Ecologically Harmful Exotic Aquatic Plant and Wild Animal Species in Minnesota

Annual Report 1994

for the year ended December 31

Minnesota

DEPARTMENT OF NATURAL RESOURCES

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

contributing authors and editors
Wendy Crowell
Steve Enger
Thomas Hagel
Gary Montz
William J. Rendall
Luke Skinner
Donna Sheridan
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 Programs. 1994. Ecologically Harmful Exotic Aquatic Plant and Wild Animal Species in Minnesota: Annual Report for 1994. Minnesota Department of Natural Resources, St. Paul, MN.

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Executive Summary

This report describes the progress made during 1994 by the Exotic Species Program of the Minnesota Department of Natural Resources (DNR) and its cooperators in Minnesota. The DNR's Exotics program is responsible for monitoring and management of ecologically harmful exotic aquatic plant and wild animal species. These are species that may harm communities of native plants and animals; they also can limit water recreation and increase operating costs for industry. The exotic species program in the DNR was established in 1987 to address problems caused by purple loosestrife. Since 1987, the exotic species program has been expanded to include Eurasian watermilfoil, zebra mussel, flowering rush, ruffe, and other harmful exotic species of aquatic plants and wild animals.

Program funding is derived primarily from a $5 surcharge on the registration of watercraft. The surcharge generates approximately $1,000,000 annually and additional funding comes from other sources. Additional funds totalled $298,900 in fiscal year 1994 (FY94) and represented both direct funding and in-kind services. A breakdown of FY94 expenditures by major categories is shown in Table 1. Expenditures in FY94 were less than the $1,011,000 appropriated from the water recreation account because spending on Eurasian watermilfoil control, watercraft inspections, and enforcement activities, was less than projected, in part, because some expenses were deferred to FY95. The funds not spent in FY94 are available to be spent in FY95. Table 1 also shows planned expenditures by category for FY95. The increased spending in the public awareness, control/eradication, and inspections/enforcement categories reflects the FY94 funds that were rolled forward and the higher appropriation ($1,112,000) for that year.

Table 1. Water recreation account spending by the exotic species program in fiscal year 1994 (FY94) and projected spending in fiscal year 1995 (FY95).

	FY94	FY95
Administration	88,640	102,200
Program Support	73,210	63,100
Public Awareness	115,430	225,600
Control/Eradication	216,840	489,500
Inspections/Enforcement	187,310	315,500
Research	119,230	126,400
Totals	**$ 800,600**	**$ 1,322,300**

Exotic species program funding continues to be focused on containing ecologically harmful species to sites where they presently occur in Minnesota (public awareness and inspection/ enforcement spending), reducing their impact on Minnesota ecosystems (control/eradication spending), and supporting the development of better control methods (research spending). The program's progress in these areas is outlined for Eurasian watermilfoil, purple loosestrife, zebra mussels, flowering rush, ruffe, and Eurasian swine.

The effectiveness of management activities was evaluated in 1994 using public surveys, boat inspections, and field surveys of infested areas. Survey results continue to show a high level of awareness about exotic species by the boating public (92% of respondents) and results compiled by Minnesota Sea Grant found that the awareness level in Minnesota exceeded that in Wisconsin and Ohio. To maintain high levels of public awareness and to increase it in targeted groups, various public awareness activities were conducted in 1994. Radio time and billboard space was purchased, public service announcements and press releases were distributed, and staff were present at the State Fair and various trade shows to reach the general public. Targeted efforts to reach resort owners, watercraft owners, and members of lake associations were also conducted.

Awareness of exotic species and the problems they cause, however, is not a guarantee that the boating public is adequately cleaning their watercraft and that the threat of inadvertent spread has been eliminated. In 1994, watercraft inspections and enforcement efforts were expanded to improve the effectiveness of containment efforts. The 20,000 hours of inspection effort mandated by statute was met, representing over 33,000 boat inspections, while conservation officers spent 71% more time in 1994 than in 1993 on exotic species enforcement. However, inspections and road checks conducted by conservation officers continued to find that about 2% of the trailered watercraft in Minnesota have Eurasian watermilfoil attached and that this exotic is being transported to areas that are currently uninfested.

Field surveys in 1994 found low rates of spread of the exotic species managed by the Department. Infestations of Eurasian watermilfoil were confirmed in only two new lakes in 1994, the lowest level since 1987. There was also no evidence that zebra mussels or ruffe moved into Minnesota's inland lakes within the last year. However, in 1994, zebra mussels were documented on boats in the St. Croix River that had traveled to the Mississippi River. Reproducing populations of zebra mussels have not been found in the St. Croix, but there is an imminent risk of spread from boats leaving the Mississippi River and entering the St. Croix.

The Department, alone or in cooperation with local groups, undertook a wide variety of control actions in 1994. Eurasian watermilfoil control efforts were conducted in 27 lakes, 162 sites were sprayed to eradicate purple loosestrife, and flowering rush control activities were implemented in four lakes. These sites will be surveyed in 1995 to determine the effectiveness of control.

Field surveys of sites where control activities were conducted in 1993 (or earlier) showed varied control success. Control efforts with herbicides are reducing many populations of Eurasian watermilfoil and purple loosestrife, and the DNR continues to modify control

approaches to improve their success. Uniform success, however, has not yet been achieved. Research efforts to develop and implement better control approaches were continued (additional funding recommended by the Legislative Commission on Minnesota Resources and appropriated by the legislature was particularly important in this effort) and a new biological-control method for managing purple loosestrife is being tested at numerous sites throughout the state (18 new sites were established in 1994).

Numerous groups participated in 1994 with the DNR in exotic species management activities. Local government units often provide cooperative funding for control efforts as did the 1854 Treaty Authority. In 1994, these groups assisted with control of Eurasian watermilfoil, purple loosestrife, and flowering rush. The Exotic Species Coordinator's role as current chair of the Great Lakes Panel on aquatic nuisance species provides many contacts for cooperative efforts. The DNR's public awareness efforts are coordinated with a broad array of local, state, and federal groups. These include: Minnesota Lakes Association, Minnesota Sea Grant, Manitoba Environment, National Park Service, and U.S. Fish and Wildlife Service. Likewise, research contracts with the Universities of Minnesota and Cornell, as well as contacts with groups such as Wisconsin and Michigan Departments of Natural Resources and the Army Corps of Engineers are enhancing the development of better control methods.

In comparison to other states, Minnesota continues to have one of the most far-reaching and aggressive approaches to managing exotic species. The rapid spread of zebra mussels in the nation, the continued expansion of Eurasian watermilfoil in other states, as well as the developing biological control approach for purple loosestrife has prompted many state and federal agencies to look to Minnesota for guidance. Exotic program staff are cooperating with state, regional, and federal agencies to improve and enhance collective management efforts. Research, public awareness, and control efforts are being enhanced through these cooperative interactions.

The level of Exotic Species Program activity continued to increase in 1994. The Department made greater use of paid radio and billboard time to reach the general public and provided general exotics information to most of the state's resorts and to all boat owners who received license renewal notices. Efforts to contain the spread of exotic species also increased. The number of boats checked by watercraft inspectors tripled, the number of inspection hours doubled, and Conservation Officers expanded their enforcement of exotic species laws. More lakes and more money was targeted for Eurasian watermilfoil control efforts. All the targeted funds were not spent in 1994, partly because only two new infestations of Eurasian watermilfoil were found, but unspent funds will be available in 1995. The number of insect species being tested to control purple loosestrife, as well as the number of test locations, increased in 1994. Thirteen Minnesota counties now have biological control experiments in progress.

It was clear in 1994 that the threat posed by exotic species and by their continued expansion in Minnesota remains high. The populations of zebra mussels in the Mississippi River below the Twin Cities continued to rapidly increase and checks of trailered boats on the state's roads documented continued movement of Eurasian watermilfoil. However, there was evidence that the exotic species program is being effective. Minnesotans have a very high

awareness of exotic species and most indicate that they are cleaning their trailers and boats when they leave infested waters. The number of new infestations of Eurasian watermilfoil was at a seven year low in 1994 and there were no reports that zebra mussels or ruffe had been moved to inland waters. Efforts continued to develop more effective and less environmentally damaging control methods, and some progress is evident.

Numerous management needs have been identified for 1995; many are refinements of existing approaches. A clear need has been identified to broaden public awareness, inventory, and containment efforts to address the threat that expanding zebra mussel populations pose to Minnesota. This ecologically harmful exotic is currently restricted to the rivers in southeastern Minnesota with commercial barge traffic, but there is high potential for zebra mussels to spread to inland waters. There is also a clear need to develop prevention strategies to restrict the introduction of additional exotic species into Minnesota that could cause ecological or economic harm if they become established.

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 Division of Fish and Wildlife is responsible for programs covering 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 which harm agricultural crops. Information about harmful terrestrial plants control and prevention programs may be obtained from the Minnesota Department of Agriculture.

Requirement to prepare annual report

Each year, by January 1, the DNR is required to prepare a report for the legislature which summarizes the status of ecologically harmful exotic species management efforts (see M.S. 84.968 in Appendix A). According to state statutes, this report must include:

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

(2) an analysis of the effectiveness of management activities conducted in the state, including chemical eradication, 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 by species; and

(6) an estimate of future management needs.

Additional sections have been added to this report to provide a more thorough account of program activities and needs.

Overview of Minnesota Exotic Species Program

History of the exotic species program in Minnesota

Although ecologically harmful exotic species have been present in Minnesota for many years (e.g. common carp and sea lamprey), the program to prevent their spread and mitigate their negative impacts is relatively new to state government. In 1987, the 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 such a program. In 1989, DNR was officially assigned (see M.S. 103G.617 in Appendix A) an additional coordinating role for Eurasian watermilfoil (EWM) control. Subsequently, and in response to the arrival of additional harmful exotic species in the state, the potential for more introductions, and the high cost of existing control activities, the state moved to initiate a proactive response to the exotics problem.

Responsibilities assigned to the DNR

During its 1991 session, and in response to the "Report and Recommendations of the Interagency Exotic Species Task Force", the legislature called for 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, flowering rush, and ruffe, as well as harmful species that have the potential to move into Minnesota.

The primary purpose for the exotic species control program is to minimize harmful effects on the state's lakes, rivers, wetlands, and other ecosystems. However, there are additional reasons to control harmful exotic species; they can limit water use and recreation, increase operating costs for industrial and municipal water users, and eliminate certain commercial enterprises..

Program staff

Responsibilities for overall coordination of the DNR's program are assigned to an Exotic Species Coordinator located in the Division of Fish and Wildlife's Administrative Services Section. This position dedicates 60% of its time to exotic species issues. 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.

Other program activities are carried out primarily by the Ecological Services' staff in the Division of Fish and Wildlife. Existing staff positions and their primary responsibilities are as follows:

Exotic Species Coordinator	Jay Rendall (297-1464)
Purple loosestrife	Luke Skinner (297-3763)
Eurasian watermilfoil	Charles (Chip) Welling (297-8021)
General Exotic Species Issues	Donna Sheridan (218-828-6132)
General Exotic Species Issues	Wendy Crowell (282-2509)
Clerical	Debbie Hunt (296-2835)
Watercraft Inspection	Thomas Hagel (297-4891)
Zebra Mussel	Gary Montz (297-4888)
Ruffe	Jack Wingate (296-0793) (Fisheries)

Other staff support

Staff from other units of the Division of Fish and Wildlife, Division of Enforcement, Trails and Waterways Unit, 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 survey and control of purple loosestrife, Eurasian watermilfoil, and flowering rush. In addition to these staff, many other individuals from the Division of Fish and Wildlife contribute by providing biological expertise, assisting with control, 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 ecologically harmful exotic species. Their activities are outlined in this report in the Enforcement chapter.

Minnesota Conservation Corps (MCC) In 1994, 26 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 when their help is needed. A summary of their efforts is included in this report (see Watercraft Inspections).

Funding

Funding for the DNR's exotic species activities is derived primarily from the surcharge on watercraft. The surcharge for a three year license period is $5, or $1.67 per year, and generates approximately $1,000,000 per year. Additional appropriations, primarily for specific research, have come from the Environment and Natural Resources Trust Fund and Minnesota Resources Fund (Table 1).

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 ecologically harmful exotic species, is contracted with various research facilities. In 1994, purple loosestrife research was conducted under contract with the University of Minnesota and Cornell University. Biological control research for Eurasian watermilfoil is done under contract with the University of Minnesota. This research is described in greater detail in the individual management chapters. Existing efforts to control purple loosestrife and Eurasian watermilfoil are usually carried out by licensed herbicide applicators under state contract. Local lake associations, conservation districts, or local governments share the cost of the contract work for most chemical control of Eurasian watermilfoil.

Federal and Regional Coordination

The DNR staff all participate in regional or federal activities regarding harmful exotic species. MNDNR Exotic Species Coordinator, Jay Rendall, is the Minnesota representative and current Chair of the Great Lakes Panel on aquatic nuisance species. Participating on this panel, established by the federal nonindigneous Aquatic Nuisance Prevention and Control Act of 1990, helps keep Minnesota informed of regional and federal efforts regarding harmful exotic species and also provides a voice for Minnesota interests as regional and federal policies are developed.

Luke Skinner, Purple Loosestrife Coordinator, has been involved in regional and national efforts to use biological controls to manage purple loosestrife infestations. He has participated in meetings with the U.S. Fish and Wildlife Service and 18 other midwestern states to develop a regional plan for biological control implementation. He is also currently a member of the National Biological Control Planning Committee established to develop national guidelines for purple loosestrife biological control implementation.

Chip Welling, Eurasian watermilfoil 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 Biologist and zebra mussel specialist, as well as Jay Rendall have participated in the development and implementation of the St. Croix River Zebra Mussel Response Plan prepared by the USFWS and National Park Service.

All of these staff members have been asked to make presentations at regional or national conferences, workshops, and meetings. They are also contacted by people and agencies in other states seeking information on our programs.

Regulations

Background

The first state laws regarding ecologically harmful exotic species were passed during the 1987 Legislative session and pertained to purple loosestrife. Because this is an emerging issue, the state laws have been modified almost every year since 1987. Statutory changes made during the 1993 legislative session included: the establishment of civil penalties for transporting exotic species on public roads (see M.S. 84.9692) and increasing mandated hours of random boat inspections at infested waters from 10,000 hours to 20,000 hours beginning in calendar year 1994.

Progress in state regulations during 1994

- Existing state statutes were amended to provide criminal penalty provisions for exotic species rules.
- Technical changes in statute were made to simplify and clarify existing regulations. The primary regulated species are referred to as "undesirable exotic species".
- Proposed rules have been drafted and a notice of solicitation was published in the State Register (see Appendix C). The DNR plans to adopt the rules in March, 1995.

Future needs for regulations:

State

- Amend statutes to allow undesirable exotic wild animals and aquatic plants to be possessed under permit for scientific research, education, control, or exhibition purposes.
- Seek new statutory authority to regulate introduction of exotic wild animals and aquatic plants that are intended for release.
- Develop additional permanent rules to curb the introduction and spread of additional ecologically harmful species.
- Replace all references to transportation of Eurasian watermilfoil and northern watermilfoil in statute preferably with "aquatic plants", or alternatively with "milfoil species". Because there can be difficulties identifying the milfoil species listed in statute and other native species of milfoil, this specific policy change is recommended to help eliminate this identification problem.

Federal

- Support efforts to reauthorize federal public law 101-646 titled the Nonindigneous Aquatic Nuisance Prevention and Control Act of 1990.
- Expand the Coast Guard's ballast water regulating authority to all U.S. waters.
- Encourage Congress to close gaps in federal prevention programs (e.g., regulations currently apply only to the Great Lakes).

Expenditures

Appropriations and activities

Funding for DNR efforts to control exotic species was first appropriated in 1988 and, since 1989, has been increasing to meet the growing problems these species posed. A summary of appropriations to the program for fiscal years 1990 through 1995 is provided in Table 2 along with projections for 1996 and 1997. A portion of the $5 watercraft surcharge which funds aquatic exotic species activities sunsets on December 31, 1996; the surcharge will be $3 beginning in 1997.

As exotic species appropriations have increased, program expenditures and activities have increased and diversified. To provide a detailed list of program expenditures, by activity, just for calendar year 1994 was not practical. This period covers parts of two fiscal years, 1994 and 1995, and many expenses extend over the December 31/January 1 boundary. Instead, we show both expenditures incurred in FY 94 and those planned in FY 95 (Table 3 and 4). The following assumption and definitions were used to report on expenditures.

Administration

Clerical staff, telephones, general postage, office rent, and staff time spent on administrative activities are considered administrative costs. Administrative staff time includes staff training and development, assistance with other division or department activities, and personal leave (holiday, sick, and vacation time).

Program support

State program coordination includes preparation of state plans and reports, legislative hearings, promulgation of rules, as well as the general oversight and planning of program activities. Expenditures represent staff time spent on these activities.

Coordination with regional and federal activities includes staff time and out-of-state travel to represent the state at meetings of the Great Lakes Panel on Aquatic Nuisance Species, seek federal funding for state management plans, and participate in regional meetings on exotic species issues.

Equipment and storage building expenses represent the purchases of equipment such as boats, trailers, and computers. The final payment on a storage building for the program's boats and field equipment is included.

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.

Control, Eradication, 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.

