment that has aquatic macrophytes, zebra mussels, or prohibited exotic species attached. A conservation officer or other licensed peace officer may order:

(1) the removal of aquatic macrophytes or prohibited exotic species from a trailer or watercraft before it is placed into waters of the state;

(2) confinement of the watercraft at a mooring, dock, or other location until the watercraft is removed from the water; and

(3) removal of a watercraft from waters of the state to remove prohibited exotic species if the water has not been designated by the commissioner as being infested with that species.

#### **M.S. 84D.11 PERMITS.**

Subdivision 1. **Prohibited exotic species.** The commissioner may issue a permit for the propagation, possession, importation, purchase, or transport of a prohibited exotic species for the purposes of disposal, control, research, or education.

Subd. 2. **Regulated exotic species.** The commissioner may issue a permit for the introduction of a regulated exotic species.

Subd. 3. **Standard.** The commissioner may issue a permit under this section only if the commissioner determines that the permitted activity would not pose an unreasonable risk of harm to natural resources or their use in the state. The commissioner may deny, issue with conditions, modify, or revoke a permit under this section as necessary to ensure that the proposed activity will not pose an unreasonable risk of harm to natural resources or their use in the state.

Subd. 4. **Appeal of permit decision.** A permit decision may be appealed as a contested case under chapter 14.

#### **M.S. 84D.12 RULES.**

Subdivision 1. **Required rules.** The commissioner shall adopt rules:

(1) designating prohibited, regulated, and unregulated exotic species;

(2) governing the application for and issuance of permits under this chapter, which rules may include a fee schedule;

(3) governing notification under section 84D.08; and

(4) designating, and governing the marking and use of, limited infestations of Eurasian watermilfoil.

Subd. 2. **Authorized rules.** The commissioner may adopt rules:

(1) regulating the possession, importation, purchase, sale, propagation, transport, and introduction of harmful exotic species; and

(2) regulating the appropriation, use, and transportation of water from infested waters.

Subd. 3. **Expedited rules.** The commissioner may adopt rules under section 84.027, subdivision 13, that designate:

(1) prohibited exotic species;

(2) regulated exotic species;

(3) unregulated exotic species;

(4) limited infestations of Eurasian watermilfoil; and

(5) infested waters.

#### **M.S. 84D.13 ENFORCEMENT; PENALTIES.**

Subdivision 1. **Enforcement.** Unless otherwise provided, this chapter and rules adopted under section 84D.12 may be enforced by conservation officers under sections 97A.205, 97A.211, and 97A.221 and by other licensed peace officers.



Subd. 2. **Cumulative remedy.** The authority of conservation officers to issue civil citations is in addition to other remedies available under law, except that the state may not seek penalties under any other provision of law for the incident subject to the citation.

Subd. 3. **Criminal penalties.** (a) A person who violates a provision of section 84D.05, 84D.06, 84D.07, 84D.08, or 84D.10, or a rule adopted under section 84D.12, is guilty of a misdemeanor.

(b) A person who refuses to obey an order of a peace officer or conservation officer to remove prohibited exotic species or aquatic macrophytes from any watercraft, trailer, or plant harvesting equipment is guilty of a misdemeanor.

Subd. 4. **Warnings; civil citations.** After appropriate training, conservation officers, other licensed peace officers, and other department personnel designated by the commissioner may issue warnings or citations to a person who:

- (1) unlawfully transports prohibited exotic species or aquatic macrophytes;
- (2) unlawfully places or attempts to place into waters of the state a trailer, a watercraft, or plant harvesting equipment that has prohibited exotic species attached;
- (3) unlawfully angles, anchors, or operates a watercraft in a marked area of a Eurasian watermilfoil limited infestation; or
- (4) intentionally damages, moves, removes, or sinks a buoy marking, as prescribed by rule, Eurasian watermilfoil.

Subd. 5. **Civil penalties.** A civil citation issued under this section may impose civil penalties up to the following penalty amounts:

- (1) for transporting aquatic macrophytes on a forest road as defined by section 89.001, subdivision 14, road or highway as defined by section 160.02, subdivision 7, or any other public road, \$50;
- (2) for placing or attempting to place into waters of the state a watercraft, a trailer, or plant harvesting equipment that has aquatic macrophytes attached, \$100;
- (3) for transporting a prohibited exotic species other than an aquatic macrophyte, \$100;
- (4) for placing or attempting to place into waters of the state a watercraft, a trailer, or plant harvesting equipment that has prohibited exotic species attached when the waters are not designated by the commissioner as being infested with that species, \$500 for the first offense and \$1,000 for each subsequent offense;
- (5) for angling, anchoring, or operating a watercraft in a marked area of a Eurasian watermilfoil limited infestation, other than as provided by law, \$100; and
- (6) for intentionally damaging, moving, removing, or sinking a buoy marking, as prescribed by rule, Eurasian watermilfoil, \$100.

Subd. 6. **Watercraft license suspension.** A civil citation may be issued to suspend, for up to a year, the watercraft license of an owner or person in control of a watercraft or trailer who refuses to submit to an inspection under section 84D.02, subdivision 4, or who refuses to comply with a removal order given under section 84D.13.

Subd. 7. **Satisfaction of civil penalties.** A civil penalty is due and a watercraft license suspension is effective 30 days after issuance of the civil citation. A civil penalty collected under this section is payable to the commissioner and must be credited to the water recreation account.

Subd. 8. **Appeal of civil citations and penalties.** A civil citation and penalty may be appealed under the procedures in section 116.072, subdivision 6, if the person to whom the citation was issued requests a hearing by notifying the commissioner within 15 days after receipt of the citation. If a hearing is not requested within the 15-day period, the citation becomes a final order not subject to further review.

#### **M.S. 84D.14 CERTAIN SPECIES NOT SUBJECT TO CHAPTER.**

This chapter does not apply to: (1) pathogens and terrestrial arthropods regulated under Minnesota Statutes, sections 18.44 to 18.61; or (2) mammals and birds defined by statute as livestock.

## SELECTED MINNESOTA STATUTES - DEPARTMENT OF NATURAL RESOURCES

**M.S. 84.027 POWERS AND DUTIES.****Subd. 13. Game and fish rules.**

(a) The commissioner of natural resources may adopt rules under sections 97A.0451 to 97A.0459 and this subdivision that are authorized under:

(1) chapters 97A, 97B, and 97C to set open seasons and areas, to close seasons and areas, to select hunters for areas, to provide for tagging and registration of game, to prohibit or allow taking of wild animals to protect a species, and to prohibit or allow importation, transportation, or possession of a wild animal; and

(2) sections 84.093, 84.14, 84.15, and 84.152 to set seasons for harvesting wild ginseng roots and wild rice and to restrict or prohibit harvesting in designated areas; and

(3) section **84D.12** to designate prohibited exotic species, regulated exotic species, unregulated exotic species, limited infestations of Eurasian watermilfoil, and infested waters.

Clause (2) does not limit or supersede the commissioner's authority to establish opening dates, days, and hours of the wild rice harvesting season under section 84.14, subdivision 3.

(b) If conditions exist that do not allow the commissioner to comply with sections 97A.0451 to 97A.0459, the commissioner may adopt a rule under this subdivision by submitting the rule to the attorney general for review under section 97A.0455, publishing a notice in the State Register and filing the rule with the secretary of state and the legislative commission to review administrative rules, and complying with section 97A.0459, and including a statement of the emergency conditions and a copy of the rule in the notice. The notice may be published after it is received from the attorney general or five business days after it is submitted to the attorney general, whichever is earlier.