Fiscal Year 1994 (FY94)

Expenditures on exotic species activities during FY94 (July 1, 1993 - June 30, 1994) totalled $1,128,800 and are shown in Table 3. Expenditures from watercraft surcharge revenues, the primary source of funding, are listed along with spending from other accounts. Expenditures from other accounts (e.g., the Game and Fish Account and the General Fund) reflect staff, who are not hired as exotic species specialists but who work on exotic species issues as part of other department positions. Exotic species research projects funded by the legislature, as recommended by LCMR, are also shown.

The $800,660 of watercraft surcharge expenditures during FY 94 was less than $1,011,000 appropriated (Table 2). The fact that all appropriated funds were not spent primarily reflects when bills for control and containment activities were paid. As described in the "Management of Eurasian Watermilfoil" chapter, $100,000 was made available during the summer of 1994 to help local organizations manage Eurasian watermilfoil. The DNR did not get reimbursement requests for those funds until after July 1 (so the expenditures show up in FY95, not FY94). In addition, because only two new infestations of milfoil were discovered during 1994, all the funds set aside for eradication efforts did not have to be spent. Funding for containment efforts was also increased substantially in 1994 (to meet the increase in access inspection effort from 10,000 to 20,000 hours - see the chapters on "Inspections" and "Enforcement"). Again, this increased activity primarily increased expenditures in FY95, not FY94. Water Recreation Account Funds not spent in FY94 were rolled forward and are included in the spending projections for FY95.

Expenditures in FY94 were generally in line with projections made in our 1993 Annual Report. For most program activities, spending matched the FY94 estimated budget. Exceptions included: state program coordination activities, which cost less in FY94 than we anticipated; public awareness efforts, where more money was spent than originally planned; and control and containment activities, where, as described above, spending was shifted from FY94 to FY95.

Fiscal Year 1995 (FY95)

Since fiscal year 1995 was only partially completed when this report was due, planned expenditures, not actual expenditures to date, are shown. Appropriations from the Water Recreation Account, $1,112,000, were higher in FY95 than in FY94 because of year-to-year variation in watercraft license sales. Total anticipated spending in FY95 exceeds appropriations because of funds carried over from FY94. These additional funds are designated to support increased public awareness, control, and containment efforts.

Table 2. Appropriations for DNR Exotic Species Programs, 1990-1997.

	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997
Purple loosestrife (PL)	$125,000 from Water Recreation Account for PL program ($1 watercraft surcharge) and $100,000 from Minnesota Future Resources Fund for research	$125,000 from Water Recreation Account for PL program ($1 watercraft surcharge) and $100,000 from Minnesota Future Resources Fund for research			$75,000 from Minnesota Environment and Natural Resources Trust Fund for research	$75,000 from Minnesota Environment and Natural Resources Trust Fund for research	$75,000 from Minnesota Environment and Natural Resources Trust Fund is recommended by LCMR	$75,000 from Minnesota Environment and Natural Resources Trust Fund is recommended by LCMR
Eurasian watermilfoil (EWM)	$125,000 from Water Recreation Account for EWM program ($1 watercraft surcharge)	$125,000 from Water Recreation Account for EWM Program ($1 watercraft surcharge)		$160,000 from Minnesota Future Resources Fund for research	$125,000 from Minnesota Environment and Natural Resources Trust Fund for research (requires a $100,000 nonstate match)	$125,000 from Minnesota Environment and Natural Resources Trust Fund for research (requires a $100,000 nonstate match)	$75,000 from Minnesota Environment and Natural Resources Trust Fund for research is recommended by LCMR	$75,000 from Minnesota Environment and Natural Resources Trust Fund for research is recommended by LCMR
Aquatic exotic species (including Eurasian watermilfoil and purple loosestrife)			$416,000 from Water Recreation Account ($2 watercraft surcharge)	$657,000 from Water Recreation Account ($3 watercraft surcharge)	$1,011,000 from Water Recreation Account ($5 watercraft surcharge)	$1,112,000 from Water Recreation Account ($5 watercraft surcharge	$1,095,000 from Water Recreation Account ($5 watercraft surcharge) is projected.	$659,000 from Water Recreation Account ($3 watercraft surcharge) is projected

Table 3. Exotic species related expenditures in fiscal year 1994.

	Water Recreation Account	Game and Fish Fund	General Fund/Other	Env. and Natural Resources Trust Fund
Administrative/Operations				
Rent	23,340			
Phones / postage	10,510	800		
Staff Administrative Activities	7,130			
Staff Personal leave (Vacation, Holiday, Sick)	16,460			
Clerical	31,200		7,130	
Program Support				
State program coordination	46,550	4,250	11,200	
Coordinate regional / federal activities	2,290			
Equipment and storage building	24,370			
Public Awareness				
Communications plan, workshops, presentations, radio spots, billboards	115,430	850	640	
Control, Eradication, and Inventory				
Eurasian watermilfoil	144,430	6,160		
Purple loosestrife control	58,410	2,480	18,200	
Zebra mussel	5,470	7,400		
Flowering Rush	5,900			
General	2,630			
Inspections/Containment				
MCC - access inspections	151,770	280		
Enforcement - road checks	35,540			
Research				
Purple loosestrife	39,990		2,500	75,000
Eurasian watermilfoil	74,440	3,340	11,650	185,000
Flowering Rush	4,800			101,500
Totals	800,660[1]	25,570[2]	51,340[3]	260,000

[1] Is less than $1,011,000 appropriated in FY94 because some Eurasian watermilfoil control and containment expenses were shifted to FY95.

[2] Two staff positions which contribute to exotic activities (staff supervisor and invertebrate biologist) are supported by the Game and Fish Fund.

[3] One position which contributes to exotic activities (Ecological Services Unit Head) was funded by the General Fund in FY94. Public awareness, control, and research efforts were supported by cooperative funding provided by outside organizations and in-kind service provided by DNR's Chemistry Laboratory.

Table 4. Planned exotic species related expenditures for fiscal year 1995.

	Water Recreation Account	Game and Fish Fund	General Fund/Other	Env. and Natural Resources Trust Fund
Administrative/Operations				
Rent	22,700			
Phones / postage	11,100			
Staff Administrative Activities	11,400			
Staff Personal Leave	23,100			
Clerical	33,900		7,000	
Program Support				
State program coordination	39,500	5,100	12,000	
Coordinate regional / federal activities	5,600			
Equipment	18,000			
Public Awareness				
Communications plan, workshops, presentations, radio spots, billboards	225,600		20,000	
Control, Eradication, and Inventory				
Eurasian watermilfoil	349,900	1,000		
Purple loosestrife control	120,400	1,000	10,000	
Zebra mussel surveys on St. Croix	4,500			
Flowering Rush	10,700			
Zebra mussel	4,000	8,900		
Inspections/Containment				
MCC - access inspection	225,300			
Enforcement - road checks	90,200			
Research				
Purple loosestrife	39,500			75,000
Eurasian watermilfoil	76,900	2,100		103,000
Ruffe	10,000			
Totals	1,322,300[1]	18,100	49,000	178,000

[1] Is more than $1,112,000 appropriated in FY95 because of funds rolled forward from FY94.

Education / Public Awareness Activities

Background

Over the past several years, substantial efforts have been made by the DNR to increase public awareness and understanding of harmful exotic species. These efforts have been designed to: 1) make the public aware of the harm and potential negative environmental impacts caused by exotics; 2) help the public identify specific exotic species; 3) outline actions that boaters must do to reduce the spread of these exotics; 4) summarize control approaches and activities.

Progress in public awareness - 1994

DNR communication efforts related to aquatic exotic species were built around the theme of "Clean boats, Clean waters". This theme captures the desired outcome (clean waters) and the proposed strategy to achieve that result. To be effective, it requires that Minnesotans have a strong sense of personal responsibility, and according to a Minnesota Sea Grant survey of boaters (see Effectiveness section), they do (Minnesota Sea Grant 1994).

Key components of the communication efforts included:

- radio advertisements, promoting "Clean boats, Clean waters", were run on metro area stations during Fishing Opener, Memorial Day, Fourth of July, and Labor Day weekends.
- billboards were posted and maintained on key travel routes.
- the On the Waterfront newsletter was written and published monthly in the Focus 10,000 magazine.
- displays were developed and staffed for sport shows and the Minnesota State Fair.
- exotic species awareness kits distributed to lake associations, as requested.
- press releases prepared and distributed throughout the year.
- radio public service announcements were prepared and distributed to all Minnesota stations.
- information packets were distributed to 1,700 resorts by Conservation Officers.
- brochures about aquatic exotic species were distributed to all watercraft registration sites for distribution to watercraft owners.

Radio was used to reach boaters and anglers in several ways. Paid advertising was placed on larger Twin Cities stations including WCCO-AM, KQRS-FM, KFAN-AM and WKLX-FM. These stations were selected for their listener profile which matched the desired demographics of boater 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.

A video news release was distributed to all Minnesota television stations just prior to the Fishing Opener weekend.

Seventeen billboards were posted along major highways leading from infested waters and into popular vacation areas. Six billboard locations were in the Twin Cities metro area, three near Duluth, one west of Rogers and one west of Sauk Rapids.

DNR Exotic Species staff participated in the Northwest Sportshow, and displayed an aquatic exotic species exhibit at the Minnesota State Fair and the Minnesota Lakes Association Conference to distribute literature and information. Information and exotics publications were also distributed at the Minneapolis Boat Show.

Various other presentations were conducted for university classes, high schools, teacher workshops, and lake associations.

Effectiveness of public awareness efforts

During the past summer, Minnesota Sea Grant sent surveys to 2,400 boaters in Minnesota, Wisconsin, and Ohio to evaluate and compare the differences of educational and awareness programs. Results of the survey suggest 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 expanded 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."***

Information from this survey will be used to guide development of future public awareness efforts and maximize their effectiveness.

Beyond the results of this survey, and ultimately the truest measure of effectiveness is the rate of spread of these exotics. For Eurasian watermilfoil, the rate of new infestations has declined steadily since 1990, which indicates that the public awareness efforts in conjunction with the other aspects of the program are having the desired impact.

Participation of others in public awareness activities

Other agencies have been involved with public awareness activities in the state. Billboards posted in the summer of 1994 were jointly sponsored by the DNR, U.S. Fish and Wildlife Service, and the Province of Manitoba. Distribution of A Field Guide to Aquatic Exotic Plants and Animals, our most popular public awareness pamphlet, was cooperatively produced, and 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, part of Minnesota Extension Service and the National Sea Grant Network, has established and operated an Information Center in Duluth for the past four years. The Information Center is part of Sea Grant's effort to inform municipal and industrial water users in the Great Lakes region, and the general public, about

the effects of zebra mussels on the economy and environment. Activities of the Information Center are funded, in part, by a grant from the National Oceanic and Atmospheric Administration. Accomplishments of the Information Center include:

- organizing a workshop for water users and managers in the Upper Mississippi River basin to address likely impacts associated with zebra mussel invasion,
- maintaining a library of visuals and graphics, responding to public inquiries about zebra mussels,
- development of a training program for extension agents and resource managers on zebra mussels,
- conducting scientific surveys of public response to information campaigns to determine the most effective means of changing public behavior to avoid spreading aquatic exotic species.

Future needs for public awareness - 1995

- Print information about aquatic exotics on boat registration mailings
- Continue, improve, and expand on those efforts found to be most successful, particularly to raise awareness of zebra mussels in southeast Minnesota.
- Target specific groups that have not received significant attention in previous years, such as the aquaculture industry, and the seaplane association.
- Increase interagency communication by publishing and distributing the exotic species newsletter, On the Loose, for resource professionals.
- Develop, distribute, and post new informational signs at all public and private water accesses on uninfested waters. The signs would provide boaters with information on several harmful species instead of one species - Eurasian watermilfoil.

Watercraft Inspections

Background

The potential for boaters to accidentally move aquatic exotic species from one lake to another has long been recognized as a serious threat to Minnesota's aquatic ecosystems. For this reason, the 1991 Minnesota Legislature mandated DNR conservation officers to 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 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, see Appendix A) calling for 10,000 hours of random inspections of watercraft leaving "infested" waterbodies, those which contain harmful aquatic exotic species such as Eurasian watermilfoil, spiny waterflea, and zebra mussels. Subsequently in 1992, a watercraft inspection program was established by the DNR to accomplish this mandate. In 1993, legislation was passed increasing the number of hours to 20,000 starting with the 1994 boating season.

Watercraft Inspectors (formerly Exotic Species Monitors) employed through the DNR's Minnesota Conservation Corps, conduct inspections at public water access sites on infested waters. The goal of their effort is to promote stewardship by educating and actively involving boaters in preventing the spread of exotic species. Their objectives are to increase public awareness of the threats posed by exotic species, the laws regarding their transportation, and to show individuals how to inspect and remove exotics from their own boating equipment before leaving an access. Inspection education activities are targeted at high-use accesses and during high-use periods.

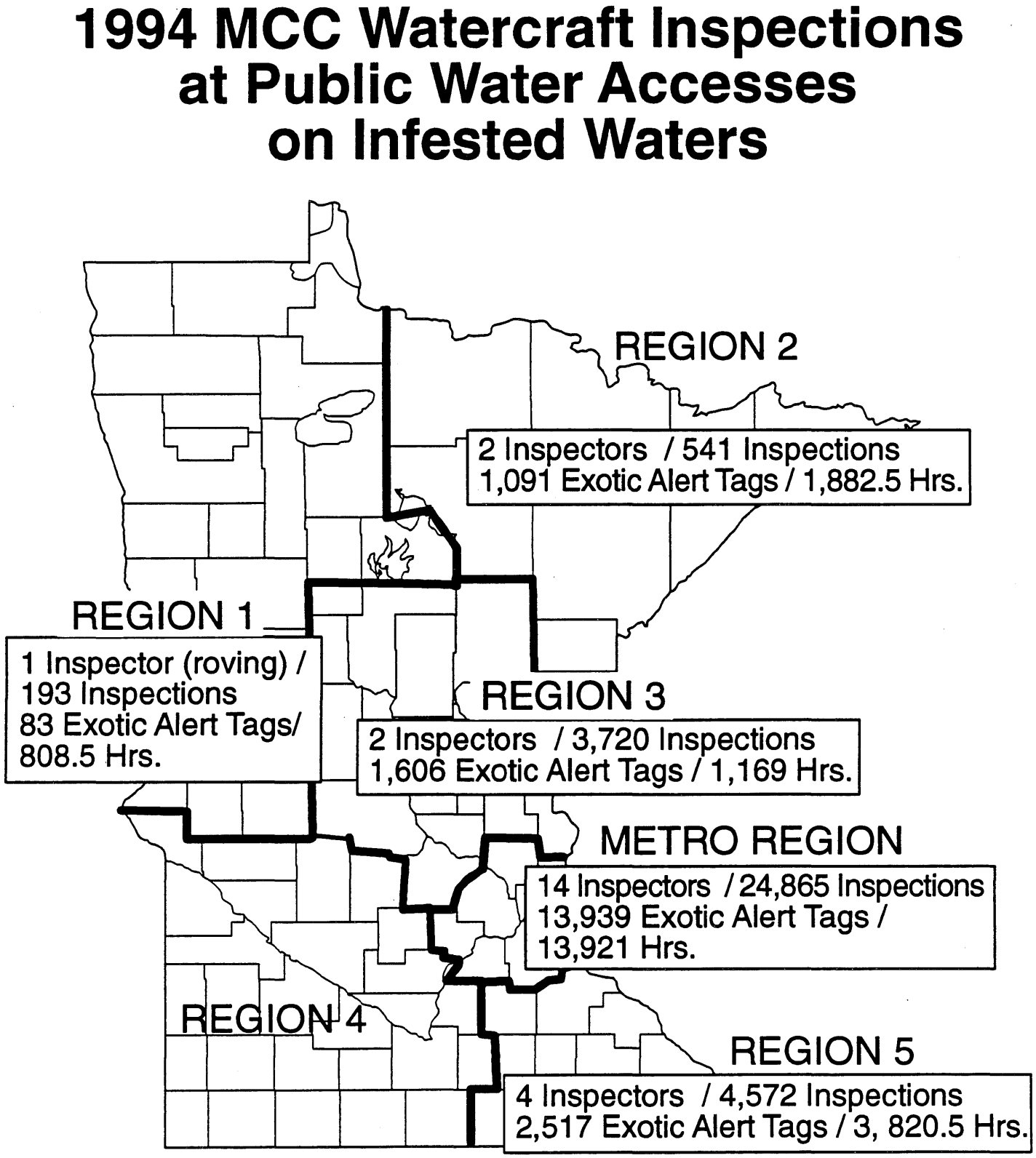
Progress in watercraft inspections - 1994

Inspections during 1994 began on May 1 and ended October 15 as prescribed in state statute. Within this 27 week period 21,601 inspection hours were logged and 33,891 watercraft/trailer units were inspected (Tables 5 & 6, Figure 1). The 1994 watercraft inspection program tripled the number of watercraft inspections and doubled the number of inspection hours in comparison to the 1993 season.

Table 5. Hours spent inspecting watercraft for exotic species in Minnesota during 1994.

Area	Hours Accomplished	% of Time Per Area
Metro Area (7 County)	13,921	64%
Duluth/Superior	1,882	9%
Mississippi River (S. of Mpls)	3,821	18%
Northwestern Minnesota	808	4%
North Central Minnesota	1,169	5%
State-wide Total	21,601	100%

Figure 1.


1994 MCC Watercraft Inspections at Public Water Accesses on Infested Waters
REGION 2
2 Inspectors / 541 Inspections
1,091 Exotic Alert Tags / 1,882.5 Hrs.
REGION 1
1 Inspector (roving) /
193 Inspections
83 Exotic Alert Tags/
808.5 Hrs.
REGION 3
2 Inspectors / 3,720 Inspections
1,606 Exotic Alert Tags / 1,169 Hrs.
METRO REGION
14 Inspectors / 24,865 Inspections
13,939 Exotic Alert Tags /
13,921 Hrs.
REGION 4
REGION 5
4 Inspectors / 4,572 Inspections
2,517 Exotic Alert Tags / 3, 820.5 Hrs.

The majority of infested waters in the state are located within the metropolitan area and include some of the most heavily used recreation lakes in Minnesota. As shown in Table 6, inspection efforts were concentrated at accesses in the seven county metropolitan area, where seventy-three percent of the inspections occurred. In 1994, inspection efforts were expanded to include sites in northwestern and north-central Minnesota where isolated infestations of flowering rush and Eurasian watermilfoil occur.

Table 6. Number of watercraft inspections for 1993 and 1994.

Area	Number of Watercraft /Trailers Inspected in 1993	Percentage of Inspections in 1993	Number of Watercraft /Trailers Inspected in 1994	Percentage of Inspections in 1994
Metro Area (7 Co.)	9,327	83%	**24,865**	**73%**
Duluth/Superior	752	7%	**541**	**2%**
Mississippi River	1,162	10%	**4,572**	**13%**
Northwestern Minnesota	0	0%	**193**	**1%**
North-Central Minnesota	0	0%	**3,720**	**11%**
State-wide Total	11,261	100%	**33,891**	**100%**

The number of inspections conducted per day varied because of weather conditions and boater activity. Increased number of inspections in 1994 may be attributed to an increase of inspection staff and an increase in boating activity due to conducive weather and improved economic conditions. Special events, such as fishing tournaments, sailing regattas, and the waterfowl hunting opener brought a large number of boaters to infested waters. Increased inspection effort was targeted during these high use periods. In addition, inspection activities were concentrated during typical high use periods including holidays, weekends and evenings.

In addition to watercraft inspections, inspectors also cleared floating aquatic plants from public water accesses as required in M.S. 18.317 (Appendix A). This removal is designed to reduce the amount of vegetation adhering to watercraft and trailer units that exit milfoil infested waters. Removal and disposal of aquatic vegetation is a cooperative effort between the MCC Watercraft Inspection program and the various public water access administrators. The increase of efforts in 1994 to 20,000 hours significantly aided in addressing this issue, and we believe this effort was very successful. However, plant accumulation at accesses is dependent upon weather, particularly wind direction, so inspectors cannot always keep accesses free of plants. To address this problem, a rake was permanently placed at one public water access on an experimental basis. This rake, which is accompanied by an instructional sign, was intended to be utilized by boaters who wish to remove aquatic

vegetation on a voluntary basis. Complete results of this effort are not known, because the experiment was not started until late August. If this approach is successful, it will be expanded.

Other accomplishments and responsibilities of MCC watercraft inspectors included:

- Provided staffing for seven 'large-scale' roadchecks conducted by the Division of Enforcement.
- Conducted inspections at over 25 DNR permitted fishing tournaments in cooperation with the Section of Fisheries.
- Posted Exotic Species signs at an additional 17 public water access sites on infested waters. These postings include both the advisory and the limited infestation sign.
- Distributed Exotic alert tags on 19,236 vehicles and trailers at access points on infested waters. That number more than doubled the 8,296 distributed in 1993.
- Staffed the Exotic Species display for several days during the 1994 Minnesota State Fair.

St. Croix zebra mussel prevention effort

The MCC Watercraft Inspection program in 1994 continued its second year of recording boat registration numbers on the St. Croix River. Boat registration numbers from a total of 7,690 watercraft leaving the zebra-mussel infested Mississippi River were logged. This was part of an inter-agency effort to keep zebra mussels from being transported upstream of the Arcola Flats area. The National Park Service and the U.S. Fish and Wildlife Service used the boat registration numbers to verify that a boater, wishing to travel into the restricted area (above Arcola), had not been in zebra mussel infested waters.

Effectiveness

The inspection surveys provide the DNR with 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 exotic species. The percentage of boats/trailers carrying Eurasian watermilfoil as they exited infested waters varied widely by county (Table 7). These variations may be caused by several variables including size of the milfoil infestation, its proximity to the public water access, and amount of recreational boating traffic. As indicated in Table 7, "infested lakes" in Hennepin County remains the highest potential source of spread. Recognizing this situation, inspection efforts in 1994 increased significantly in Hennepin County to maximize inspection efforts. The percentage of boats with Eurasian watermilfoil was higher in 1994 than in 1993 and 1992 for most counties surveyed. This increase of eight percent state-wide may reflect year to year variation of boater use, a change in how access inspection efforts are allocated, and/or better Eurasian watermilfoil growth in 1994.

Table 7. Percentage of boat and trailers exiting Eurasian watermilfoil infested waters by county.

	1993		1994	
Counties with Eurasian watermilfoil	**Number of Boats & Trailers Inspected**	**Percent of Boats & Trailers exiting with Eurasian watermilfoil**	**Number of Boats & Trailers Inspected**	**Percent of Boats & Trailers Exiting with Eurasian watermilfoil**
Anoka	23	0%	11	0%
Carver	764	10%	2,976	31%
Chisago	n.s.	n.s.	397	4%
Crow Wing	n.s.	n.s.	211	1%
Dakota	561	1%	1,131	5%
Douglas	n.s.	n.s.	38	4%
Goodhue	45	0%	707	1%
Hennepin	1,232	36%	13,053	40%
Houston	n.s.	n.s.	153	0%
Kanabec	n.s.	n.s.	153	0%
Ramsey	779	6%	4,548	5%
Scott	827	0%	1,517	3%
Todd	No Infestation	No Infestation	101	3%
Wabasha	218	0%	1,795	2%
Washington	200	<1%	1,385	0%
Winona	16	6%	1,948	1%
Wright	n.s.	n.s.	1,265	8%
Stearns	n.s.	n.s.	1,772	14%
State-wide Total	***1 4,665**	**12%**	***2 33,224**	**20%**

n.s. = no surveys conducted

*1 Number of sample surveys drawn from a total of 11,261 inspections (page 21)
*2 Number of legible records entered from a total of 33,891 (page 21)

Table 8. Awareness of exotic species laws in Minnesota by county.

	1993		1994	
Counties with Exotic Species Infestations	**Number of individual who were asked whether they were aware of Exotic Species Laws**	**Percent of individuals who answered "yes" when asked whether they were aware of Exotic Species Laws**	**Number of individuals who were asked whether they were aware of Exotic Species Laws**	**Percent of individuals who answered "yes" when asked whether they were aware of Exotic Species Laws**
Anoka	23	78%	11	99%
Becker	n.s.	n.s.	155	52%
Carlton	n.s.	n.s.	10	60%
Carver	756	93%	2,682	93%
Chisago	n.s.	n.s.	397	60%
Cook	n.s.	n.s.	4	50%
Crow Wing	n.s.	n.s.	211	79%
Dakota	557	94%	1,127	97%
Douglas	n.s.	n.s.	38	2%
Goodhue	45	89%	707	89%
Hennepin	1,232	91%	13,140	98%
Houston	n.s.	n.s.	153	90%
Kanabec	n.s.	n.s.	216	80%
Lake	n.s.	n.s.	15	0%
Ramsey	779	83%	4,546	89%
Scott	827	93%	1,517	96%
St. Louis	303	76%	512	86%
Todd	No Infestation	No Infestation	101	84%
Wabasha	218	84%	1,795	91%
Washington	200	66%	1,368	88%
Winona	17	88%	1,948	97%
Wright	n.s.	n.s.	1,259	79%
Stearns	n.s.	n.s.	1,772	88%
State-wide Total	**4,959**	**88%**	**33,225**	**92%**

n.s. = no surveys conducted
*[1] Number of sample surveys drawn from a total of 11,261 inspections (page 21)
*[2] Number of legible records entered from a total of 33,891 (page 21)

Awareness of exotic species laws is high among Minnesota boaters, particularly in the metropolitan area, and appears to have increased slightly from 1993 to 1994 (Table 8). In 1994, ninety-eight percent of the interviewed boaters in Hennepin County were aware of the laws regarding exotic species transportation, while statewide 92% of surveyed boaters indicated awareness. From 1993 to 1994, there was an increase in the level of awareness statewide by four percent (from 88% to 92%). This suggests that public awareness efforts are reaching recreational boaters. Awareness of exotic species laws, however, does not measure whether boaters are cleaning their watercraft adequately. Enforcement efforts continue to be necessary to evaluate compliance with existing exotic species laws.

The 1994 inspection season was generally well received by boaters. Inspection efforts were conducted more efficiently in 1994 due in part to extended and continuous training and the use of an official DNR uniform. A concerted effort was made to hire individuals with excellent communication skills and inspection personnel were provided training in customer relations.

Participation with other groups

DNR's effort to use volunteers to inspect watercraft at public water accesses was significantly reduced in 1994. In 1993, an intense volunteer recruitment program produced a disappointing response and a decision was made to focus DNR staff efforts on inspections at infested waters. Other agencies and organizations continued to hire individuals and recruit volunteers to conduct inspections on infested waters while several lake associations participated in awareness events on non-infested waters.

Future needs/recommendations for watercraft inspection:

During the 1995 open water season, the number of inspection hours will remain at 20,000. Additional effort will be focused on high use access points where 1994 surveys indicated a high percentage of watercraft exit the water with Eurasian watermilfoil or other exotics attached (e.g. Hennepin and Carver Counties).

- Develop and distribute a decal to boaters whose watercraft have been inspected for exotic species. This decal is to be affixed to the trailer post on a voluntary basis and will assist in eliminating duplication of education efforts as well as provide an additional reminder of the need to properly clean boating equipment. This decal will be distributed solely by MCC Watercraft Inspectors.
- Use MCC Watercraft Inspectors to staff the DNR building exotic species display throughout the Minnesota State Fair.
- Use MCC Watercraft Inspectors to experiment with water sprayer units to facilitate removal of exotic species from the exterior of watercraft and associated boating equipment.

Enforcement

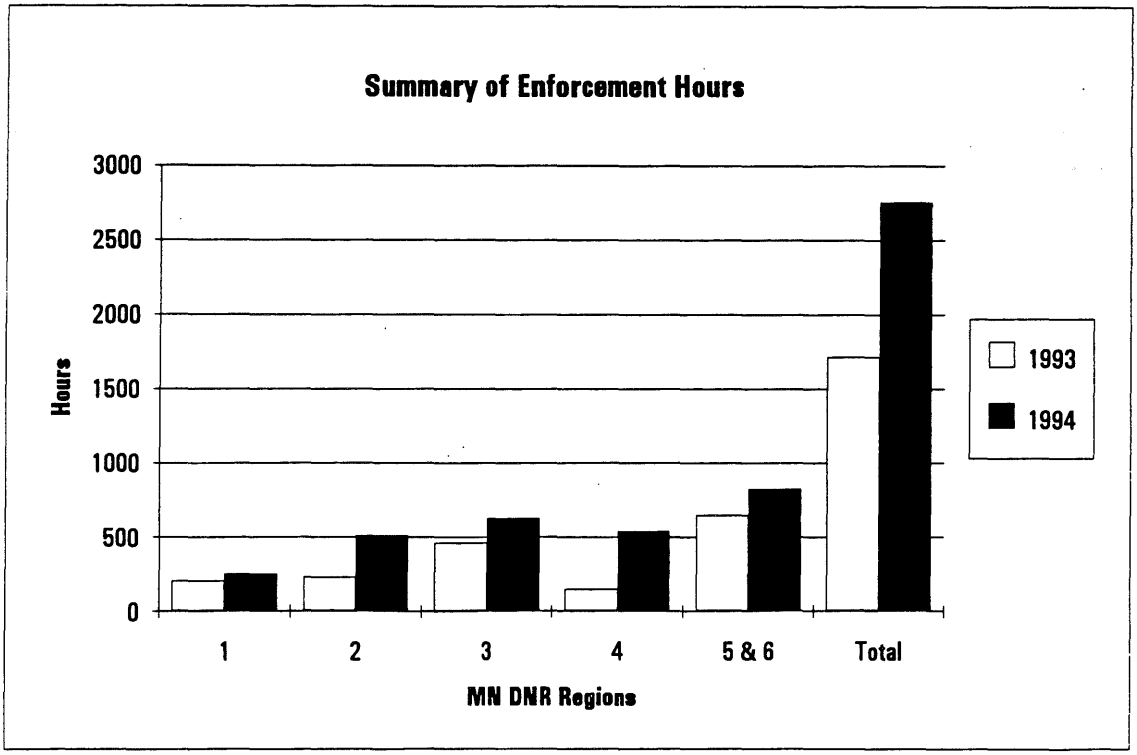
Background

In 1991, the Minnesota Legislature directed the DNR Commissioner of Natural Resources to establish a two year program designed to check trailered boats for the presence of milfoil. These requirements became effective August 1, 1991. Since then, a minimum of five checks per year have been conducted. Road checks are designed to inspect boats and trailers for the presence of milfoil fragments, educate and inform boaters about Eurasian watermilfoil and measure the success of containment efforts. As more exotic species have become established in Minnesota, roadchecks have been expanded to include inspection for other exotic species violations, including transportation of zebra mussels, spiny waterflea, ruffe, and other undesirable exotic species.

Progress in exotic species enforcement - 1994

In 1994, Conservation Officers conducted 2,753 hours of exotic species enforcement activities statewide. This was a seventy-one percent increase from 1993 and reflects an increase in all regions of the state (Figure 2). These activities were designed to enforce exotic species laws and improve containment efforts. The primary enforcement activities include 1) 'large-scale' roadchecks (conducted on a major thoroughfare with ten or more officers), 2) 'roadchecks' (conducted on a minor thoroughfare with less than ten officers), 3) public and private water access checks on both infested and non-infested waterbodies, 4) patrol of restricted areas on infested waterbodies, and 5) patterned checks (trailered watercraft stopped at random on a public road).

Figure 2. Summary of hours devoted to exotic species enforcement activities by Conservation Officers in the Division of Enforcement during 1993 and 1994.



Seven 'large-scale' roadchecks in five counties were conducted in 1994 (Figure 3). A total of 775 watercraft were checked and 36 boats/trailers were found to be illegally transporting milfoil (Eurasian or northern). The 'large-scale' roadchecks during 1994 reveal a statewide violation rate of 5% for all milfoil species (range 0% to 8%) and a 2% rate for Eurasian watermilfoil. This violation rate indicates that there is a clear potential for boats to carry Eurasian watermilfoil, or other harmful aquatic exotic species, to new locations within the state and that awareness and containment efforts need further improvement. Significant to the checks were that a portion of the violators were traveling from other states and that Eurasian watermilfoil was found on trailered watercraft as far north as Baudette. Discovering Eurasian watermilfoil so far from any known infestation strongly reinforces the need to continue enforcement throughout the state.

Figure 3.

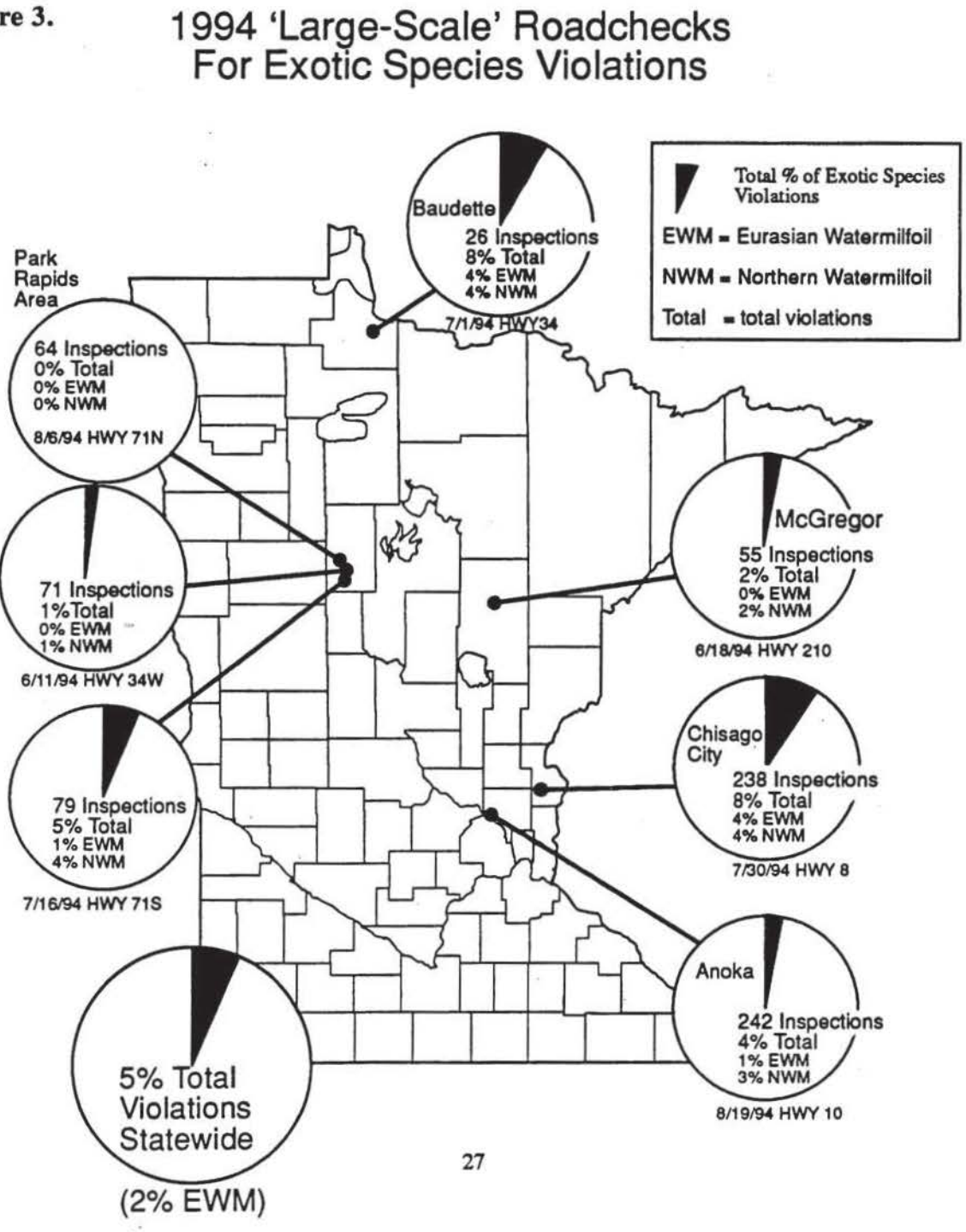


Table 9. Exotic species enforcement activities at various check points in 1994. Note: Table excludes 'large-scale' roadcheck data.