(c) Rules adopted under paragraph (b) are effective upon publishing in the State Register and may be effective up to seven days before publishing and filing under paragraph (b), if:

(1) the commissioner of natural resources determines that an emergency exists;

(2) the attorney general approves the rule; and

(3) for a rule that affects more than three counties the commissioner publishes the rule once in a legal newspaper published in Minneapolis, St. Paul, and Duluth, or for a rule that affects three or fewer counties the commissioner publishes the rule once in a legal newspaper in each of the affected counties.

(d) Except as provided in paragraph (e), a rule published under paragraph (c), clause (3), may not be effective earlier than seven days after publication.

(e) A rule published under paragraph (c), clause (3), may be effective the day the rule is published if the commissioner gives notice and holds a public hearing on the rule within 15 days before publication.

(f) The commissioner shall attempt to notify persons or groups of persons affected by rules adopted under paragraphs (b) and (c) by public announcements, posting, and other appropriate means as determined by the commissioner.

(g) Notwithstanding section 97A.0458, a rule adopted under this subdivision is effective for the period stated in the notice but not longer than 18 months after the rule is adopted.

**M.S. 86B.415 LICENSE FEES.**

**Subd. 7. Watercraft surcharge.** A \$5 surcharge is placed on each watercraft license under subdivisions 1 to 5, for control, public awareness, law enforcement, monitoring, and research of nuisance aquatic exotic species such as zebra mussel, purple loosestrife and Eurasian watermilfoil in public waters and public wetlands.

**History:** 1990 c 391 art 9 s 24; 1991 c 199 art 1 s 12; 1991 c 254 art 2 s 19; 1992 c 594 s 10; 1993 c 235 s 3; 1995 c 220 s.

**M.S. 97A.105 GAME AND FUR FARMS.****Subdivision. 1. License requirements.**

(a) A person may breed and propagate fur-bearing animals, game birds, bear, moose, elk, caribou, mute swans, or deer only on privately owned or leased land and after obtaining a license. Any of the permitted animals on a game farm may be sold to other licensed game farms. "Privately owned or leased land" includes waters that are shallow or marshy, are not actually navigable, and are not of substantial

beneficial public use. Before an application for a license is considered, the applicant must enclose the area to sufficiently confine the animals to be raised in a manner approved by the commissioner. A license may be granted only if the commissioner finds the application is made in good faith with intention to actually carry on the business described in the application and the commissioner determines that the facilities are adequate for the business.

(b) A person may purchase live game birds or their eggs without a license if the birds or eggs, or birds hatched from the eggs, are released into the wild, consumed, or processed for consumption within one year after they were purchased or hatched. This paragraph does not apply to the purchase of migratory waterfowl or their eggs.

A person may not introduce **mute swans** into the wild without a permit issued by the commissioner.

#### **M.S. 97A.205 ENFORCEMENT OFFICER POWERS.**

An enforcement officer is authorized to:

(1) execute and serve court issued warrants and processes relating to wild animals, wild rice, public waters, water pollution, conservation, and use of water, in the same manner as a constable or sheriff;

(2) enter any land to carry out the duties and functions of the division;

(3) make investigations of violations of the game and fish laws;

(4) take an affidavit, if it aids an investigation;

(5) arrest, without a warrant, a person who is detected in the actual violation of the game and fish laws, a provision of chapters 84, 84A, **84D**, 85, 86A, 88 to 97C, 103E, 103F, 103G, sections 86B.001 to 86B, 815, 89.51 to 89.61; or 609.66, subdivision 1, clauses (1), (2), (5), and (7); and 609.68; and (6) take an arrested person before a court in the county where the offense was committed and make a complaint. Nothing in this section grants an enforcement officer any greater powers than other licensed peace officers.

#### **M.S. 97A.221 SEIZURE AND CONFISCATION OF PROPERTY.**

Subdivision 1. **Property subject to seizure and confiscation.** (a) An enforcement officer may seize:

(1) wild animals, wild rice, and other aquatic vegetation taken, bought, sold, transported, or possessed in violation of the game and fish laws or chapter 84 or **84D** ; ...

### **SELECTED MINNESOTA STATUTES - NOXIOUS WEEDS**

#### **M.S. 18.75 PURPOSE**

It is the policy of the legislature that residents of the state be protected from the injurious effects of noxious weeds on public health, the environment, public roads, crops, livestock, and other property. Sections 18.76 to 18.88 contain procedures for controlling and eradicating noxious weeds on all lands within the state.

#### **M.S. 18.76 CITATION.**

Sections 18.76 to 18.88 may be cited as the "Minnesota noxious weed law."

#### **M.S. 18.77 DEFINITIONS.**

Subd. 8. **Noxious weed.** "Noxious weed" means an annual, biennial, or perennial plant that the commissioner ( of agriculture) designates to be injurious to public health, the environment, public roads, crops, livestock, or other property. (MN Department of Agriculture Commissioner's Order declares purple loosestrife, both *L. salicaria* and *L. virgatum* to be a noxious weed.)

#### **M.S. 18.78 CONTROL OR ERADICATION OF NOXIOUS WEEDS.**

Subdivision 1. **Generally** Except as provided in section 18.85, a person owning land, a person occupying land, or a person responsible for the maintenance of public land shall control or eradicate all noxious weeds on the land at a time and in a manner ordered by the commissioner (of agriculture), a county agricultural inspector, or a local weed inspector.

**Subdivision 2. Control of purple loosestrife** Except as provided below, an owner of nonfederal lands underlying public waters or wetlands designated under section 103G.201 is not required to control or eradicate purple loosestrife below the ordinary high water level of the public water or wetland. The commissioner of natural resources is responsible for control and eradication of purple loosestrife on public waters and wetlands designated under section 103G.201, except those located upon lands owned in fee title or managed by the United States. The officers, employees, agents and contractors of the commissioner of natural resources may enter upon public waters and wetlands designated under section 103G.201 and, after providing notification to the occupant or owner of the land, may cross adjacent lands as necessary for the purpose of investigating purple loosestrife infestations, formulating methods of eradication, and implementing control and eradication of purple loosestrife. The commissioner, after consultation with the commissioner of agriculture, shall, by June 1 of each year, compile a priority list of purple loosestrife infestations to be controlled in designated public waters. The commissioner of agriculture must distribute the list to county agriculture inspectors, local weed inspectors, and their appointed agents. The commissioner of natural resources shall control listed purple loosestrife infestations in priority order within the limits of appropriations provided for that purpose. This procedure shall be the exclusive means for control of purple loosestrife on designated public waters by the commissioner of natural resources and shall supersede the other provisions for control of noxious weeds set forth elsewhere in Minnesota Statutes, chapter 18. The responsibility of the commissioner to control and eradicate purple loosestrife on public waters and wetlands located on private lands and the authority to enter upon private lands ends ten days after receipt by the commissioner of natural resources of a written statement from the landowner that the landowner assumes all responsibility for control and eradication of purple loosestrife under sections 18.78 to 18.88. State officers, employees, agents, and contractors of the commissioner of natural resources are not liable in a civil action for trespass committed in the discharge of their duties under this section and are not liable to anyone for damages, except for damages arising from gross negligence.

#### **M.S. 18.79 DUTIES OF THE COMMISSIONER (OF AGRICULTURE).**

Subd. 1. **Enforcement.** The commissioner of agriculture shall administer and enforce sections 18.76 to 18.88.

Subd. 4. **Rules.** The commissioner may adopt necessary rules under chapter 14 for the proper enforcement of sections 18.76 to 18.88.

Subd. 5. **Order For Control Or Eradication Of Noxious Weeds.** The commissioner (of agriculture), a county agricultural inspector, or a local weed inspector may order the control or eradication of noxious weeds on any land within the state.

### **MINNESOTA STATUTES - RESTRICTED SPECIES, EXOTIC SPECIES**

#### **M.S. 17.457 RESTRICTED SPECIES.**

Subdivision 1. **Definitions.** (a) The definitions in this subdivision apply to this section.

(b) "Commissioner" means the commissioner of agriculture.

(c) "Restricted species means Eurasian wild pigs and their hybrids (*Sus scrofa* subspecies and *Sus scrofa* hybrids), excluding domestic hogs (*Sus scrofa domesticus*).

(d) "Release" means an intentional introduction or escape of a species from the control of the owner or responsible party.

Subd. 2. **Importation; possession; release of restricted species.** It is unlawful for a person to import, possess, propagate, transport, or release restricted species, except as provided in subdivision 3.

Subd. 3. **Permits.** (a) The commissioner may issue permits for the transportation, possession, purchase, importation of restricted species for scientific, research, education, or commercial purposes. A permit issued under this subdivision may be revoked by the commissioner if the conditions of the permit are not met by the permittee or for any unlawful act or omission, including accidental escapes.

(b) The commissioner may issue permits for a person to possess and raise a restricted species for commercial purposes if the person was in possession of the restricted species on March 1, 1993. Under the permit, the number of breeding stock of the restricted species in the possession of the person may not increase by more than 25 percent and the person must comply with the certification requirements in subdivision 7.

(c) A person may possess a restricted species without a permit for a period not to exceed two days for the purpose of slaughtering the restricted species for human consumption.

Subd. 4. **Notice of escape of restricted species.** In the event of an escape of a restricted species, the owner must notify within 24 hours a conservation officer and the board of animal health and is responsible for the recovery of the species. The commissioner may capture or destroy the escaped animal at the owner's expense.

Subd. 5. **Enforcement.** This section may be enforced under sections 97A.205 and 97A.211.

Subd. 6. **Penalty.** A person who violates subdivision 2, 4, or 7 is guilty of a misdemeanor.

Subd. 7. **Certification and identification and identification requirements.** (a) A person who possesses restricted species on July 1, 1993, must submit certified numbers of restricted species in the person's possession to the board of animal health by June 1, 1993.

(b) Restricted species in the possession of a person must be marked in a permanent fashion to identify ownership. The restricted species must be marked as soon as practicable after birth or purchase.

Subd. 8. **Containment.** The commissioner, in consultation with the commissioner of natural resources, shall develop criteria for approved containment measures for restricted species with the assistance of producers of restricted species.

Subd. 9. **Bond; security.** A person who possesses restricted species must file a bond or deposit with the commissioner security in the form and amount determined by the commissioner to pay for the costs and damages caused by an escape of restricted species.

Subd. 10. **Fee.** The commissioner shall impose a fee for permits in an amount sufficient to cover the costs of issuing the permits and for facility inspections. The fee may not exceed \$50. Fee receipts must be deposited in the state treasury and credited to the special revenue fund and are appropriated to the commissioner for the purposes of this section.

**History:** 1993 c 129 s 3; 1994 c 623 art 1 s 16-18, 46.

## Appendix B - Minnesota Rules Regarding Harmful Exotic Species

### CONTENTS

|                | Page  |
|----------------|---|
| M.R. 6110.1500 | WATERWAYS MARKERS (Milfoil Areas) ..... 115   |
| M.R. 6216.0100 | PURPOSE. .... 115   |
| M.R. 6216.0200 | DEFINITIONS. .... 115   |
| M.R. 6216.0230 | NOMENCLATURE ..... 116  |
| M.R. 6216.0250 | PROHIBITED EXOTIC SPECIES.<br>(Designation; Aquatic plants; Fish; Invertebrates; Mammals) ..... 116   |
| M.R. 6216.0260 | REGULATED EXOTIC SPECIES<br>(Designation; Aquatic plants; Fish; Invertebrates; Birds) ..... 117   |
| M.R. 6216.0265 | PERMITS FOR PROHIBITED AND REGULATED EXOTIC SPECIES<br>(Requirement, Exemptions and alternate permits for regulated exotic species, Prohibited exotic species permit limitation, Eligibility; prohibited exotic species permit, Permit application, Inspection of facilities or equipment, Transferability, Expiration date and renewal, Revocation of permit, Disclaimer of liability, Effective date) ..... 117 |
| M.R. 6216.0270 | UNREGULATED EXOTIC SPECIES<br>(Designation; Fish; Invertebrates; Mammals; Birds) ..... 119  |
| M.R. 6216.0280 | ESCAPE OF EXOTIC SPECIES<br>(Reporting, Information required) ..... 119   |
| M.R. 6216.0290 | PROCESS FOR REVIEW OF PROPOSED INTRODUCTIONS OF<br>UNLISTED EXOTIC SPECIES<br>(Applications and information required, Application review, Review period, Review process, Comment period and comments, Designation and notification) ..... 119   |
| M.R. 6216.0300 | DESIGNATION, NOTICE, AND MARKING OF INFESTED WATERS<br>AND LIMITED INFESTATIONS OF EURASIAN WATERMILFOIL. .... 120  |
| M.R. 6216.0350 | DESIGNATED INFESTED WATERS<br>(Listing of waters infested with Eurasian water milfoil, round goby, ruffe, spiny water flea, white perch, and zebra mussels) ..... 121   |
| M.R. 6216.0400 | RESTRICTED ACTIVITIES ON INFESTED WATERS.<br>(Prohibition of taking bait from infested waters; Prohibition of sport gill netting for whitefish and ciscoe in infested waters; Commercial fishing restrictions in infested waters; Prohibition on entry into delineated areas marked for limited infestation of Eurasian watermilfoil) ..... 124   |
| M.R. 6216.0500 | TRANSPORTATION OF WATER FROM INFESTED WATERS. .... 124  |
| M.R. 6216.0600 | VIOLATIONS; CONFISCATIONS. .... 125   |



**WATERWAY MARKERS**

**M.R. Chapter 6110.1500, Subp. 7. Milfoil areas.** Buoys or signs indicating an area that is infested with Eurasian watermilfoil may be marked using a solid yellow sign or buoy. If a buoy is used, it shall be no less than four inches in diameter and extend at least 30 inches above the surface of the water. The words "Milfoil Area" must appear on opposing sides of the buoy in at least two-inch high black letters. If a sign is used, it shall be no more than 12 inches in width or more than 18 inches in height and extend 30 inches above the surface of the water at normal water level. The words "Milfoil Area" must appear on the sign in at least two-inch high black letters.

**MINNESOTA RULES CHAPTER 6216 - HARMFUL EXOTIC SPECIES**

(note: amendments included in these rules became effective June 2, 1998)

**6216.0100 PURPOSE.**

The purpose of parts 6216.0100 to 6216.0600 is to prevent the spread of harmful exotic species, including prohibited and regulated exotic aquatic plants and wild animals, into and within the state as authorized by Minnesota Statutes, sections 17.497 and 84D.12, while allowing flexibility for conditional possession of harmful exotic species. Parts 6216.0100 to 6216.0600 also provide a public process for designation of infested waters and classification and designation of exotic species according to criteria in statute.

STAT AUTH: MS s 84.9691; 84D.12

HIST: 20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076

**6216.0200 DEFINITIONS.**

Subpart 1. **Scope.** For the purposes of parts 6216.0100 to 6216.0600, the terms used have the meanings given to them in Minnesota Statutes, section 84D.01, unless otherwise noted in this part.