Counties with Exotics Enforcement Activities	Boats Checked	Summons	Written Warnings	Verbal Warnings	Total Violations	Percent Violations
Aitkin	33	0	0	0	0	0
Anoka	242	0	9	0	9	4
Becker	13	0	0	0	0	0
Beltrami	30	2	1	0	3	10
Blue Earth	48	0	1	0	1	2
Carver	242	0	6	6	12	5
Cass	45	0	1	11	12	27
Chisago	64	0	0	1	1	2
Cook	59	0	0	0	0	0
Crow Wing	58	0	3	2	5	9
Douglas	13	0	0	0	0	0
Goodhue	43	0	0	0	0	0
Grant	15	0	0	0	0	0
Hennepin	458	1	14	38	53	12
Hubbard	214	4	14	4	22	10
Itasca	89	0	0	1	1	1
Kandiyohi	306	0	0	0	0	0
Koochiching	36	0	0	0	0	0
Lac Qui Parle	13	0	0	0	0	0
Le Sueur	100	0	0	0	0	>1
Meeker	304	0	0	0	1	3
Mille Lacs	165	0	3	2	5	5
Murray	22	0	1	0	1	5
Ottertail	107	0	3	3	6	6
Scott	17	0	0	2	2	12
St. Louis	196	1	0	5	6	3
Wabasha	132	0	0	9	9	12
Waseca	8	0	0	0	0	70
Winona	155	0	0	0	0	0
Wright	53	0	0	3	3	6
Total	3,250	8	56	87	151	5

The number of counties where Conservation Officers conducted enforcement activities (excluding 'large-scale' roadchecks) expanded significantly in 1994 (Table 9). The twelve counties with enforcement activities in 1993 were increased to 30 in 1994. A total of 3,250 contacts were made and 151 received either a summons, written warning or verbal warning. The majority of the violations occurred in Hennepin County, an observation consistent with the large number of "high-risk" public water accesses in the county. However, Cass not Hennepin County, had the highest rate of violations. These checks found a statewide exotic species violation rate of 5%.

Future plans and needs regarding enforcement:

- Appoint an Exotic Species Enforcement Officer with statewide enforcement and coordination responsibilities.
- Focus additional inspections at commercial access sites on infested and non-infested waters.
- Increase exotic species education through Enforcement, news releases, and the Adopt a School program.
- Begin civil citation training for all DNR enforcement officers and other persons authorized by the Commissioner.
- Conduct additional education and enforcement activities at high use marinas and resorts.
- Readjust locations and numbers of 'large-scale' roadchecks to include at least one in each DNR regional area.

Management of Eurasian Watermilfoil

Eurasian watermilfoil *(Myriophyllum spicatum)* is an exotic plant that was inadvertently introduced to Minnesota. The Minnesota DNR manages milfoil because it can limit recreational activities on water-bodies and alter aquatic ecosystems by displacing native plants. In this report we describe the DNR's efforts in 1994 to contain this exotic plant and limit its spread in Minnesota.

Progress in management of Eurasian watermilfoil - 1994

The progress or effectiveness of the DNR's milfoil program is evaluated in relation to the objectives listed below. These objectives are described in the agency's plan for management of this exotic (MDNR 1994).

Objective 1: Contain Eurasian watermilfoil in Minnesota to existing waterbodies and limit the establishment of new populations, primarily by reducing the spread of milfoil fragments by boats and other watercraft.

Evaluation of Objective 1: The DNR will evaluate this objective by determining the number and statewide distribution of new milfoil populations each year and by estimating the number of watercraft carrying milfoil each year. The DNR's efforts in this area appear to have been quite successful in 1994 because the number of Minnesota water-bodies with milfoil increased by only two lakes. This is the smallest number of water-bodies added to the list in any year since 1987, when milfoil was first discovered in the state. Unfortunately, one of the new populations of milfoil is located near Sauk Center in an area of the state that has few other populations nearby.

Though few new populations of milfoil were discovered in Minnesota during 1994, this exotic continued to be carried by trailered watercraft. In 1994, Eurasian watermilfoil was found on 20% of the boats and trailers leaving infested waters (see section on Watercraft Inspections) and on 2% of trailered watercraft inspected on highways (see section on Enforcement). In 1994, as in previous years, Eurasian watermilfoil was found on trailered watercraft on highways as far north as Baudette. This town is over 160 miles north of the northern-most population of milfoil in Minnesota.

Objective 2: Eradicate or reduce the amount of Eurasian watermilfoil in Minnesota lakes.

Evaluation of Objective 2: The DNR will evaluate this objective by determining the number of milfoil populations that are successfully eradicated or reduced in size. In 1994, the DNR did not find milfoil in four Minnesota lakes where control work was done in previous years. In four of 23 lakes where control work was done in 1993, the acreage of milfoil present in 1994 was reduced by comparison with the previous year. In 1994, the DNR took the lead in attempts to eradicate milfoil on 19 lakes. In addition, the DNR made $100,000 available for management of milfoil on another 28 lakes where eradication of this exotic does not appear to be feasible with current technology and resources.

Objective 3: Find new ways to control and eradicate Eurasian watermilfoil.

Evaluation of Objective 3: The DNR will evaluate this objective by determining if new approaches to management will control milfoil. In 1994, the DNR supported one study of the potential for biological control which indicated that weevils caused significant damage to plants under experimental conditions. Although damaged milfoil plants and weevils have been observed in Minnesota lakes, researchers have not detected any significant declines in the abundance of milfoil that could be correlated with weevil activity. In two other studies, progress was made in the evaluation of herbicides with potential to control milfoil.

New lakes with Eurasian watermilfoil

The number of Minnesota lakes discovered in 1994 to have Eurasian watermilfoil was lower than the number found in any of the preceding six years (Figure 4). Sauk Lake, which was discovered to have milfoil in 1994, is located 90 miles northwest of the Twin Cities. Lake Hiawatha, the other new population discovered in 1994, is located in Hennepin County and is connected to Minnehaha Creek which flows from Lake Minnetonka. Milfoil most likely was carried by currents in the creek from Lake Minnetonka to Lake Hiawatha.

It is encouraging that the number of milfoil populations discovered in Minnesota during 1994 is low because this suggests that the DNR's Exotic Species Program is succeeding in limiting the spread of this exotic. Nevertheless, it is important to note that we can't determine for certain whether the rate of spread actually decreased or the rate of detection was low.

The participation of the public in monitoring the distribution of milfoil remains a critical element in the Eurasian Watermilfoil Program. As in previous years, most reports received in 1994 of suspected occurrences of milfoil turned out to be another plant species. The DNR continues to follow through on likely reports as soon as possible because early detection and treatment of milfoil is the key to limiting the spread of this exotic.

Control of Eurasian watermilfoil

Results of attempts to eradicate or reduce Eurasian watermilfoil prior to 1994

In 1994, surveys were done to evaluate the long-term outcomes of attempts to eradicate or reduce Eurasian watermilfoil in previous years. Surveys conducted by DNR staff during 1994 did not locate any milfoil in one lake, Augusta, where control work was done in 1993, and in two lakes, Crooked and Christmas, where control work was done in 1992 (Table 10). In addition, no milfoil was seen in Sugar Lake during 1994, the third consecutive year during which this body of water was free of milfoil. Unfortunately, milfoil was found in 1994 in two lakes, Bay and Wabasso, where milfoil was treated in 1992 and not found in 1993.

Surveys conducted during 1994 also indicated that the DNR and its cooperators have succeeded in reducing, but not eliminating, the acreage of Eurasian watermilfoil in three (Table 10) of the 23 lakes where control work was done in 1993 (MDNR 1993). The amount of milfoil found in Oscar Lake, the western-most occurrence of this exotic in Minnesota, was the same in 1994 as in 1993. Excluded from consideration here are 18 lakes where efforts made in 1993 to eliminate milfoil neither eradicated the plant nor produced significant reductions in its abundance in 1994.

Figure 4.

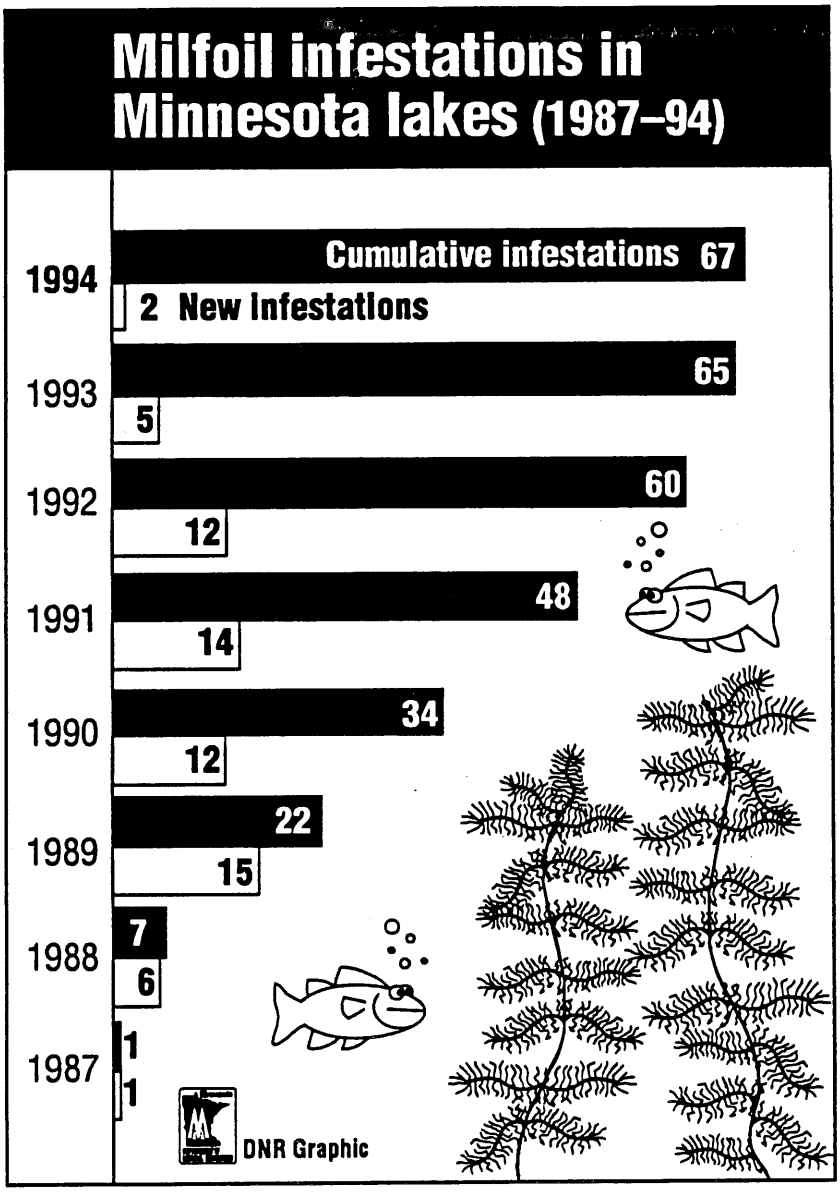

Milfoil infestations in Minnesota lakes (1987–94)
1994
Cumulative infestations 67
2 New infestations
1993
65
5
1992
60
12
1991
48
14
1990
34
12
1989
22
15
1988
7
6
1987
1
1
DNR Graphic

Table 10. Changes in acres of Eurasian watermilfoil in lakes to which 2,4-D was applied in an attempt to eradicate milfoil. All lakes were treated in 1993, or before, and were surveyed in 1993 and 1994.

County	Lake (Herbicide if not 2,4-D alone)	Acres of milfoil treated in 1993	Acres of milfoil present in 1993	Acres of milfoil present in 1994	Change in acres between 1993 and 1994
Anoka	Crooked (Sonar®)[1]	0	0	0	None
Crow Wing	Bay	0	0	63	Increase
Douglas	Oscar	5	5	5	None
Hennepin	Christmas[2]	0	0	0	None
	Dutch	8	8	2	Decrease
	Eagle	4	4	2	Decrease
Ramsey	Wabasso	0	0	1	Increase
Wright	Augusta	2	2	0	Decrease
	Beebe	25	25	≥20	Decrease
	Sugar[3]	0	0	0	None

[1] Last treated in 1992.
[2] Last treated in 1992.
[3] Last treated in 1991.

Organization of control program in 1994

Before describing the DNR's program for control of milfoil in 1994, it is necessary to review recent changes in the availability of funds and prioritization of lakes. During the last four years, the amount of State funds spent on this activity has been increasing (Table 11). In 1994, the amount of State funds allocated for control of milfoil was doubled by comparison with 1993 due to the increase from $3 to $5 in the surcharge on watercraft licenses (M.S. 86B.415).

In 1994, as in past years, the DNR continued to take the lead in attempts to eradicate milfoil from lakes given the highest priority according to the DNR's system for prioritization of milfoil lakes (see MDNR 1994). Beginning in 1994, the DNR initiated a program to provide assistance with management of milfoil on lakes where past efforts to eliminate this exotic neither eradicated the plant nor produced significant, long-lasting reductions in its abundance. In such lakes, eradication of milfoil does not appear to be feasible with current technology and available funds. The goals of management in such lakes are to 1) alleviate problems caused by milfoil and 2) reduce the probability that milfoil might be carried from the lake by

boats or trailers, primarily by reducing the amount of milfoil near water accesses. For these lakes, the DNR made funds available to lake associations, conservation districts, municipalities, and similar organizations. These organizations, or cooperators, were asked to take responsibility for surveying the vegetation, determining what management should be undertaken, and contracting with a commercial operator to carry out control. To be eligible for state funds for management of milfoil, a lake must have at least one public access. These funds are intended to pay for management of Eurasian watermilfoil that will benefit a majority of homeowners and the general public who use a lake. These funds may not be used for control work that would otherwise be done by private individuals under a DNR permit to control aquatic plants.

In the spring of 1994, the DNR classified bodies of water with milfoil on the basis of surveys done in 1993. Nineteen lakes were designated for attempts to eradicate milfoil and 28 were designated for management (Table 12). Five lakes were included in the DNR's study of Sonar® herbicide; two of these were treated with Sonar® and three were untreated reference lakes (see below). Another 13 bodies of water were determined to be ineligible for control.

All nineteen lakes designated for attempts to eradicate milfoil were surveyed by DNR staff in 1994. No attempts were made to eradicate milfoil on four of these lakes because no milfoil was found on them (Table 10). Applications of herbicide were made on 12 of these lakes designated for eradication and two of the Sonar® study lakes at a total cost of approximately $77,000, which included $44,500 and $36,500 contributed by cooperators and the DNR, respectively (Table 11). No applications of herbicide were made on three of the lakes designated for eradication, primarily because surveys of these lakes in 1994 indicated that the milfoil was too well established to be susceptible to eradication with current technology and available funds.

Some management was undertaken on at least 13 of the 28 lakes designated for management of milfoil (Table 12). These efforts ranged from surveys of milfoil by a commercial aquatic plant management company at a cost less than $500 to a mechanical harvesting program on Lake Minnetonka for which the DNR made $24,500 available. Most management involved applications of herbicide to milfoil on lakes that were eligible for reimbursement at levels between $1,500 and $8,500.

Table 11. Summary of the numbers of Minnesota lakes with Eurasian watermilfoil to which 2,4-D (or Sonar®) herbicide was applied during 1991-1994. Also included are costs of these applications.

Year	Number of lakes treated	State funds	Non-state funds	Total funds
1991[1]	20	?	?	$ 63,000
1992[2]	23	$ 63,000	$ 62,000	$ 125,000
1993	23	$ 95,000	$ 62,000	$ 157,000
1994	27	$ 119,600[3]	$ 36,500	$ 153,100

[1] Costs for this year were estimated by multiplying the number of acres treated by $184, the average cost per acre of applications of 2,4-D made in 1992.

[2] Excluded from this summary are lakes that were treated with Sonar®.

[3] The total amount of State funds available for control of milfoil in 1994 was $200,000. These efforts included mechanical harvesting, surveys, and hand-pulling in addition to use of herbicides. Funds allocated for 1994, but not spent, will be carried over for control in 1995.