Subp. 1a. **Applicant.** "Applicant" means a person who applies for a Minnesota Department of Natural Resources prohibited exotic species permit or regulated exotic species permit according to part 6216.0265, a water appropriation permit or public works permit according to Minnesota Statutes, chapter 103G, or an infested water permit according to part 6216.0500, subpart 6, or who requests a determination of the appropriate classification of an unlisted exotic species for introduction according to Minnesota Statutes, section 84D.06.

Subp. 2. **Commissioner.** "Commissioner" means the commissioner of natural resources of Minnesota or the commissioner's designated representative.

Subp. 3. **Department.** "Department" means the Minnesota Department of Natural Resources.

Subp. 3a. **Free-living state.** "Free-living state" means to be unconfined or outside the control of a person, and:

A. in the case of animals other than fish, includes the ability to fly, walk, or swim out of human control;  
B. in the case of a fish or aquatic plants, the following locations shall be considered to be in a free-living state:

- (1) waters identified as public waters;
- (2) natural or artificial waters that are continually or intermittently connected to public waters; or
- (3) water-using facilities, such as fish hatcheries, aquatic farms, zoos, and minnow retail or wholesale operations, with outflows that provide direct access for species to enter public waters; and

C. in the case of a fish or aquatic plant, the following locations are not considered a free-living state:

- (1) artificial ponds such as water gardens that have no outlet to public waters;
- (2) waters whose shorelines are entirely within the land owned by a person, not continually or intermittently connected to public waters, and not identified by the department as public waters; or
- (3) water-using facilities, such as fish hatcheries, aquatic farms, zoos, and minnow retail or wholesale operations, with outflows that do not provide direct access for species to enter public waters.

Subp. 4. **Repealed, 22 SR 2076**

Subp. 4a. **Introduction.** "Introduction" has the meaning given in Minnesota Statutes, section 84D.01, subdivision 9. Introduction does not include the immediate return of an exotic species to waters of the state from which it was removed.

"Introduce" means the act of introduction.

Subp. 5. **Littoral area.** "Littoral area" means any part of a body of water 15 feet deep or less.

Subp. 6. **Person.** "Person" has the meaning given in Minnesota Statutes, section 645.44, subdivision 7.

Subp. 7. **Public waters.** "Public waters" means public waters as defined under Minnesota Statutes, section 103G.005, subdivision 15, that have been designated as public waters under the public waters inventory pursuant to Minnesota Statutes, section 103G.201.

STAT AUTH: MS s 84.9691; 84D.12

HIST: 20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076

#### 6216.0230 NOMENCLATURE.

The scientific taxonomic nomenclature used in parts 6216.0100 to 6216.0600 follows the nomenclature assigned by the following sources, which are incorporated by reference. The sources are available through the Minitex interlibrary loan system and are not subject to frequent change:

A. The American Fisheries Society, Common and Scientific Names of Fishes from the United States and Canada (fifth edition 1991);

B. John J. Mayer and I. Lehr Brisbin, Jr., Wild Pigs in the United States (1991);

C. The American Ornithologists' Union, Checklist of North American Birds (sixth edition 1983 and subsequent supplements);

D. John T. Kartesz, A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland (second edition 1994);

E. Ronald M. Nowak, Walker's Mammals of the World (fifth edition 1991);

F. A.J. Healy and Elizabeth Edgar, Flora of New Zealand, volume III (1980);

G. C.J. Webb, W.R. Sykes, and P.J. Garnock-Jones, Flora of New Zealand, volume IV (1988); and

H. Flora of North America Editorial Committee, Flora of North America North of Mexico, volume 3 (1997) (for waterlilies only).

STAT AUTH: MS s 84D.12

HIST: 22 SR 2076

#### 6216.0250 PROHIBITED EXOTIC SPECIES.

Subpart 1. **Designation.** The species in subparts 2 to 5 and any hybrids, cultivars, or varieties of the species are designated as prohibited exotic species.

Subp. 2. **Aquatic plants.** The following aquatic plants are designated as prohibited exotic species:

A. African oxygen weed (*Lagarosiphon major*) (Ridley) Moss ex Wagner;

B. aquarium watermoss or giant salvinia (*Salvinia molesta*) Mitchell;

C. Australian stonecrop (*Crassula helmsii*) (Kirk) Cockayne;

D. curly-leaf pondweed (*Potamogeton crispus*) Linnaeus;

E. Eurasian water milfoil (*Myriophyllum spicatum*) Linnaeus;

F. European frog-bit (*Hydrocharis morsus-ranae*) Linnaeus;

G. flowering rush (*Butomus umbellatus*) Linnaeus;

H. hydrilla (*Hydrilla verticillata*) (Carl von Linnaeus) Royle;

I. Indian swampweed (*Hygrophila polysperma*) (Roxburgh) T. Anders;

J. purple loosestrife (*Lythrum salicaria*, *Lythrum virgatum*, or any variety, hybrid, or cultivar thereof) Linnaeus;

K. water aloe or water soldiers (*Stratiotes aloides*) Linnaeus; and

L. water chestnut (*Trapa natans*) Linnaeus.

Subp. 3. **Fish.** The following fish are designated as prohibited exotic species:

A. bighead carp (*Hypophthalmichthys nobilis*) Richardson;

B. black carp (*Mylopharyngodon piceus*) (Richardson) Peters;

C. grass carp (*Ctenopharyngodon idella*) Valenciennes;

D. round goby (*Neogobius melanostomus*);

E. rudd (*Scardinius erythrophthalmus*) Linnaeus;

F. ruffe (*Gymnocephalus cernuus*) Linnaeus;

G. sea lamprey (*Petromyzon marinus*) Linnaeus;

H. silver carp (*Hypophthalmichthys molitrix*) Valenciennes;

I. white perch (*Morone americana*) Gmelin; and

J. zander (*Stizostedion lucioperca*) Linnaeus.

Subp. 4. **Invertebrates.** The following invertebrate is designated as a prohibited exotic species:

zebra mussel (*Dreissena* spp.).

Subp. 5. **Mammals.** The following mammals are designated as prohibited exotic species:

- A. Asian raccoon dog, also known as finnraccoon (*Nyctereutes procyonoides*);
- B. Eurasian swine, European wild boar (*Sus scrofa scrofa*) Linnaeus;
- C. European rabbit (*Oryctolagus cuniculus*); and
- D. nutria, any strain (*Myocastor coypu*).

STAT AUTH: MS s 84.9691; 84D.12

HIST: 20 SR 2292(NO. 43); L 1996 c 385 art 2 s 7; 22 SR 2076

#### 6216.0260 REGULATED EXOTIC SPECIES.

Subpart 1. **Designation.** The species in subparts 2 to 5 are designated as regulated exotic species.

Subp. 2. **Aquatic plants.** The following aquatic plants are designated as regulated exotic species:

- A. Carolina fanwort or fanwort (*Cabomba caroliniana*) A. Gray;
- B. parrot's feather (*Myriophyllum aquaticum*) (da Conceicao Vellozo) Verdcourt; and
- C. nonnative waterlilies (*Nymphaea* spp.) Linnaeus, or any variety, hybrid, or cultivar thereof. Native Minnesota waterlilies are: *Nymphaea odorata* Aiton subsp. *odorata* Aiton, *N. leibergeii* Morong, and *N. Odorata* Aiton subsp. *tuberosa* (Paine) Wiersema & Hellquist.

Subp. 3. **Fish.** The following fish are designated as regulated exotic species:

- A. alewife (*Alosa pseudoharengus*) Wilson;
- B. common carp, koi (*Cyprinus carpio*) Linnaeus;
- C. goldfish (*Carassius auratus*) Linnaeus;
- D. rainbow smelt (*Osmerus mordax*) Mitchell; and
- E. tilapia (*Tilapia*, *Oreochromis*, *Sartheradon* spp.).

Subp. 4. **Invertebrates.** The following invertebrates are designated as regulated exotic species:

- A. Chinese mystery snail, Japanese trap door snail (*Cipangopaludina* spp.) Hannibal;
- B. rusty crayfish (*Orconectes rusticus*) Girard; and
- C. spiny water flea (*Bythotrephes cederstroemi*) Schoedler.

Subp. 5. **Birds.** The following birds are designated as regulated exotic species:

- A. Egyptian goose (*Alopochen aegyptias*) Linne;
- B. mute swan (*Cygnus olor*) Gmelin; and
- C. Sichuan pheasant (*Phasianus colchicus strachi*).

STAT AUTH: MS s 84D.12

HIST: 22 SR 2076

#### 6216.0265 PERMITS FOR PROHIBITED AND REGULATED EXOTIC SPECIES.

Subpart 1. **Requirement.** No person may possess, import, purchase, propagate, or transport a prohibited exotic species without a permit from the commissioner issued according to this part, except as authorized by Minnesota Statutes, section 84D.05. No person may introduce a regulated exotic species without a permit from the commissioner issued according to this part, except as authorized in subpart 2. A regulated exotic species permit is not required for a person to possess, import, purchase, propagate, transport, own, or sell a regulated exotic species.

Subp. 2. **Exemptions and alternate permits for regulated exotic species.** In lieu of an additional permit issued under Minnesota Statutes, section 84D.11, permits and licenses issued under Minnesota Statutes, sections 17.4981 to 17.4994 and chapter 97C, and rules adopted thereunder, may authorize the introduction of regulated exotic species, provided that the conditions specified in those permits and licenses are in accordance with the conditions specified under this part.

Subp. 3. **Prohibited exotic species permit limitation.** A person may apply for a permit for prohibited exotic species only for the purposes of disposal, control, research, or education according to Minnesota Statutes, section 84D.11, subdivision 1.

Subp. 4. **Eligibility; prohibited exotic species permit.** An applicant for a prohibited exotic species permit must:

- A. have experience in the skills necessary for handling potentially harmful species, including:
  - (1) knowledge of precautions necessary to prevent spread through handling; or
  - (2) previous experience handling harmful exotic species without allowing escapes;
- B. maintain a facility or transportation equipment that prevents the escape of exotic species;
- C. if the applicant is an individual, be at least 18 years of age at the time the application is received by the department; and

D. if the applicant is a corporation, limited partnership, or other business entity, be qualified to do business in Minnesota as shown by a certificate of authority to transact business in Minnesota or a certificate of limited partnership from the Minnesota Secretary of State.

**Subp. 5. Permit application.**

A. Written application for a permit for a prohibited or regulated exotic species shall be made on a form prescribed by the commissioner and shall contain the following:

(1) the legal name, address, daytime and evening telephone numbers, and, if an individual, date of birth of the applicant;

(2) the scientific and common names of either the prohibited exotic species that the applicant desires to propagate, possess, import, purchase, or transport or the regulated exotic species that the applicant desires to introduce;

(3) a detailed description of the activity the applicant will be undertaking;

(4) a detailed description of the facilities or transportation equipment to be used and an explanation of how the equipment is sufficient to prevent an unauthorized introduction of a prohibited exotic species;

(5) a description of the applicant's experience in handling the same or similar species;

(6) a written contingency plan for eradication or recapture in the event of an unauthorized introduction of the prohibited exotic species; and

(7) an agreement to comply with the requirements of parts 6216.0100 to 6216.0600.

B. The commissioner may request additional information from the applicant in writing after the application is received if necessary to evaluate the potential risk to the state's resources.

C. The commissioner shall review the permit applications and respond to the applicant within 30 days of receipt of the application or the additional information requested in item B.

**Subp. 6. Inspection of facilities or equipment.** After receipt of an application for a prohibited exotic species permit, and a determination by the commissioner that the applicant has satisfied all the initial requirements for a permit as described in this part, the commissioner may inspect the applicant's holding facilities or other containment or transportation equipment. Facilities holding prohibited exotic species under permit are subject to inspection by the commissioner at any reasonable time.

**Subp. 7. Transferability.** A permit issued under this part is not transferable.

**Subp. 8. Expiration date and renewal.** All prohibited exotic species and regulated exotic species permits expire at midnight on December 31 of each year, unless otherwise specified in the permit. Applications for renewal of permits shall be made by October 1 of the year the permit expires. Applications for renewal shall describe any changes to the information initially required in subpart 5.

**Subp. 9. Revocation of permit.**

A. The commissioner may revoke all or part of a permit issued under this part when:

(1) the commissioner determines that a permittee has failed to comply with parts 6216.0100 to 6216.0600; or

(2) it is necessary to protect the interests of the public, to protect native plant and animal populations in the state, or to otherwise protect the state's natural resources.

B. Except in an emergency situation when delay would threaten the state's natural resources, the commissioner shall, at least 14 days prior to the effective date of the revocation, inform the permit holder in writing of the nature of the revocation and of the conditions that, in the commissioner's opinion, require revocation.

C. Within 30 days of receipt of a notice of revocation, the permit holder may apply for an amendment to the permit or request a hearing before the commissioner to contest the revocation, to support the permit holder's proposed amendment, or both.

D. The permit shall be revoked on the date stated on the revocation notice until such time that the decision is reversed or modified.

**Subp. 10. Disclaimer of liability.** A prohibited exotic species permit or regulated exotic species permit issued under this part is permissive only. No liability is assumed by the state or any of its officers, agents, or employees by issuing a prohibited or regulated exotic species permit or by any acts or operations of the permittee or any prohibited or regulated exotic species in possession of the permittee.

**Subp. 11. Effective date.** A person possessing, importing, purchasing, selling, propagating, transporting, or introducing a prohibited exotic species on June 2, 1998, must apply for a permit within 60 days of June 2, 1998.

STAT AUTH: MS s 84D.12

HIST: 22 SR 2076

**6216.0270 UNREGULATED EXOTIC SPECIES.**

Subpart 1. **Designation.** The species in subparts 2 to 5 are designated as unregulated exotic species. These exotic species are not subject to regulation under Minnesota Statutes, chapter 84D.

Subp. 2. **Fish.** The following fish are designated as unregulated exotic species:

- A. Atlantic salmon (*Salmo salar*) Linnaeus;
- B. brown trout (*Salmo trutta*) Linnaeus;
- C. coho salmon (*Oncorhynchus kisutch*) Walbaum;
- D. Chinook salmon (*Oncorhynchus tshawytscha*) Walbaum;
- E. pink salmon (*Oncorhynchus gorbuscha*) Walbaum;
- F. rainbow trout (*Oncorhynchus mykiss*) Walbaum; and
- G. subtropical, tropical, and saltwater fish, except anadromous species.

Subp. 3. **Invertebrates.** The following invertebrates are designated as unregulated exotic species: subtropical, tropical, and saltwater invertebrates.

Subp. 4. **Mammals.** The following mammal is designated as an unregulated exotic species: rat (*Rattus norvegicus* and *Rattus rattus*).