Table 12. Classification of bodies of water in Minnesota with Eurasian watermilfoil.

Classification	Spring 1994	Fall 1994
Eligible for management with State funds		
Eradication	19	16
Management	28	33
Sonar® study	5	5
Ineligible for management with State funds		
Public water but no public access	4	4
Flowing water	4	4
Not public water	4	4
Supply of public drinking water	1	1
Total	**65**	**67**

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

The success achieved in controlling Eurasian watermilfoil in Minnesota is due in large part to cooperation between the DNR and other organizations such as lake associations, and various local units of government. In 1994, the DNR established cooperative agreements with 17 organizations outside the DNR to share costs of attempting to eradicate milfoil on 15 lakes designated for eradication and two lakes in the Sonar® study (Table 12). In the basic agreement, the DNR agreed to pay the first $3,000 of the cost of control work and to pay 50% of the remainder up to a maximum of $15,000 total. Organizations outside the DNR which entered into these agreements were expected to pay 50% of the costs between $3,000 and $15,000, as well as all costs above $15,000. The DNR was unsuccessful in attempts to establish cooperative agreements to share costs of attempting to eradicate milfoil with four organizations outside the DNR, primarily because these outside organizations did not have funds available for this effort. None of the four lakes had milfoil populations with the highest priority for eradication.

In 1994, the DNR notified 24 potential cooperators on 28 lakes designated for management of milfoil (Table 12) that the DNR would make at least $1,500 available for this activity on each of these lakes. The number of potential cooperators is less than the number of lakes designated for management because some cooperators have responsibility for more than one lake. Applications for funds were received from cooperators on 17 lakes. The DNR will reimburse cooperators for control work done in 1994 on at least 11 lakes for which cooperative agreements were established. Reimbursements for 1994 will total at least $79,000. Thirteen organizations outside the DNR chose not to establish cooperative agreements with the DNR to obtain state funds for management of milfoil. In most of these cases, cooperators were interested in establishing an agreement with the DNR, but decided to wait until 1995 to do so because they decided not to attempt to control milfoil in 1994. Funds allocated for work on individual lakes in 1994, but not spent, will be carried over and added to funds allocated for 1995.

Research on Eurasian watermilfoil

In 1994, the DNR supported research on several aspects of biological control and biology of Eurasian watermilfoil. In addition, the Army Corps of Engineers (COE) conducted research in these areas as 'in-kind services' to meet the Minnesota Legislature's requirement for a match to state funds appropriated for this project. Lastly, the DNR also participated in research on herbicides with potential to control milfoil.

Insects as biological controls of Eurasian watermilfoil in Minnesota

In 1992 and 1993, aquatic insects known to feed on, or cause damage to, Eurasian watermilfoil were found in Minnesota by researchers at the University of Minnesota (Newman and Maher 1995) with funding appropriated by the Minnesota Legislature as recommended by the Legislative Commission on Natural Resources (LCMR) (M.L. 1992, Ch. 513, Art. 2, Sec. 9). In other states and in Canada, investigators have found that these same native or naturalized aquatic insects are associated with, and may be causes of, declines in abundance of milfoil. Reductions in abundance of milfoil by herbivorous insects, i.e., biological control, is an ecologically sound method for management of Eurasian watermilfoil

and would minimize our need to use herbicides for control.

In 1994, researchers at the University of Minnesota continued their efforts with additional funding appropriated by the Minnesota Legislature as recommended by the LCMR (M.L. 1993, Ch. 72, Sec. 14, Subd. 12(L)). These efforts included an experiment designed to evaluate the effects of a weevil, *Euhrychiopsis lecontei*, on Eurasian watermilfoil in outdoor tanks. These tanks had a volume of 380 liters or 100 gallons. In this experiment, weevils reached densities of up to 300 per square meter and had significant effects on milfoil. Biomass of milfoil above ground was reduced by up to 60% four weeks after introduction of weevils into tanks; biomass of milfoil below ground was reduced by up to 45%. Biomass of milfoil that was detached and either floating or sunken increased with numbers of weevils introduced into ranks, suggesting that the insects damaged plants rather than consumed them. In addition, the concentrations of sugars and total nonstructural carbohydrates in both roots and shoots were reduced by weevils. This result suggests that weevils may have potential to reduce survival over winter of Eurasian watermilfoil and perhaps lead to reduced growth during the following spring.

Future efforts in this area will be directed toward determining whether weevils can have similar effects on Eurasian watermilfoil in field environments. In 1994, research done in four Minnesota lakes found both weevils and damage to milfoil plants. Nevertheless, these efforts have not yet detected any strong reductions in the abundance of milfoil that are related to the abundance of weevils. The maximum density of weevils observed in these lakes was 55 per square meter; average densities for three of the four lakes in May was 13 weevils per square meter. These values are much lower than the level of approximately 300 weevils per square meter shown to affect milfoil in tanks. Efforts are being made to determine what factors might be limiting densities of weevils in Minnesota lakes.

The COE plans to spend approximately $65,000 on further evaluation of insects as biological control agents for Eurasian watermilfoil. The COE has developed a study to be done by Dr. Sallie Sheldon at Middlebury College to evaluate the effects of weevils on native plants and also evaluate selected aspects of the biology of this insect.

Fungus as a biological control of Eurasian watermilfoil in Minnesota

In 1994, the COE conducted surveys in Minnesota and the upper midwest for fungal pathogens of Eurasian watermilfoil. These efforts were undertaken because disease has been observed to affect milfoil in field environments and is suspected to have contributed to past declines observed in North America. Initial isolations of fungi have been completed and more results will become available later.

Use of genetic markers to distinguish between Eurasian and native watermilfoils

In 1994, studies of genetic markers that differentiate between Eurasian and native watermilfoils were continued by researchers at the University of Minnesota with funding appropriated by the Minnesota Legislature as recommended by the LCMR (M.L. 1993, Ch. 72, Sec. 14, Sud. 12(L)). The results of this research will become available in 1995 and should be useful to managers who must be able to confirm the identity of a suspected population of Eurasian watermilfoil before expensive control efforts are undertaken.

Genetic variation in Eurasian watermilfoil

Recent research based on analysis of isozymes (Furnier and Mustaphi 1992) found that at least two different genotypes of Eurasian watermilfoil occur in Minnesota lakes. These different genotypes may react differently to chemical and biological control techniques in ways that could explain observed variations in control success. Current research at the University of Minnesota is being carried out with funding appropriated by the Minnesota Legislature as recommended by the LCMR (M.L. 1993, Ch. 72, Sec. 14, Subd. 12(L)). The objective of this research is to determine the total number of genotypes present in Minnesota, their geographic distribution, and whether or not multiple genotypes are present in the same lake. During the spring of 1994, considerable efforts were made to refine techniques involving the use of Randomly Amplified Polymorphic DNR markers (RAPD) to analyze the genetic 'fingerprints' of milfoil specimens. In addition, arrangements were made to obtain specimens of milfoil from researchers and natural resource agencies outside Minnesota. Genetic variation in Eurasian watermilfoil was examined using RAPD for samples collected from 27 lakes and one river in Minnesota as well as two lakes outside the state. These efforts identified 11 different genotypes, a number significantly greater than two genotypes identified previously by use of isozymes (Furnier and Mustaphi 1992). In 11 samples collected from White Bear Lake, nine different genotypes have tentatively been identified. This level of variation may be higher than that in most lakes with milfoil. For example, only one genotype was found in 17 of 20 Minnesota lakes from which two samples were collected. These results are generally consistent with the belief that most reproduction in Eurasian watermilfoil is clonal or asexual, though they do suggest that some sexual reproduction may be occurring in Minnesota lakes.

Viability of Eurasian watermilfoil seeds in Minnesota

In 1994, research on viability of Eurasian watermilfoil seeds was done by researchers at the University of Minnesota with funding appropriated by the Minnesota Legislature as recommended by the LCMR (M.L. 1993, Ch. 72, Sec. 14, Subd. 12(L)). It is generally assumed that milfoil spreads primarily by vegetative fragmentation. Nevertheless, past research in other states has shown that Eurasian watermilfoil can produce viable seeds. Though establishment of milfoil seedlings appears to occur only rarely, this mechanism of establishment merits investigation because it could re-establish milfoil in lakes following successful control of established plants.

Sampling of inflorescences of Eurasian watermilfoil in one Minnesota lake indicated seed set of up to 1,400,000 seeds per hectare per year. No germination was observed in 100 seeds in petri dishes in the lab. In addition, no seedlings emerged from 600 seeds sewn in soil in aquaria filled with water. A germination rate of 1.5% was observed in 270 seeds placed in nylon mesh bags placed in three Minnesota lakes during fall, 1993 and examined in May, 1994. These results indicate that Eurasian watermilfoil in Minnesota can produce significant numbers of seeds, but that the rate of germination in these seeds is low. These results are generally consistent with those from previous studies conducted elsewhere in North America.

Natural declines of Eurasian watermilfoil in Minnesota

Major declines of Eurasian watermilfoil have been reported in other states but the causes of such declines are often difficult to determine. Research on apparent declines of milfoil in Minnesota and the possible relationships with environmental factors, biological agents or other management efforts is being done with funding appropriated by the Minnesota

Legislature as recommended by the LCMR (M.L. 1993, Ch. 72, Sec. 14, Subd. 12(L)). In 1994, analyses by researchers at the University of Minnesota identified relationships between abundance of Eurasian watermilfoil, secchi depth, concentrations of chlorophyll a, and occurrence of other plant taxa. No large or widespread declines in milfoil were observed in the study lakes during 1992 and 1993. Future analyses will include information on concentrations of nutrients and carbohydrates in plants. The utility of this information will become evident if we can identify and enhance factors that cause declines in milfoil.

Evaluation of herbicides for long-term control of Eurasian watermilfoil

Evaluation of fluridone herbicide

In 1992, the DNR began an evaluation of the potential to selectively control Eurasian watermilfoil with fluridone, the active ingredient in Sonar® herbicide. The DNR initiated an evaluation of fluridone primarily because this herbicide must be applied to whole bays or lakes in order to control Eurasian watermilfoil. Concentrations of fluridone observed soon after application of Sonar® A.S. to two Minnesota lakes in 1994 were much higher than the target concentration of ten ppb. These applications reduced both the frequency of submersed and floating-leaved aquatic plants and the number of plant species present. Further evaluation of the potential to selectively control milfoil with fluridone will require additional applications at rates lower than those used in Minnesota in 1994. The status of this study and future efforts will be the subject of a meeting the DNR plans to hold in late this winter with people interested in fluridone and management of milfoil.

Evaluation of triclopyr herbicide

In 1994, the DNR assisted an effort by the COE to collect information on Garlon™ 3A herbicide in which the active ingredient is triclopyr. The COE sought information of the fate of triclopyr after application of Garlon™ 3A to a northern lake to control Eurasian watermilfoil. In 1994, the COE, working in close cooperation with DowElanco, the manufacturer of Garlon™ 3A, applied this herbicide under an Experimental Use Permit from the EPA to a total of 32 acres in Lake Minnetonka. Initial results indicated that these applications produced excellent control of milfoil and little damage to other submersed aquatic plants. Results on the fate of triclopyr will become available in the future.

Future plans and needs of the Eurasian watermilfoil program:

The Eurasian Watermilfoil Program is now well established and the increase in the surcharge on licenses for watercraft (see M.S. 86B.415 in Appendix A) passed during the 1993 legislative session has generated adequate funds for this program. Priorities for the Eurasian Watermilfoil Program, which are described in detail in the DNR's management plan, include:

- Inform the public 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,
- Control milfoil in Minnesota lakes, especially new populations in areas outside Minneapolis and St. Paul metropolitan area, and
- Support research on the potential for biological control of milfoil and the biology of this species.

Management of Purple Loosestrife

Background

Purple loosestrife *(Lythrum salicaria)* 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. State statutes direct the DNR to coordinate a control program to curb the growth of purple loosestrife (see M.S. 84.966 in Appendix A). Much progress has been made toward the development of a sound approach to manage this ecologically harmful exotic. The Purple Loosestrife Program was established in 1987.

Progress in management of purple loosestrife - 1994

The DNR has taken a major step forward towards the development of long-term control methods for loosestrife. Insects released as biological control agents in Minnesota in 1992 survived the winter and produced offspring. However, more research is needed to determine how rapidly these populations will expand and how effective the insects will be at reducing purple loosestrife in Minnesota. Research on the use of biological controls was expanded in 1994 with releases of leaf-eating beetles at 13 sites in 7 counties. A flower-feeding weevil was also released for the first time in Minnesota at 5 sites in the metro area.

- No purple loosestrife was found at 8 sites where purple loosestrife infestations were treated with herbicides in 1993. This control success is limited to the small infestations that are treated soon after purple loosestrife invades an area. Twelve sites that were treated in 1993 had a 75% reduction in quantity of herbicide needed to control these infestations in 1994. This is directly due to reductions in infestation size from previous treatments made in 1993.
- Inventory of known purple loosestrife sites expanded.
- Involvement in regional efforts to expand biological control of purple loosestrife.
- Funded research to bring fourth biological control agent into the U.S.

Statewide inventory of purple loosestrife

In 1987, the DNR began to inventory sites in Minnesota where purple loosestrife was established. Observations by DNR Area Wildlife Managers, county agricultural inspectors, local weed inspectors, personnel of the Minnesota Department of Transportation, and the general public are reported 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.

In Minnesota, 169 new purple loosestrife infestations were identified in 1994. This large increase in new sites is primarily due to the expanded inventory efforts carried out by the Metropolitan Mosquito Control District (MMCD). The MMCD, while conducting routine mosquito control work in wetlands, surveyed for the presence of purple loosestrife. A total of 140 reports were received from the MMCD during 1994. Most of these new sites were found in Hennepin and Ramsey counties.

Overall, there are now 1,727 purple loosestrife infestations documented in the inventory (Table 13). Of those sites, the majority (70%) are lakes, rivers or wetlands. Inventory totals indicate that Minnesota presently has 38,000 acres that are infested with purple loosestrife. These infestations range in size from a few plants to thousands, and vary greatly in plant density.

Table 13. Purple loosestrife infestations documented by the Purple Loosestrife Program, Minnesota Department of Natural Resources in 1993 and 1994.

Site Type	Total Sites - 1993	New Sites - 1994	Total Sites - 1994
Lake	495	43	538
River	128	11	139
Wetland	466	74	540
Roadsides and ditches	343	33	376
Other[1]	126	8	134
Total	**1,558**	**169**	**1,727**

[1] Includes gardens and other misc. sites.

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 2,4-D affects primarily broad-leaved or dicotyledonous plants, it is less effective than Rodeo. A third herbicide, Garlon 3A, or triclopyr, has been applied to purple loosestrife on a trial basis to test whether it will selectively kill loosestrife. Once Garlon 3A is registered for aquatic use in the U.S., it will be the herbicide of choice for loosestrife control. Garlon 3A has proven to be very effective and is more selective than Rodeo and less harmful to monocots. Garlon 3A is also less expensive than Rodeo.

Between 1990 and 1994, herbicides were applied to an average of 180 purple loosestrife sites per year (Table 14). 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.

Table 14. Number of purple loosestrife infestations treated by the Purple Loosestrife Program classified by infestation size.

Year	< 20 plants	20-99 plants	100-1000 plants	≥ 1000 plants	Total number of sites treated	Number of sites visited where no herbicide was applied 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

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 1,727 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 (≥ 1000 plants) being treated (Table 14).

During the summer of 1994, the DNR visited 190 high priority purple loosestrife stands for herbicide control work. At 26 of these sites workers found no loosestrife plants; 8 of these sites had been treated in 1993. Two sites had too many loosestrife plants to treat. A total of 162 sites covering 607 acres were treated. Most of the sites treated by the DNR were very small; 50% of the treated sites had less than 100 plants (Table 14). These applications used 30 gallons of herbicide, took 1,846 worker hours, and cost $51,893 (Table 15).

Table 15. Summary of herbicide applications to purple loosestrife infestations in 1994. This list includes only applications made by or reported to the Purple Loosestrife Program, Minnesota Department of Natural Resources.