Subp. 5. **Birds.** The following birds are designated as unregulated exotic species:

- A. chuckar partridge (*Alectoris chuckar*) Gray;
- B. helmeted Guinea fowl (*Numida meleagris*) Linnaeus;
- C. house sparrow (*Passer domesticus domesticus*) Linnaeus;
- D. Hungarian partridge, gray partridge (*Perdix perdix*) Linnaeus;
- E. peafowl (*Pavo cristatus*) Linnaeus;
- F. pigeon or rock dove (*Columba livia*) Gmelin;
- G. ring-necked pheasant (*Phasianus colchicus*) Linnaeus; and
- H. starling (*Sturnus vulgaris vulgaris*) Linnaeus.

STAT AUTH: MS s 84D.12

HIST: 22 SR 2076

**6216.0280 ESCAPE OF EXOTIC SPECIES.**

Subpart 1. **Reporting.** To report an unauthorized introduction of prohibited, regulated, or unlisted exotic animal species, in compliance with Minnesota Statutes, section 84D.10, a person shall notify the department's area or regional conservation officer or the exotic species program staff in the department's St. Paul office by telephone within 48 hours after learning of the unauthorized introduction.

Subp. 2. **Information required.** The following information shall be provided to the department about the unauthorized introduction:

- A. the quantity and species;
- B. the location of the introduction;
- C. the date and time the introduction occurred or was discovered;
- D. the last known location of the species; and
- E. the reporter's address and daytime and evening telephone numbers.

STAT AUTH: MS s 84D.12

HIST: 22 SR 2076

**6216.0290 PROCESS FOR REVIEW OF PROPOSED INTRODUCTIONS OF UNLISTED EXOTIC SPECIES.**

Subpart 1. **Applications and information required.**

A. A person who seeks to introduce an unlisted exotic species in the state according to Minnesota Statutes, section 84D.06, shall submit an application on a form prescribed by the commissioner. The form shall request the following information:

- (1) the name, address, and telephone number of the applicant;
- (2) the scientific and common names, family, and reference used for the scientific name of the unlisted exotic species proposed for introduction;
- (3) the number of individual plants or animals proposed for introduction;
- (4) the reason and need for the proposed introduction;
- (5) the potential to use native species for the same purpose;
- (6) the location for the proposed introduction;
- (7) scientific-based information about the native range of the unlisted exotic species;



- (8) the source of the actual individual organisms proposed to be introduced;
- (9) scientific-based information about the ability of the unlisted exotic species to naturalize, displace native species, and harm natural resources or their use in similar climates and latitudes; and
- (10) an assessment of the potential adverse impacts on native Minnesota species and ecosystems, including scientific-based information about:
  - (a) the potential to introduce disease or parasites to native fish or wildlife populations;
  - (b) the potential for interbreeding or hybridizing with native fish or wildlife;
  - (c) the potential predation on native fish or wildlife; and
  - (d) any possible competition with native fish, wildlife, or aquatic plants for food, habitat, water, or other resources.

B. The commissioner may request additional information in writing after the application is received if necessary to assess the potential impacts of an introduction.

**Subp. 2. Application review.** The commissioner shall reject an application within ten working days after receipt of the application if the application does not contain the information required in subpart 1.

**Subp. 3. Review period.** Within 60 days of receipt of an application that contains the information in subpart 1, the commissioner shall assess the apparent risk of the introduction in the state and classify the species according to Minnesota Statutes, section 84D.04, subdivision 2. If the commissioner determines during the 60-day period that there should be a public comment period for the proposed introduction, or the commissioner determines that additional information is necessary to adequately evaluate the proposed introduction, the commissioner may extend the review period and state the basis of the extension in writing to the applicant. The review period may be extended to a date 30 days from the end of the public comment period or receipt by the department of the additional information requested from the applicant.

**Subp. 4. Review process.** Prior to classification of an unlisted exotic species and making a final assessment on a proposed introduction, the commissioner may:

- A. seek information and opinions from technical experts;
- B. solicit public comment and hold public hearings on the proposed introduction;
- C. consult with other potentially affected jurisdictions; and
- D. in the case of an animal species, request a certificate of veterinary inspection or other appropriate certification that the animal is pathogen-free.

**Subp. 5. Comment period and comments.** If the commissioner determines that a public comment period is necessary on the proposed introduction, the commissioner shall promptly proceed to publish a notice in the EQB Monitor, which is published by the Environmental Quality Board. A 30-day period for review and comment begins the day a notice of the public comment period is published in the EQB Monitor. Written comments to the commissioner during the public comment period may address the accuracy and completeness of material contained in the application, additional information regarding the proposed introduction that is not contained in the application, or potential impacts that may warrant further investigation before the commissioner acts on the proposed introduction.

**Subp. 6. Designation and notification.** After completion of the review of a proposal to introduce an unlisted exotic species and making a determination of the appropriate classification, the commissioner shall designate the species and notify the applicant as required under Minnesota Statutes, section 84D.06.

STAT AUTH: MS s 84D.12

HIST: 22 SR 2076

## **6216.0300 DESIGNATION, NOTICE, AND MARKING OF INFESTED WATERS AND LIMITED INFESTATIONS OF EURASIAN WATER MILFOIL.**

**Subpart 1. Designation of infested waters and notice.** The commissioner shall designate infested waters. The commissioner shall publish the names of designated water bodies in the State Register before May 1 of each year and provide notice through other available means where practical. The department shall post signs describing the infestation at all public accesses to designated water bodies. At any time, the commissioner may designate additional water bodies or remove from designation those water bodies which no longer are infested waters.

**Subp. 2. Designation of limited infestations of Eurasian water milfoil and notice.** The commissioner shall designate water bodies having limited infestations of Eurasian water milfoil as defined in Minnesota Statutes, section 84.967, subdivision 3. The commissioner shall publish the names of designated water bodies in the State Register before May 1 of each year and provide notice through other available means where practical. The department shall post signs describing the infestation at all public accesses to designated water bodies. At any time, the commissioner may designate additional water



bodies or remove from designation those water bodies which no longer have limited infestations.

Subp. 3. **Delineation and markers for limited infestations of Eurasian water milfoil.** Areas of infestation of Eurasian water milfoil where control is planned in water bodies designated as having limited infestations shall be marked by the commissioner, or other persons authorized by the commissioner, using buoys or signs as specified in part 6110.1500, subpart 7. A minimum of three buoys or signs must be used to delineate an infested area, and placed at intervals of not more than 300 feet apart. In addition, at least two buoys or signs shall be placed at or near the shoreline to delineate an infested area if adjacent to shore. Buoys or signs shall be removed after control actions are completed and the posting requirements specified in Minnesota Rules, part 6280.0600, subpart 2, have been met.

STAT AUTH: MS s 84.9691; 84D.12

HIST: 20 SR 2292(NO. 43); 22 SR 2076

#### 6216.0350 DESIGNATED INFESTED WATERS.

Subpart 1. **Listing of waters infested with Eurasian water milfoil.** The following water bodies are designated by the commissioner as infested with Eurasian water milfoil (*Myriophyllum spicatum*). Activities at these waters are subject to parts 6216.0100 to 6216.0600, Minnesota Statutes, section 84D.13, and other applicable laws.

| DNR Protected Waters                             |                  |
|--|------------------|
| Name   | Inventory Number |
| <b>A. Anoka County</b>                           |                  |
| (1) Cenaiko Lake                                 | 02-0654          |
| (2) Crooked Lake                                 | 02-0084          |
| (3) Otter Lake                                   | 02-0003          |
| (4) Unnamed lake in<br>Springbrook Nature Center | 02-0688          |
| <b>B. Carver County</b>                          |                  |
| (1) Ann Lake                                     | 10-0012          |
| (2) Auburn Lake                                  | 10-0044          |
| (3) Bavaria Lake                                 | 10-0019          |
| (4) Firemen's Lake                               | 10-0226          |
| (5) Lotus Lake                                   | 10-0006          |
| (6) Lake Minnewashta                             | 10-0009          |
| (7) Pierson Lake                                 | 10-0053          |
| (8) Riley Lake                                   | 10-0002          |
| (9) Schutz Lake                                  | 10-0018          |
| (10) Stone Lake                                  | 10-0056          |
| (11) Lake Virginia                               | 10-0015          |
| (12) Lake Waconia                                | 10-0059          |
| (13) Lake Zumbra                                 | 10-0041          |
| <b>C. Chisago County</b>                         |                  |
| (1) Green Lake                                   | 13-0041          |
| (2) Rush Lake                                    | 13-0069          |
| <b>D. Crow Wing County</b>                       |                  |
| (1) Bay Lake                                     | 18-0034          |
| (2) Ruth Lake                                    | 18-0212          |
| <b>E. Dakota County</b>                          |                  |
| (1) Crystal Lake                                 | 19-0027          |
| (2) Lac Lavon                                    | 19-0347          |
| (3) Twin Lakes                                   | 19-0028          |
| <b>F. Douglas County</b>                         |                  |
| (1) Oscar Lake                                   | 21-0257          |
| <b>G. Hennepin County</b>                        |                  |
| (1) Arrowhead Lake                               | 27-0045          |
| (2) Brownie Lake                                 | 27-0038          |
| (3) Bryant Lake                                  | 27-0067          |

|                        |         |
|------------------------|---------|
| (4) Bush Lake          | 27-0047 |
| (5) Lake Calhoun       | 27-0031 |
| (6) Cedar Lake         | 27-0039 |
| (7) Christmas Lake     | 27-0137 |
| (8) Dutch Lake         | 27-0181 |
| (9) Eagle Lake         | 27-0111 |
| (10) Fish Lake         | 27-0118 |
| (11) Forest Lake       | 27-0139 |
| (12) Lake Harriet      | 27-0016 |
| (13) Hiawatha Lake     | 27-0018 |
| (14) Lake Independence | 27-0176 |
| (15) Lake of the Isles | 27-0040 |
| (16) Libbs Lake        | 27-0085 |
| (17) Little Long Lake  | 27-0179 |
| (18) Long Lake         | 27-0160 |
| (19) Medicine Lake     | 27-0104 |
| (20) Minnehaha Creek   | 27-0000 |
| (21) Lake Minnetonka   | 27-0133 |
| (22) Niccum's Pond     | private |
| (23) Lake Nokomis      | 27-0019 |
| (24) Parker's Lake     | 27-0107 |
| (25) Lake Rebecca      | 27-0192 |
| (26) Rice Lake         | 27-0116 |
| (27) Round Lake        | 27-0071 |
| (28) Lake Sarah        | 27-0191 |
| (29) Schmidt Lake      | 27-0102 |
| (30) Swan Lake         | 27-0000 |
| (31) Whaletail Lake    | 27-0184 |
| (32) Wirth Lake        | 27-0037 |
| H. Kanabec County      |         |
| (1) Knife Lake         | 33-0028 |
| I. Olmsted County      |         |
| (1) George Lake        | 55-0008 |
| J. Pope County         |         |
| (1) Gilchrist Lake     | 61-0072 |
| K. Ramsey County       |         |
| (1) Bald Eagle Lake    | 62-0002 |
| (2) Lake Gervais       | 62-0007 |
| (3) Island Lake        | 62-0075 |
| (4) Keller Lake        | 62-0010 |
| (5) Phalen Lake        | 62-0013 |
| (6) Round Lake         | 62-0012 |
| (7) Silver Lake        | 62-0001 |
| (8) Sucker Lake        | 62-0028 |
| (9) Lake Vadnais       | 62-0038 |
| (10) Lake Wabasso      | 62-0082 |
| L. Scott County        |         |
| (1) Lower Prior Lake   | 70-0026 |
| M. Todd County         |         |
| (1) Sauk Lake          | 77-0150 |
| N. Washington County   |         |
| (1) White Bear Lake    | 82-0167 |
| (2) St. Croix River    | 82-0001 |
| O. Wright County       |         |
| (1) Augusta Lake       | 86-0284 |
| (2) Beebe Lake         | 86-0023 |
| (3) Clearwater Lake    | 86-0252 |

|  |         |
|--|---------|
| (4) Lake Mary  | 86-0156 |
| (5) Little Waverly Lake                                | 86-0106 |
| (6) Lake Pulaski                                       | 86-0053 |
| (7) Rock Lake  | 86-0182 |
| (8) Sugar Lake   | 86-0233 |
| (9) Waverly Lake                                       | 86-0114 |
| P. Multiple Counties                                   |         |
| (1) Mississippi River, downstream of St. Anthony Falls |         |

Subp. 2. **Listing of waters infested with round goby.** The following water bodies are designated by the commissioner as infested with round goby (*Neogobius melanostomus*). Activities at these waters are subject to parts 6216.0100 to 6216.0600, Minnesota Statutes, section 84D.13, and other applicable laws.

| Name   | DNR Protected Waters<br>Inventory Number |
|--|--|
| Multiple Counties                                      |  |
| (1) Lake Superior                                      | 16-0001                                  |
| (2) St. Louis River, downstream of the Fond du Lac dam |  |

Subp. 3. **Listing of waters infested with ruffe.** The following water bodies are designated by the commissioner as infested with ruffe (*Gymnocephalus cernuus*). Activities at these waters are subject to parts 6216.0100 to 6216.0600, Minnesota Statutes, section 84D.13, and other applicable laws.

| Name   | DNR Protected Waters<br>Inventory Number |
|--|--|
| Multiple Counties                                      |  |
| (1) Lake Superior                                      | 16-0001                                  |
| (2) St. Louis River, downstream of the Fond du Lac dam |  |

Subp. 4. **Listing of waters infested with spiny water flea.** The following water bodies are designated by the commissioner as infested with spiny water flea (*Bythotrephes cederstroemi*). Activities at these waters are subject to parts 6216.0100 to 6216.0600, Minnesota Statutes, section 84D.13, and other applicable laws.

| Name  | DNR Protected Waters<br>Inventory Number |
|---|--|
| A. St. Louis County                                       |  |
| (1) Fish Lake   | 69-0491                                  |
| (2) Island Lake   | 69-0372                                  |
| B. Multiple Counties                                      |  |
| (1) Lake Superior   | 16-0001                                  |
| (2) Cloquet River from Island Lake to the St. Louis River |  |
| (3) St. Louis River, downstream of the Cloquet River      |  |

Subp. 5. **Listing of waters infested with white perch.** The following water bodies are designated by the commissioner as infested with white perch (*Morone americana*). Activities at these waters are subject to parts 6216.0100 to 6216.0600, Minnesota Statutes, section 84D.13, and other applicable laws.

| Name   | DNR Protected Waters<br>Inventory Number |
|--|--|
| Multiple Counties                                      |  |
| (1) Lake Superior                                      | 16-0001                                  |
| (2) St. Louis River, downstream of the Fond du Lac dam |  |

Subp. 6. **Listing of waters infested with zebra mussels.** The following water bodies are designated by the commissioner as infested with zebra mussels (*Dreissena* spp.). Activities at these waters are subject to parts 6216.0100 to 6216.0600, Minnesota Statutes, section 84D.13, and other applicable laws.

| Name | DNR Protected Waters<br>Inventory Number |
|------|--|
|------|--|

Multiple Counties

- |  |         |
|--|---------|
| (1) Lake Superior                                      | 16-0001 |
| (2) Mississippi River, downstream of St. Anthony Falls |         |
| (3) St. Louis River, downstream of the Fond du Lac dam |         |

**6216.0400 RESTRICTED ACTIVITIES ON INFESTED WATERS AND WATERS WITH LIMITED INFESTATIONS OF EURASIAN WATER MILFOIL.**

Subpart 1. **Prohibition of taking bait from infested waters.** The taking of wild animals from infested waters for bait or aquatic farm purposes is prohibited.