DNR Region	Treated By	Number of sites treated with Rodeo	Number of sites treated with Garlon 3A	Hours of labor	Acres treated	Total cost
I	DNR	31	13	528	146	$ 16,493
	other					
II	DNR	25	28	530	137	$ 15,230
	other					
III	DNR	22	21	564	181	$ 13,836
	other	1	0	126	25	$ 2,996
IV	DNR	14	0	165	19	$ 5,000
	other					
V	DNR	0	8	59	25	$ 1,334
	other					
VI	DNR					
	other	2	13	274	75	$ 7,168
Total	**DNR**	**92**	**70**	**1,846**	**508**	**$ 51,893**
	other	**3**	**13**	**400**	**100**	**$ 10,164**

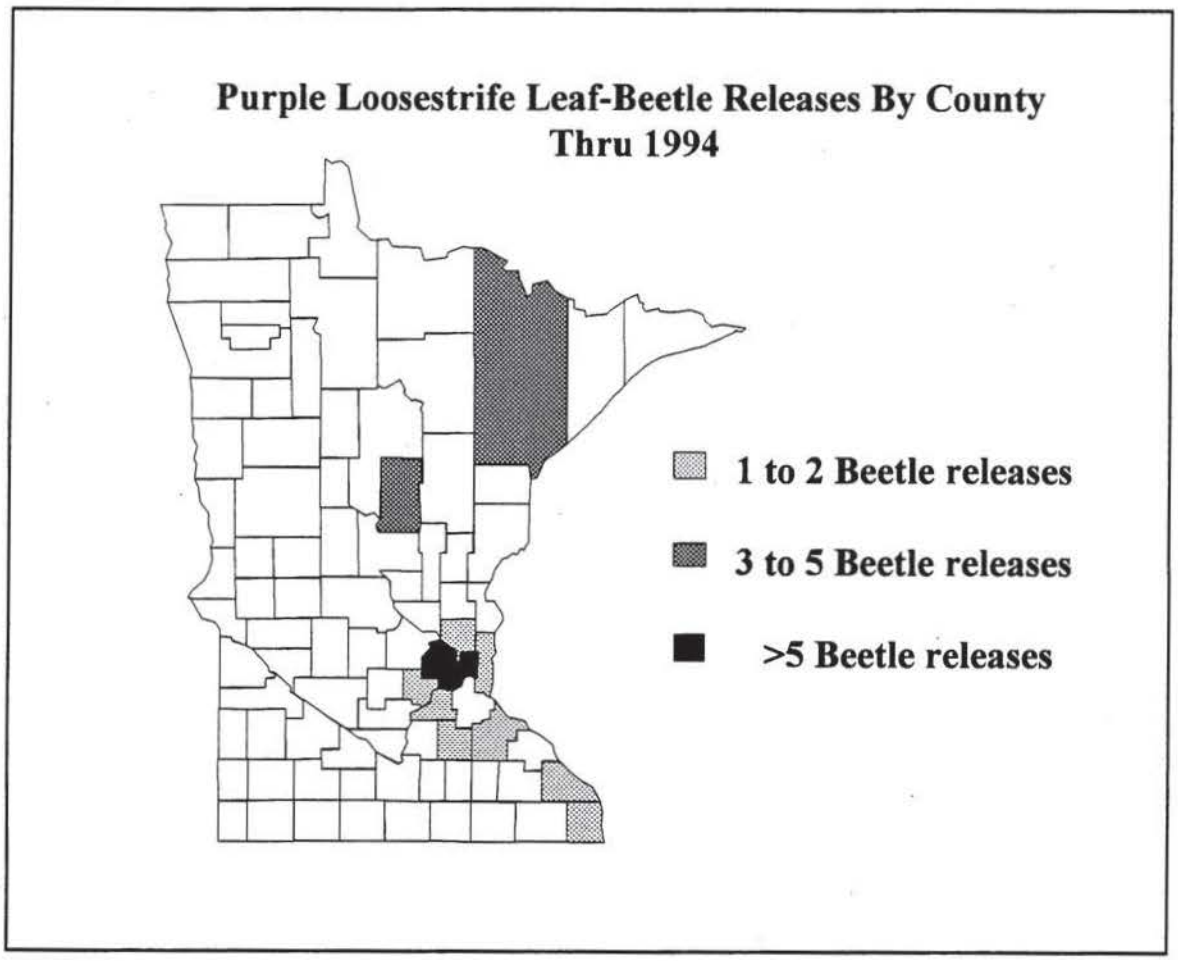
Research on purple loosestrife

In 1994, DNR continued to vigorously support purple loosestrife biological control research. Two different biological control approaches, one using insects and the other fungal pathogens, show promise.

Insects as biological control agents

Insects for biological control of purple loosestrife were first released at one research site by DNR staff in 1992. This was accomplished after years of testing to make sure the insects were loosestrife specific. Once the insects were approved for release by the United States Department of Agriculture, insects were provided by Cornell University for release in MN. This research was expanded in 1993 through funding appropriated by the legislature as recommended by the LCMR. Four species of insects, two leaf-eating beetles, a root-boring weevil and a flower-feeding weevil are now being tested as potential biological controls for loosestrife in Minnesota. The leaf-feeding beetles and the root-boring weevil passed their first test by surviving through the winter.

Figure 5.



Insects were reared in the lab at the University of Minnesota for research and field releases during the summer of 1994. Most of the lab rearing and research efforts is focused on the leaf-eating beetles. To date, 12,400 leaf beetles have been released in 23 sites around the state (see Figure 5).

The DNR is also funding biological research at Cornell University to improve the effectiveness and accelerate the establishment of the insects already present in Minnesota and bring two new insects, both flower feeding weevils, into the state. Researchers believe that multiple insect species which attack different parts of the loosestrife plant, will increase the likelihood of achieving successful control. Cornell provided both root-boring and flower-feeding weevils during the summer of 1994. The flower-feeding weevils received approval from U.S.D.A. for release in the United States in May 1994 and Minnesota was one of the first states to be selected for introductions. A total of one thousand adults were divided up and released in five wetlands in the metro area.

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.

The 1854 Treaty Authority in northern Minnesota provided $10,000 in funding to the DNR for the establishment of field releases in the Treaty Authority area. This funding was used to purchase insects from Europe. Leaf beetles were released in three sites in the Treaty Authority area in July 1994. These sites will be monitored by DNR staff in the coming year.

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. They will be tested in the field during the summer of 1995.

Management of purple loosestrife in other states

Over 90,000 leaf-eating beetles have been released in 18 states across the U.S. (CO, IA, ID, IL, IN, MD, MI, MN, MT, NY, OH, OR, PA, SD, UT, VA, WA, WI). Insects are being monitored by local researchers. A national workshop was held in March of 1994 to discuss results in each state and to develop a cooperative plan to address future needs.

The U.S. Fish and Wildlife Service's Federal Aid Program, in a coordinated effort with the Minnesota DNR, has helped to start biological control efforts in seven midwest states. This effort will provide midwest states with a source for insects, technical assistance for their initial release, and monitoring strategies. Planning efforts culminated with a meeting with Indiana, Missouri, Michigan, Iowa, Wisconsin, Illinois, and Ohio to coordinate logistics of this effort. A follow-up meeting, held in December 1994, discussed results, needs, and implementation plans for 1995. Fifteen states and several federal agencies are now involved.

Effectiveness

Effectiveness of this program will be based on short term and long term objectives. Control or eradication of small infestations statewide with herbicides is the main short term objective. Each year, a small number of purple loosestrife infestations (8 in 1994) are eradicated with herbicides in Minnesota. This is critical because these infestations are in watersheds that have very few infestations of loosestrife. This prevents the spread into uninfested wetlands and lakeshores.

A long term objective is to utilize biological controls to reduce loosestrife infestations within wetlands and statewide. Biological controls, if effective, will reduce the impact loosestrife has on wetland flora and fauna communities. The goal is to reduce loosestrife populations in Minnesota by 70% within 15-20 years. Purple loosestrife may not be eradicated from each wetland but it may be reduced in abundance to only one of many plant species in the community, and not the dominant one.

Participation of others in purple loosestrife control efforts

In 1994, the DNR worked with a variety of local governments and other organizations to control purple loosestrife in Minnesota (Table 16). Control information and technical assistance was provided to landowners and local units of government.

Table 16. List of cooperators participating in purple loosestrife control efforts and the type of participation.

Government/Organization	Type of Cooperation
Ramsey County	Cooperative agreement to allow Ramsey Co. to utilize state contract to hire commercial applicators.
City of Grand Rapids	Cooperative agreement to cost-share on control in the City of Grand Rapids.
City of Sunfish Lake	DNR provided equipment and herbicide
1854 Treaty Authority	Provided $10,000 in funding for the purchase of insects from Europe for biological control research in Northern Minnesota.
Pelican Lake Watershed	DNR received funding for control in Pelican Lake watershed
Birch Lake Association, Ramsey Co.	DNR provided equipment and herbicide
L. Sand Lake Association, St. Louis Co.	DNR provided equipment and herbicide
City of Lakeville	DNR provided equipment and herbicide

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 control efforts on small infestations of loosestrife.
- Increased coordination to control loosestrife on other state agency managed areas.

Management of Zebra Mussels

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 life style of this exotic has created numerous problems, such as clogging water pipes for industry and killing native species of molluscs. The high reproductive capacity and free-floating microscopic larval life stage of the zebra mussel allows rapid dispersal of this exotic within a waterbody. Despite having been present in North America for less than a decade, it has established populations throughout most of the eastern United States and its eventual distribution is expected to include most of the U.S. and southern Canada. The following report summarizes activities in Minnesota for 1994.

Progress in management of zebra mussels - 1994

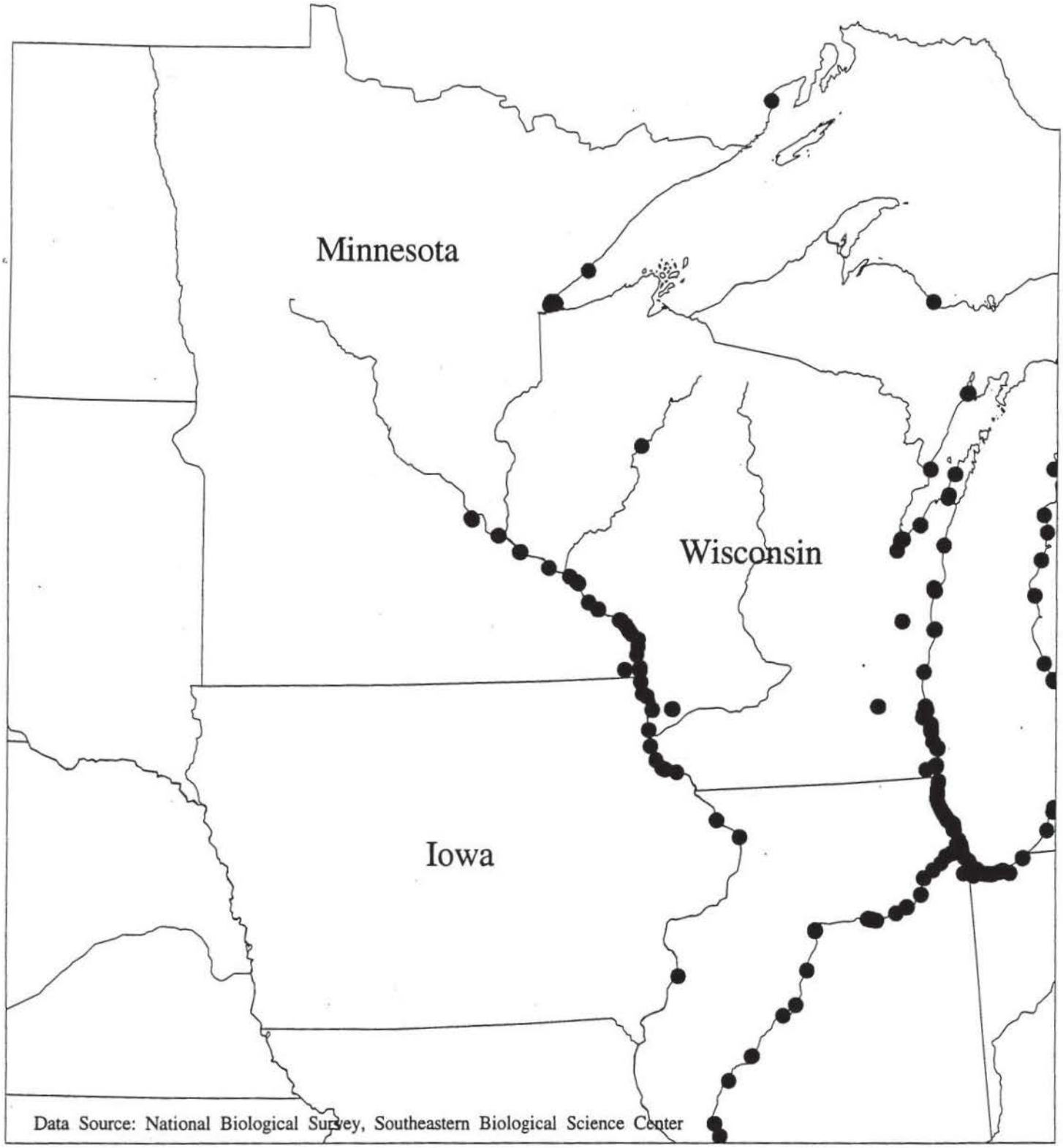
- No infestations of zebra mussel were recorded from inland waters in Minnesota.
- Watercraft inspections and public information activities increased significantly over 1993 levels (see Education and Inspection sections).
- Drafts of the state zebra mussel management plan were distributed for internal review. Adoption by the DNR of the plan is anticipated for January 1996.
- The DNR continued to work with the NPS and USFWS on the St. Croix River Zebra Mussel Plan as a task force member.

Current distribution/inventory of zebra mussels

Zebra mussel population levels in the Mississippi River continued to increase 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 6). Zebra mussels continue to be found in the Duluth Harbor, but no evidence has been found to suggest that these mussels are reproducing. No zebra mussels have been reported from any lakes or inland rivers within the state.

The DNR provided financial assistance for active monitoring for zebra mussels on the St. Croix River in cooperation with the National Park Service (NPS) and provided technical advice for monitoring activities. DNR staff also responded to public calls concerning zebra mussels found attached to boats removed from the St. Croix River and from barge service companies that documented several barges heavily infested with zebra mussels on the Mississippi River.

Figure 6. Confirmed Zebra Mussel Sightings as of December, 1994.



Control of zebra mussels

There was no control of zebra mussels within natural ecosystems conducted in 1994 and we do not anticipate undertaking control activities at any time in the near future. There are still no environmentally safe control methods available for natural systems. Thus, control is not a viable option once the zebra mussel becomes established in a lake or river. Because safe control methods do not exist, it is essential that a strong effort remains 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 Inspection sections).

Research on zebra mussels

The DNR continued research to document increasing levels of zebra mussel infestation on native unionids in Lake Pepin on the Mississippi River. DNR staff also attended the Fourth International Zebra Mussel Research Conference to gather current information on research being conducted in the United States and Canada. Staff have been contacted regarding the possible use in Minnesota of a natural plant extract to control zebra mussels. However, this toxin is not specific to zebra mussels and does not appear to be an option for controlling zebra mussels in the natural environment.

Management of zebra mussels in other states

Management efforts in other states are very similar to efforts in Minnesota. With no control options available, management focuses mainly on public information and education to prevent or slow the spread of the zebra mussel. The phrase "management of zebra mussels" can give false hopes. Because this organism can withstand a lack of water or oxygen for extended periods, has no environmentally acceptable control options, spreads rapidly once established in a lake or river, and has microscopic life stages, detection and prevention of spread are difficult. It is highly likely that management of zebra mussels will remain focused on identifying vectors which would spread this exotic and developing targeted public awareness and educational efforts.

Wisconsin is the most recent state to complete a management plan for zebra mussels ("Protecting Wisconsin Waters from Exotic Invaders - A Zebra Mussel Report to the Legislature"). The goals of their plan are similar to the goals of other states such as Minnesota and New York. The major focus to preventing or slowing spread is on public education and information. This plan basically addresses the problem in a similar fashion to Minnesota's management plan.

DNR staff presented information at a Minnesota Sea Grant sponsored workshop in Iowa to help resource personnel in that state begin to address this issue. To date, Iowa has focused efforts on public information and education and has no formal management plans for the zebra mussel.

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 improve control methods. Targeted public awareness and enforcement activities will be used to reduce the rate of movement of zebra mussels, zebra mussel-infested water, or zebra mussel-infested

plants on trailered watercraft. In 1994, increased public awareness and enforcement activity was focused in areas adjacent to zebra mussel infestations. However, data on the importance of various vectors and the effectiveness of containment efforts is not available. No inland lakes in Minnesota are known to be infested with zebra mussels.

Participation with other groups

The 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 (see MDNR 1993). DNR staff again assisted the NPS by monitoring boats heading upstream at the Kinnichinnic Narrows which had been in infested waters. Approximately 700 boats per weekend over a three month period were recorded and this information was given to the NPS to aid their efforts. DNR staff also assisted in having construction barges that were being moved into the St. Croix River for bridge work stopped for dive inspection to prevent movement of zebra mussels into the Hudson area.

Discoveries during Fall 1994 of zebra mussels attached to recreational boats in the Stillwater and Hudson area have lead to questions concerning the effectiveness of the voluntary program to prevent zebra mussel movement through recreational boat traffic. This issue will be addressed at future meetings of the St. Croix Interagency Zebra Mussel Task Force.

Public awareness and education efforts have benefitted from cooperation from the many groups involved in the zebra mussel issue: federal agencies (NPS), state agencies (DNR), Minnesota Sea Grant Extension, and private industry (Northern States Power). These efforts are covered more fully in the Education section.

Future needs for management of zebra mussels

- Review the need to place moratorium on the commercial take of native mussels in the Mississippi River to try and protect the populations from further stress and maintain native densities as high as possible until zebra mussel impacts are more fully known.
- Implement measures to prevent the movement of aquatic vegetation from infested waters.
- Establish a centralized, easily accessible GIS-based database on statewide distribution and abundance through cooperation with Minnesota Sea Grant, or internally within the Exotic Species Program.

Management of Flowering Rush

Background

Flowering Rush *(Butomus umbellatus)* is a Eurasian aquatic plant that has been introduced to North America. It occurs in several waterbodies in Becker County, north central Minnesota. The Minnesota Department of Natural Resources (DNR) describes flowering rush as an undesirable exotic species because it may grow abundantly in a variety of aquatic habitats and possibly crowd out native aquatic vegetation.