Subp. 2. **Prohibition of sport gill netting for whitefish and ciscoe in infested waters.** If the commissioner designates waters that are open to sport gill netting for whitefish and ciscoe as infested waters, the commissioner may close the gill netting season for the designated water body or require that gill nets used in the infested waters not be used in other water bodies. The commissioner shall publish the names of designated water bodies and new requirements or closures in the State Register and provide notice through media releases and other available means where practical. In addition, the commissioner shall post notice of the restrictions at public access points to designated water bodies.

Subp. 3. **Commercial fishing restrictions in infested waters.** Nets, traps, buoys, anchors, stakes, and lines used for commercial fishing purposes that are used in infested waters must be dried for a minimum of ten days or frozen for a minimum of two days before they are used in noninfested waters. All aquatic vegetation must be removed from nets and other equipment when they are removed from infested waters. Commercial operators must notify the department's regional or area fisheries office or a conservation officer when removing nets from infested waters and before resetting those nets in noninfested waters.

Subp. 4. **Entry into delineated areas prohibited.**

A. Entry by boaters, anglers, or other water users and their equipment into marked areas of a water body where limited infestations of Eurasian water milfoil have been delineated in accordance with part 6216.0300 is prohibited, except in emergency situations where property or human life is endangered.

B. Enforcement, emergency, resource management, and other government personnel or their agents may enter into waters where limited infestations of Eurasian water milfoil have been delineated in accordance with part 6216.0300 when performing official duties. Owners or lessees of land adjacent to delineated areas who do not have water access to their land other than through the delineated area may use the shortest and most direct route through the delineated area for such access.

**6216.0500 TRANSPORTATION AND APPROPRIATION OF WATER FROM INFESTED WATERS.**

Subpart 1. **Transporting water and live fish from infested waters.** Water from infested waters may not be used to transport fish except as provided in subpart 4. Live fish taken under a commercial fishing license may be transported from infested waters to other waters or holding facilities from May 1 to October 31 with a transportation permit issued by the department pursuant to Minnesota Statutes, section 17.4985.

Subp. 2. **Disposition of water used to transport fish from infested waters.** Water used to transport live fish from infested waters pursuant to subpart 1, including water from waters or facilities permitted to hold fish from infested waters, may be disposed of only at sites approved in writing by the commissioner.

Subp. 3. **Persons leaving select infested waters.** A person leaving infested waters designated as having populations of zebra mussel or spiny water flea must drain bait containers, other boating-related equipment holding water excluding marine sanitary systems, and livewells and bilges by removing the drain plug before transporting the watercraft and associated equipment on public roads.

Subp. 4. **Diversion, appropriation, and transportation of infested waters.** Infested waters may not be transported on a public road or off property riparian to infested waters except:

- A. in emergencies, such as fire emergencies;
- B. as specified in a water appropriation or public waters work permit issued by the commissioner

pursuant to Minnesota Statutes, chapter 103G; or

C. under a permit issued pursuant to this part.

Infested waters may not be diverted to other waters without a permit issued pursuant to this part, or as authorized in a public waters work permit or water appropriation permit issued by the commissioner pursuant to Minnesota Statutes, chapter 103G.

**Subp. 5. Fish hatchery or aquatic farm operations in infested waters.**

A. Natural lakes or wetland basins that are designated as infested waters will not be licensed by the department pursuant to Minnesota Statutes, section 17.4984, for aquatic farms or pursuant to Minnesota Statutes, section 97C.211, as private fish hatcheries.

B. Artificial water basins that have populations of prohibited or regulated exotic species may be used for aquatic farm or private hatcheries under license by the department. After notifying a licensee that an artificial water basin has a prohibited or regulated exotic species, the commissioner may require that nets, traps, buoys, stakes, and lines that have been used in such artificial water basins must be dried for a minimum of ten days, or frozen for a minimum of two days, before they are used in noninfested waters. All aquatic plants must be removed from nets and other equipment that are removed from the artificial water basins.

C. The commissioner may license aquatic farm or private fish hatchery facilities to use infested waters as a source for the facilities' water. The commissioner may require that the waters be treated to eliminate prohibited or regulated exotic species.

D. Fish raised in artificial water basins that have populations of prohibited exotic species, or in any facility using infested water as a source, must be sold directly to a wholesale buyer for processing, or for stocking in other waters containing populations of prohibited exotic species, provided it contains the same prohibited exotic species as the source waters.

**Subp. 6. Infested waters diversion or transportation permits.** Applications for permits issued pursuant to this part, to divert or transport water from infested waters, shall be made on forms obtained from the commissioner and shall contain information as the commissioner may prescribe. The department shall act upon the application within 90 days of receipt. Failure on the part of the department to act upon the permit within the required time shall not be construed as approval of the application. Permits shall state all the conditions and limitations upon which they are based. A permit may be modified at any time by the department.

**6216.0600 VIOLATIONS; CONFISCATIONS.**

Unless a different penalty is prescribed, a violation of parts 6216.0265, 6216.0280 to 6216.0290, or 6216.0400 to 6216.0500 is a misdemeanor as set forth in Minnesota Statutes, section 84D.13. Where a violation has occurred, the department may confiscate the prohibited, regulated, or unlisted exotic species immediately upon discovery wherever found and, at the department's discretion, destroy it. Where infested water is being appropriated, or diverted or transported without a permit, or otherwise contrary to the provisions of parts 6216.0100 to 6216.0600, the department may order that the activities cease. Any expense or loss in connection with enforcement of the order shall be borne by the permittee or responsible person.

**SUPERSEDING PERMANENT RULE; REPEALER.** Minnesota Rules, part 6216.0350, as permanently adopted by these rules, supersedes the expedited emergency rule adopted effective August 4, 1997, and published in the State Register, volume 22, page 199. The expedited emergency rule, Minnesota Rules, part 6216.0350, is repealed. Minnesota Rules, part 6216.0200, subpart 4, is repealed.

## Appendix C - Other Infested Waters

In addition to infested waters listed in permanent rule (in Appendix B) the following water bodies were first found to be infested with Eurasian watermilfoil (*Myriophyllum spicatum*) during 1998. They have been, or will be designated as infested water through expedited rulemaking.

| <u>County</u> | <u>Water body</u>   |
|---------------|---|
| Anoka         | George  |
| Dakota        | Marion  |
| Hennepin      | Bass, Gleason   |
| Mille Lacs    | Mille Lacs  |
| Pope          | Minnewaska  |
| Washington    | Powers  |
| Wright        | Clearwater River (downstream of Clearwater Lake); Weigand, (unnamed wetland within the Clearwater River). |

The following bodies of water were found to be infested with Eurasian watermilfoil previous to 1998. They will be designated through expedited rulemaking.

| <u>County</u> | <u>Water body</u> |
|---------------|-------------------|
| Ramsey        | Spoon Creek       |
| Chisago       | Ellen Lake        |