Progress in flowering rush management - 1994

- The DNR Exotic Species Program completed a state management plan for flowering rush which includes information on flowering rush biology and management strategies. The DNR will use the plan to guide future flowering rush management and to write specific work plans to describe annual management actions.
- The Exotic Species Program continues to include information about flowering rush in its public awareness efforts (see Education Chapter) and in 1994 revised the flowering rush fact sheet and trailer tag. Minnesota Conservation Corps (MCC) staff inspected watercraft leaving public accesses on all lakes containing flowering rush.

Inventory

Historically, there are reports of flowering rush in Anoka, Rice, and Becker Counties in Minnesota. In 1993 and 1994, Exotic Species staff surveyed historical sites in Anoka and Rice Counties but did not locate any flowering rush plants. In 1994 in Becker County, staff verified flowering rush locations in Big and Little Detroit Lakes, Muskrat Lake, Lake Sallie and Lake Melissa, and portions of the Pelican River that connect these lakes.

Control of flowering rush

As outlined in the Flowering Rush Management Plan, a DNR permit is required to remove any emergent aquatic plant, including flowering rush. Small, isolated patches of emergent flowering rush can be removed by hand-pulling if the entire rhizome system is removed. In 1994, volunteers from the Lakes Melissa, Sallie Improvement Association spent about 100 hours hand-pulling flowering rush in Lakes Melissa and Sallie.

In Detroit Lakes, submersed flowering rush plants were mechanically harvested as part of the Pelican River Watershed's lakewide harvesting program.

Research on flowering rush

Flowering rush forms extensive rhizome systems that are especially difficult to remove in dense stands. If rhizomes are not completely removed, the plants will regrow and uprooted rhizome fragments may spread throughout the waterbody. Cutting emergent flowering rush below the water surface will reduce its abundance without disturbing the rhizome system. Repeated cutting throughout the summer may provide long term reduction in flowering rush abundance. In 1994, the Exotic Species Program continued to evaluate hand-cutting as a control method for emergent plants.

Rodeo is a systemic herbicide that is capable of killing emergent flowering rush plants (plants that extend above the waters surface). In 1994, the Exotic Species Program evaluated Rodeo applications for emergent flowering rush. Control was not successful in water depths greater than six inches, apparently because the herbicide is washed from the plants. Field trials will continue in 1995 and Rodeo is expected to be most effective when applied to fully emergent plants.

Participation of others in control of flowering rush

Individuals and organizations involved in flowering rush management include, DNR Exotic Species Program, DNR Fisheries, DNR Minnesota Conservation Corps, Pelican River Watershed District, and Lakes Sallie and Melissa Improvement Association. Coordination with these individuals and organizations will continue in the future.

The Pelican River Watershed District reviewed and provided comments on the DNR Flowering Rush Management Plan. The District manages the existing mechanical harvesting program which is regulated by DNR Fisheries. District staff have trained volunteers to identify and hand-pull emergent flowering rush plants. In 1994, volunteers spent about 100 hours hand-pulling plants on Lakes Sallie and Melissa.

Effectiveness

The primary goals of DNR's flowering rush management plan are to: 1) contain flowering rush to waterbodies where it presently occurs, 2) reduce its impact on the aquatic communities and on other water users where it is found, and 3) improve our treatment methods. In 1994, progress was made on attaining these goals. Despite increased survey and public awareness efforts to provide a more accurate description of the statewide distribution of flowering rush, no new sites were located. Surveys of boaters in Detroit Lakes found that most had some knowledge of flowering rush. Important data on the relative abundance of flowering rush and the associated native plant species was gathered which will be essential to monitor future control efforts. Chemical treatment methods for emergent flowering rush plants and manual removal methods for partially emergent and submersed plants were improved through field trials.

Future needs for flowering rush management

- Monitoring of flowering rush populations will be continued to evaluate the plant's rate of spread, its potential impact on native plant communities, and the effects of management activities. In 1995, Exotic Species Program staff will monitor selected emergent populations by boat and selected submersed populations by SCUBA.
- Control of flowering rush populations will be continued using a combination of control techniques. The following activities are proposed for 1995:

1) Test the herbicide Rodeo, using field trials, as a control for fully emergent plants.

2) Hand-pull small, isolated patches of emergent flowering rush in Lake Sallie and/or Lake Melissa, where removal of the entire rhizome appears feasible.

3) Hand-cut emergent flowering rush stands and continues to evaluate its effectiveness.

4) Mechanically harvest large areas of submersed flowering rush plants that interfere with recreational use.

Management of Ruffe

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 National Biological Survey have been studying this exotic fish to better understand its impacts on North American fish communities. Research has not shown how fisheries will be most affected, but the rapid increase in the ruffe population and possible replacement of fish biomass concerns many fish management agencies and sportfishing interests. Opinions within fish management agencies vary about how, and whether it is possible, to control ruffe in North America (Ruffe Control Committee 1993).

Progress in management of ruffe - 1994

- No ruffe have been discovered in inland waters of Minnesota.
- Information about the ruffe has been included in brochures, billboards, and 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 MCC Watercraft Inspections continue at public access points in MN waters.
- "Ruffe Watch" identification cards for anglers were prepared by MN Sea Grant in cooperation with the Great Lakes Sea Grant Network, the U.S. Fish and Wildlife Service, and several state resource agencies.
- The development of a species management plan for ruffe was initiated and will be completed by spring of 1995.

A federal ruffe control committee, established in 1992, has finished preparing a Ruffe Control Program and additional required supporting information (see Control of Ruffe). It was published in the Federal Register in December 1994.

Inventory of ruffe - 1994

The population of ruffe in the St. Louis River estuary continues to increase. The ruffe population there, and in the adjacent Lake Superior waters, is now estimated to be 3.6 million fish (Table 17).

Table 17. Density and population estimate for ruffe in the St. Louis River 1989 - 1993.

Year	1989	1990	1991	1992	1993	1994
No / Hectare	81	257	422	403	588	850
Total Population	0.36 Million	1.15 Million	1.9 Million	1.8 Million	2.6 Million	3.6 Million

Source: National Biological Survey - Ashland Biological Station

Figure 7. Confirmed Ruffe Sightings as of December, 1994.

The National Biological Survey, Ashland Biological Station, of the National Fisheries Research Center - Great Lakes has taken the lead role in ruffe population investigations. 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 Ontonogan, Michigan, and a reproducing population was discovered in Thunder Bay, Ontario in 1994 (Figure 7).

The USFWS Fisheries Resources Offices will continue to conduct or 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.

During routine fish population assessment netting, DNR's Section of Fisheries sets nets in inshore areas of Lake Superior. Ruffe have been found in Minnesota waters of Lake Superior as far north as French River. 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. No ruffe were confirmed in Minnesota inland waters in 1994.

Control of ruffe

The Minnesota and Wisconsin DNR have attempted to control ruffe in the Duluth area of Lake Superior and the St. Louis River since 1988. Several tactics were considered including predator control, chemical treatment of the lower St. Louis River system, and stocking sterile male ruffe. Predator control was chosen as the tactic that might provide a check on the ruffe expansion. The goal of angling regulations and stocking of predator fish was to increase predation on ruffe by native fish. This tactic has not checked ruffe expansion.

Since it was not and still is not possible or feasible to eradicate ruffe from the Duluth harbor area with existing technology, the objective of the Federal Ruffe Control Program is to confine ruffe to western Lake Superior. The current draft of the Federal Ruffe Control Program identifies the following objectives:

1) Eliminate reproducing ruffe populations on the periphery of the range using chemical pesticides.
2) Prevent the transport of ruffe out of western Lake Superior in the ballast waters of ships.
3) Continue and expand investigations of ruffe populations and affected fish communities to provide information necessary to plan and evaluate control activities.
4) Conduct surveillance sampling in likely locations to find newly established populations of ruffe, and designate a single office to compile collections of ruffe.
5) Evaluate the ongoing predator enhancement program in Duluth Harbor and quantify the predation on ruffe.
6) Educate the public so that ruffe will not be transported and so will be killed and reported when caught by anglers.

Research on ruffe

The USFWS and the National Biological Survey are conducting most of the research on ruffe. The amount of research they have conducted has been limited by funding. Current research topics include: monitoring in St. Louis River estuary, monitoring areas of future expansion, monitoring native populations after ruffe invade, predator food habits on ruffe, and chemical control methods (Bills 1994). The U.S. Environmental Protection Agency-Duluth Lab has also funded ruffe research.

Effectiveness of ruffe management

The effectiveness of the state's predator stocking and angler regulations is unclear but appears to have had no effect in slowing the expansion of the ruffe. Those activities were the only control strategies initially available and are being evaluated. Regulations and public awareness efforts to prevent the transportation of ruffe to inland lakes have, to date, been effective.

Management in other states

The Lake Superior waters of Wisconsin, Ontario, and Michigan 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 draft plan for nonindigenous fish introductions to 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 the Superior harbor or in tributaries along the south shore of Lake Superior. Chemical control of ruffe has been proposed for Wisconsin or Michigan waters.

Participation of others in ruffe control efforts

The National Biological Survey (NBS) 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.

- Invest in the research of environmentally sound control methods. MNDNR, WDNR, NBS, EPA, the USFWS and the Sea Grant Network are possible cooperators on future ruffe research projects.
- Support continued biological assessment efforts by the USFWS and NBS so that the impact of ruffe on native communities can be monitored.
- Continue existing public awareness efforts.
- Continue monitoring using routine fish sampling and angler reports.

Management of Eurasian Swine

Background

Eurasian swine (*Sus scofa* 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. The Wild Hog Task Force, chaired by Minnesota Department of Agriculture (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. 84.9695/17.457 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 restricted species 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;
- authorized the state to issue permits to possess 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 management of Eurasian swine - 1994

- In 1994, legislation was enacted which transferred the responsibility for Eurasian swine from the DNR to the Minnesota Department of Agriculture.
- Report of the "Wild Hog Task Force" was finalized February 1994 and recommended continued permitting of wild hog facilities in MN by MDA (Minnesota Department of Agriculture Wild Hog Task Force 1994). A minority report signed by DNR recommended banning this species in Minnesota.

Inventory of Eurasian swine - 1994

No wild populations of Eurasian swine are known to exist in the state. There are six known herds of Eurasian swine held in captivity in Minnesota registered with the Board of Animal Health as required by 1993 legislation. There may be additional herds in captivity that have not been registered. Simple methods are not available to determine the parentage of Eurasian swine. Therefore, it is difficult to determine if swine herds in Minnesota are Eurasian or domestic *(Sus scofa domesticus)*.

Management in other states

The MDA survey conducted in 1993 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 states. DNR offers its assistance to MDA for control of this species and encourages MDA to fully implement these items as identified in the Wild Hog Report - February 1994.

Future needs for Eurasian swine management - 1995:

- Identify non-registered herds.
- Inspect facilities holding known herds and issue permits when appropriate.
- Develop methods to differentiate between domestic and Eurasian swine herds.

Appendix A - Selected Minnesota Exotic Species Statutes

Compiled by the Minnesota Department of Natural Resources - Exotic Species Program

M.S. 18.317 UNDESIRABLE EXOTIC AQUATIC PLANTS OR WILD ANIMALS.

Subd.1. **Transportation prohibited.** Except as provided in subdivision 2, a person may not transport Eurasian or Northern water milfoil, myriophyllum spicatum or exalbescens, zebra mussels, or undesirable exotic aquatic plants or wild animals identified by the commissioner of natural resources on a road or highway, as defined in section 160.02, subdivision 7, or on forest roads.

Subd.1a. **Placement Prohibited.** A person may not intentionally place undesirable exotic aquatic plants or wild animals, as defined in section 84.967[*this is an incorrect reference*], in public waters within the state.

Subd. 2. **Exception.** A person may transport Eurasian or Northern water milfoil, myriophyllum spicatum or exalbescens, or other undesirable exotic aquatic plants or wild animals identified by the commissioner of natural resources for disposal as part of a harvest or control activity conducted under a permit or as specified by the commissioner.

Subd. 3. **Launching of watercraft with Eurasian or Northern water milfoil or other Harmful Species prohibited.** (a) A person may not place a trailer or launch a watercraft into waters of the state if the trailer or watercraft has attached to it Eurasian or Northern water milfoil, zebra mussels, or other undesirable exotic aquatic plants or wild animals identified by the commissioner of natural resources. A conservation officer or other licensed peace officer may order the removal of Eurasian or Northern water milfoil, zebra mussels, or other undesirable exotic aquatic plants or wild animals identified by the commissioner of natural resources from a trailer or watercraft before being placed or launched into waters of the state.

(b)For purposes of this section, the meaning of watercraft includes a float plane and "waters of the state" has the meaning given in section 103G.005, subdivision 17.

(c) A commercial harvester shall clean aquatic plant harvesting equipment of all aquatic vegetation at a suitable location before launching the equipment in another body of water.

Subd. 3a. **Inspection of Watercraft and Equipment.** (a) Watercraft and associated equipment including weed harvesters, that are removed from any waters of the state that the commissioner of natural resources identifies as being contaminated with Eurasian water milfoil, zebra mussels, or other undesirable exotic aquatic plants or wild animals identified by the commissioner of natural resources, shall be randomly inspected between May 1 and October 15 for a minimum of 10,000 hours by personnel authorized by the commissioner of natural resources. Beginning in calendar year 1994, a minimum of 20,000 hours of random inspections must be conducted per year.

Subd. 4. **Enforcement.** This section may be enforced by conservation officers under sections 97A.205, 97A.211, and 97A.221, subdivision 1, paragraph (a), clause (1), and by other licensed peace officers.

Subd. 5. **Penalty.** A person who violates subdivision 1, 1a, 3, or 3a is guilty of a misdemeanor. A person who refuses to obey the order of a peace officer or conservation officer to remove Eurasian or Northern water milfoil, zebra mussels, or other undesirable exotic aquatic plants or wild animals from a trailer or watercraft is guilty of a misdemeanor.

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 188.88 contain procedures for controlling and eradicating noxious weeds on 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.

ECOLOGICALLY HARMFUL SPECIES

M.S. 84.966 CONTROL OF PURPLE LOOSESTRIFE:

Subd. 1. **Definition:** For the purpose of this section, "purple loosestrife" means Lythrum salicaria, Lythrum virgatum, or combinations thereof.

Subd. 2. **Establishment of Control Program:**

The commissioner of natural resources shall coordinate a control program to curb the growth of purple loosestrife. The commissioners of agriculture and transportation must aid and corporate with the commissioner of natural resources to establish, implement and enforce the control program.

M.S. 84.967 ECOLOGICALLY HARMFUL SPECIES; DEFINITIONS.

Subdivision 1. **Scope.** For the purposes of sections 84.967 to 84.9692, the following terms have the meanings given them.

Subd. 2. **Ecologically Harmful Exotic Species.** "Ecologically harmful exotic species" means non-native aquatic plants or wild animals that can naturalize, have high propagation potential, are highly competitive for limiting factors, and cause or may cause displacement of, or otherwise threaten, native plants or native animals in their natural communities.

Subd. 3. **Limited Infestation of Eurasian Watermilfoil.** "Limited infestation of Eurasian water milfoil" or "limited infestation" means an infestation of Eurasian watermilfoil that occupies less than 20 percent of the littoral area of a waterbody up to a maximum of 75 acres, excluding water bodies where mechanical harvesting is used to manage Eurasian watermilfoil or where no Eurasian watermilfoil control is planned.

M.S. 84.968 ECOLOGICALLY HARMFUL SPECIES: MANAGEMENT PLAN; REPORT

Subdivision 1. **Management Plan.** (a) By January 1, 1993, a long-term statewide ecologically harmful exotic species management plan must be prepared by the commission of natural resources and address the following:

(1) coordinated detection and prevention of accidental introduction;

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

(3) a coordinated public awareness campaign regarding ecologically harmful exotic animals and aquatic plants;

(4) a process, where none exits, to designate and classify ecologically harmful exotic species into the following categories:

(i)undesirable wild animals that must not be sold, propagated, possessed, or transported; and

(ii) undesirable aquatic exotic plants that must not be sold, propagated, possessed, or transported;

(5) coordination of control and eradication of ecologically harmful exotic species on lands and public waters; and

(6) develop a list of exotic wild animal species intended for nonagricultural purposes, or propagation for release by state agencies or the private sector.

(b) The plan prepared under paragraph (a) must include containment strategies that include:

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

(2) a reasonable and workable inspection requirement for boats and equipment participating in organized events on the waters of the state.

(3) allowing access points infested with ecologically harmful exotic species to be closed, for not more than a total of seven days during the open water season, for control or eradication purposes, and requiring posting of signs

(4) provisions for reasonable weed-free maintenance of public accesses to infested waters; and

(5) notice to travelers of the penalties for violations of laws relating to ecologically harmful exotic species.

Subd. 2. **Report .** The commissioner of natural resources shall be January 1 each year submit a report on ecologically 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, eradication, inspections, and research;

(2) an analysis of the effectiveness of management activities conducted in the state, including chemical eradication, 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 by species;

(6) an estimate of future management needs.

M.S. 84.969 COORDINATING PROGRAM, GRANTS, AND REGIONAL COOPERATION

Subd. 1. **Coordinating Program.** The commissioner of natural resources shall establish a statewide coordinating program to prevent and curb the spread of ecologically harmful exotic animals and aquatic plants.

Subd. 2. **Grants.** The coordinating program created in subdivision 1 may accept gifts, donations, and grants to accomplish its duties and must seek available federal grants through the federal Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. A portion of these funds shall be used to implement the plan under section 10.

Subd. 3. **Regional Cooperation.** The governor may cooperate individually and regionally, with other state governors in the midwest for the purposes of ecologically harmful exotic species management and control.

M.S. 84.9691 RULEMAKING

(a) The commissioner of natural resources may adopt emergency and permanent rules restricting the introduction, propagation, use, possession, and spread of ecologically harmful exotic species in the state, as outlined in section 84.967. The emergency rulemaking authority granted in this paragraph expires July 1, 1994.

(b) The commissioner shall adopt rules to identify bodies of water with limited infestation of Eurasian watermilfoil. The areas that are infested shall be marked and prohibited for use.

(c) A violation of a rule adopted under this section is a misdemeanor.

M.S. 84.9692 CIVIL CITATIONS AND PENALTIES.

Subdivision 1. **Authority to issue.** After appropriate training, conservation officers, peace officers, and other staff designated by the commissioner may issue warnings or citations to persons who:

(1) unlawfully transport ecologically harmful exotic species on a public road;

(2) place a trailer or launch a watercraft with ecologically harmful species attached into waters of the state;

(3) operate a watercraft in a marked Eurasian water milfoil limited infestation area; or

(4) damage, remove, or sink a buoy marking a Eurasian water milfoil infestation area.

Subd. 2. **Penalty Amount.** A citation issued under this section may impose up to the following penalty amounts:

(1) $50 for transporting visible Eurasian water milfoil on a public road in each of the following locations:

(i) the exterior of the watercraft below the gunwales including the propulsion system;

(ii) any surface of a watercraft trailer;

(iii) any surface of a watercraft interior of the gunwales;

(iv) any water container including livewells, minnow buckets, or coolers which hold water; or

(v) any other area where visible Eurasian water milfoil is found not previously described in items (1) to (4);

(2) $150 for transporting visible zebra mussels on a public road;

(3) $300 for transporting live ruffe or live rusty crayfish on a public road;

(4) for attempting to launch or launching into noninfested waters a watercraft with visible Eurasian water milfoil or adult zebra mussels attached, $500 for the first offense and $1,000 for a second or subsequent offense;

(5) $100 for operating a watercraft in a marked Eurasian water milfoil limited infestation area other than as provided by law;

(6) $150 for intentionally damaging, moving, removing, or sinking a milfoil buoy; or

(7) $150 for launching or attempting to launch into infested waters a watercraft with visible Eurasian water milfoil or visible zebra mussels attached .

Subd. 3. **Payment of Penalty.** If not appealed under subdivision 4, civil penalties are payable to the commissioner no later than 30 days after issuance. Fines collected under this section must be credited to the water recreation account.

Subd. 4. **Appeals.** Citations may be appealed under the procedures in section 116.072, subdivision 6, if the person 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.

Subd. 5. **Enforcement of Field Citations.** Field citations may be enforced under section 18.317.

Subd. 6. **Cumulative Remedy.** The authority of conservation officers to issue field 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.

LICENSES

M.S. 86B.401 WATERCRAFT LICENSES.

Subd. 11. **Suspension for not removing water milfoil or other undesirable exotic species.** The commissioner , after notice and an opportunity for hearing, may suspend for a period of not more than one year the license of a watercraft if the owner or person in control of the watercraft or its trailer refuses to comply with an inspection order of a conservation officer or other licensed peace officer or an order to remove Eurasian or Northern water milfoil, myriophyllum spicatum or exalbescens, zebra mussels, or other undesirable exotic aquatic plants or wild animal species identified by the commissioner from the watercraft or its trailer as provided in section 18.317, subdivision 3.

M.S. 86B.415 LICENSE FEES.

Subd. 7. **Watercraft surcharge.** A surcharge is placed on each watercraft licenses 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 water milfoil in public waters and public wetlands. The surcharge is $5 until December 31, 1996, and $3 there after.

HARVEST AND CONTROL OF AQUATIC PLANTS

103G.615 PERMITS TO HARVEST OR DESTROY AQUATIC PLANTS.

Subd.1. **Authorization.** (a) The commissioner may issue permits, with or without a fee, to:

(1) gather or harvest aquatic plants, or plant parts, other than wild rice from public waters;

(2) transplant aquatic plants into public waters;

(3) destroy harmful or undesirable aquatic vegetation or organisms in public waters under prescribed conditions to protect the waters, desirable species of fish, vegetation, other forms of aquatic life, and the public.

(b) Application for a permit must be accompanied by a permit fee, if required.

Subd. 2. **Fees** (a) The commissioner shall establish a fee schedule for permits to harvest aquatic plants other than wild rice, by order, after holding a public hearing. The fees may not exceed $200 per permit based upon the cost of receiving, processing, analyzing, and issuing the permit, and additional costs incurred after the application to inspect and monitor the activities by the permit.

(b) The fee for a permit for chemical treatment of rooted aquatic vegetation may not exceed $20 for each contiguous parcel of shoreline owned by an owner. This fee may not be charged for permits issued in connection with lakewide Eurasian water milfoil control programs.

(c) A fee may not be charged to the state or a federal government agency applying for a permit.

(d) The money received for the permits under this subdivision shall be deposited in the treasury and credited to the game and fish fund.

Subd 3. **Permit standards.** The commissioner shall, by order, prescribe standards to issue and deny permits under subdivision 2. The standards must ensure that aquatic plant control is consistent with shoreland conservation ordinances, lake management plans and programs, and wild and scenic river plans.

103G.617 EURASIAN WATER MILFOIL EDUCATION AND MANAGEMENT.

Subd. 1. **Definition.** For the purposes of this section, "Eurasian water milfoil" means myriophyllum spicatum.

Subd. 2. **Inventory.** The commissioner shall inventory and monitor the growth of Eurasian water milfoil on lakes in the state. The commissioner may use volunteers to aid in the inventory effort.

Subd. 3. **Education.** The commissioner shall publish and distribute informational materials to lakeshore owners and boaters on the control problems of Eurasian water milfoil.

Subd. 4. **Management.** The commissioner shall coordinate a control program to manage the growth of Eurasian water milfoil with appropriate local units of government, special purpose districts, and lakeshore associations. Technical assistance may be provided by the commissioner upon request.

Subd. 5. **Research.** The commissioner shall initiate cooperative research with the University of Minnesota and other public and private research facilities to study the use of nonchemical methods, including biological control agents, for control of Eurasian water milfoil.

103G.625 MUNICIPAL CONTROL OF AQUATIC VEGETATION AND ORGANISMS.

Subdivision 1. **Authority.** The governing body of a municipality or town may expend funds for the control or destruction of harmful or undesirable aquatic vegetation or organisms in public waters and may cooperate with other governing bodies and landowners in the control or destruction.

Subd. 2. **Permit required.** The control or destruction of the aquatic vegetation or organisms may not be started unless a permit has been obtained from the commissioner under section 103G.615 and the work is done in accordance with the terms and conditions of the permit.

Subd.3. **Funding.** (a) The governing body of a municipality or town may use any available funds and may levy a tax not to exceed the lesser of (1) 0.01596 percent of taxable market value, or (2) 50 cents per capita, to implement this section.

(b) To provide funds in advance of collection of the tax levies, the governing body may, at any time after the tax has been levied and certified to the county auditor for collection, issue certificates of indebtedness in anticipation of the collection and payment of the tax. The total amount of the certificates, including principal and interest, may not exceed 90 percent of the amount of the levy and must become payable from the proceeds of the levy not later than two years from the date of issuance. The certificates shall be issued on terms and conditions as the governing body may determine and sold as provided in section 475.60.

(c) If the governing body determines that an emergency exists, it may make appropriations from the proceeds of the certificates for authorized purposes without complying with statutory or charter provisions requiring that expenditures be based on a prior budget authorization or other budgeting requirement.

(d) The proceeds of a tax levied or an issue of certificates of indebtedness must be deposited in a separate fund and expended only for purposes authorized by this section. If a disbursement is not made from the fund for a period of five years, money remaining in the fund may be transferred to the general fund.

Appendix B - Selected Minnesota Rules

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" or "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" or "Milfoil Area" must appear on the sign in at least two-inch high black letters.

SESSION LAWS

M.L. 1991 - CHAPTER 241 CHECKS OF TRAILERED BOATS. (SF 800)

(a) The Commissioner of natural resources shall establish a two-year program of at least five checks per year of trailered boats. The purpose of the checks is to inspect boats and trailers for Eurasian water milfoil fragments, and to inform and educate the boat owners about Eurasian milfoil and other exotic species and how to prevent their spread.

(b) The commissioner shall assess the effectiveness of the program established in paragraph (a), keep records on the occurrence of Eurasian water milfoil fragments or other exotic species, and report to the legislature by January 1, 1993.

1992 SESSION LAWS:

Biological Control of Eurasian Water Milfoil $160,000

This appropriation is to the commissioner of natural resources for a research program leading to biological control of Eurasian water milfoil.

$166,000 for the fiscal year ending June 30, 1992 and 166,000 for the fiscal year ending June 30, 1993, are appropriated to the commissioner of natural resources from the water recreation account for control, public awareness, law enforcement, monitoring, and research of exotic species such as zebra mussel, purple loosestrife and Eurasian water milfoil in public waters and public wetlands. Any unencumbered balance in the first year does not cancel and is available for the second year. (effective the day following enactment)

M.L. 1992, CHAPTER 594

$219,000 is appropriated from the water recreation account in the natural resources fund to the commissioner of natural resources for control, public awareness, law enforcement, monitoring, and research of nuisance exotic species in public waters. Of this amount, $80,000 may be used to conduct access inspections under section 5.

1993 SESSION LAWS:

CHAPTER 235 (HF 864)

Management of Eurasian water milfoil in White Bear lake.

By May 31, 1993, the department of natural resources shall recommend appropriate management methods for the control of Eurasian water milfoil in White Bear Lake to be implemented by the White Bear Lake conservation district in cooperation with local units of government, lake associations, and other local citizen groups.

Appropriation.

$347,000 in fiscal year 1994 and $448,000 in fiscal year 1995 are appropriated from the water recreation account in the natural resources fund to the commissioner of natural resources for control, public awareness, law enforcement, monitoring and research on nuisance aquatic exotic species in public waters and wetlands.

Effective Date.

Sections 3 [surcharge] and 4 [permit fees] are effective January 1, 1994. Sections 2[Civil penalties]and 6 [White Bear Lake] are effective the day following enactment.

CHAPTER 172, Article 1., Sec. 14, Subd. 12,

This appropriation is from the trust fund to the commissioner of natural resources to research biological control for purple loosestrife and Eurasian watermilfoil. The purple loosestrife research must be done in cooperation with the commissioner of agriculture. $100,000 is for the propagation, release, and evaluation of insects for purple loosestrife control; $50,000 is for the development of mycoherbicides to control purple loosestrife; $200,000 is for evaluation of biocontrol agents for Eurasian watermilfoil fungi and insects; and $50,000 is to research the biology of Eurasian watermilfoil. The $250,000 for Eurasian watermilfoil must be matched by $200,000 of nonstate funds.

M.S. 84.9695 RESTRICTED SPECIES (will be renumbered as M.S. 17.457)

Subd. 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 (S. 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, or importation of restricted species for scientific, research, educational, 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 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 Requirements.**

(a) A person who possesses restricted species on the effective date of this section 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 procedures 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 in the amount determined by the commissioner to pay for the costs and damages caused by an escape of a 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.

RESTRICTED SPECIES TASK FORCE

Subd. 1. **Creation.** A task force is created to evaluate the feasibility of allowing restricted species in the state. The task force shall consist of the following members: a member of the senate appointed by the subcommittee on committees of the committee on rules and administration, a member of the house of representatives appointed by the speaker of the house of representatives, the commissioner of natural resources or the commissioner's designee, the commissioner of agriculture or the commissioner's designee, a representative of the board of animal health, two representatives of producers of restricted species, a representative of the Minnesota pork producers association, and a representative of the conservation community appointed by the commissioner of natural resources.

Subd. 2. **Chair.** The commissioner of agriculture or the commissioner's designee shall chair the task force and shall make the appointments for the procedures of the restricted species and the board of animal health as provided in subdivision 1.

Subd. 3. **Duties.** The task force shall conduct a study of restricted species in the state and make recommendations concerning the following issues:

(1) the economic viability of raising restricted species in the state in a safe manner;

(2) health threats, including the spread of diseases posed by restricted species;

(3) the ecological threat to the state posed by restricted species;

(4) the administrative impact on the departments of agriculture and natural resources if restricted species are permitted in the state;

(5) development of a plan to ban restricted species from the state and recommendations for the amount of compensation that is appropriate to pay producers if a ban is enacted into law;

(6) a determination of the number of restricted species in the state and their location; and

(7) any other factors relative to the costs, benefits, and feasibility of permitting restricted species in the state.

Subd. 4. **Report.** The task force shall submit a written report containing its recommendations and findings to the legislature by January 1, 1995.

Appendix C - Proposed Ecologically Harmful Exotic Species Permanent Rules

Rules as proposed (all new material)

6216.0100 PURPOSE.

The purpose of parts 6216.0100 to 6216.0600 is to prevent the spread of ecologically harmful exotic species, and undesirable exotic plants and wild animals, into and within the state as authorized by Minnesota Statutes, sections 17.457, 18.317, and 84.967 to 84.9692.

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, sections 17.457, 17.4985, 174984,18.317, 84.967 to 84.9692, and 97A.015, unless otherwise noted in this part.

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. 4. **Infested waters.** "Infested waters" means water and waterbodies identified by the commissioner as having populations of select ecologically harmful exotic species such as zebra mussel, Eurasian water milfoil, ruffe, spiny water flea, or white perch.

Subp. 5. **Littoral area.** "Littoral area" means those areas of a water body 15 feet or less in depth.

6216.0300 IDENTIFICATION, NOTICE, AND MARKING OF INFESTED WATERS AND LIMITED INFESTATIONS OF EURASIAN WATER MILFOIL.

Subpart 1. **Identification of infested waters and notice.** The commissioner shall identify infested waters. The commissioner shall publish the names of identified water bodies in the state register before May 1 of each year and provide notice though other available means where practical. The department shall post signs describing such infestation at all public accesses to identified waterbodies. At any time the commissioner may identify additional waterbodies or identify those waterbodies which no longer are infested waters.

Subpart 2. **Identification of limited infestations of Eurasian watermilfoil and notice.** The commissioner shall identify 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 identified waterbodies in the state register before May 1 of each year and provide notice though other available means where practical. The department shall post signs describing the infestation at all public accesses to identified waterbodies. At any time the commissioner may identify additional waterbodies or identify those waterbodies 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 identified as having limited infestations shall be marked by the commissioner, or other persons authorized by the commissioner, using buoys or signs as specified in Minnesota Rules, 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.

6216.0400 RESTRICTED ACTIVITIES ON INFESTED WATERS AND WATERS WITH LIMITED INFESTATIONS OF EURASIAN WATERMILFOIL.

Subp. 1. **Prohibition of taking bait from infested waters.** The taking of wild animals from infested waters for bait purposes is prohibited.

Subp. 2. **Prohibition of sport gill netting for whitefish and ciscoe in infested waters.** If the commissioner identifies waters that are open to sport gill netting for whitefish and ciscoe in infested waters, the commissioner may close the gillnetting season for the identified waterbody or require that gill nets used in the infested waters not be used in other waterbodies. The commissioner shall publish the names of identified 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 identified 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 re-setting those nets in noninfested waters.

Subp. 4. **Prohibition on entry into delineated areas marked for limited infestation of Eurasian water milfoil.**

(a) Entry by boaters, anglers or other water users and their equipment into waters where limited infestations of Eurasian water milfoil have been delineated in accordance with part 6216.300 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 6216.300 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.

6216.500 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. Live fish taken under a commercial fishing license may be transported from infested waters to other waters or holding facilities from May 1 through 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 of this part, 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. **Watercraft leaving select infested waters.** Owners or operators of watercraft leaving infested waters identified as having populations of zebra mussel or spiny waterflea including, but not limited to, Minnesota waters of the Mississippi River downstream of St. Anthony Falls; Minnesota waters of Lake Superior including waters of the St. Louis River downstream of the mouth of the Cloquet River; waters of the Minnesota River downstream of Shakopee; Island Lake Reservoir in St. Louis County; and the Cloquet River downstream from Island Lake Reservoir, must drain bait containers, other boating related equipment holding water, 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 M.S. 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 ~~rule~~ part , or as authorized in a public waters work permit or water appropriation permit issued by the commissioner, pursuant to M.S. 103G..

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

A. Natural lakes or wetland basins that are identified 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 undesirable exotic species may be used for aquatic farm or private hatcheries under license by the department. 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 the nets and other equipment that are removed from such 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 such waters be treated to eliminate

undesirable exotic species.

D. Fish raised in artificial water basins that have populations of populations of undesirable 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 undesirable exotic species provided it contains the same undesirable exotic species as the source waters.

Subd. 6. **Infested waters Diversion or Transportation Permits.** Applications for permits issued pursuant to these rules to divert or transport water from infested waters shall be made on forms provided by the department and shall be submitted pursuant to the direction of the department. The department shall act upon the application within 90 days. 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 6216.0100 through 6216.0500 is a misdemeanor as set forth in Minnesota Statutes, sections 18.317 and 84.9691. Where a violation has occurred, the department may confiscate the exotic species immediately upon discovery wherever found and, at the departments' discretion, destroy it. Where infested water is being appropriated, or diverted or transported without a permit, or otherwise contrary to the provisions of parts 6216.100 to 6216.0600, the department may order that such activities cease. Any expense or loss in connection there with shall be borne by the permittee or responsible person.

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