DEPARTMENT OF NATURAL RESOURCES

INVASIVE SPECIES 2024 ANNUAL REPORT

Photo on cover: *A silver carp is tagged to allow the DNR to track its movements.*

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For current invasive species regulations, a list of infested waters, species information and local DNR contacts, visit mndnr.gov/ais.

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2024 Invasive Species Annual Report

The Minnesota Department of Natural Resources (DNR) is pleased to submit the 2024 Invasive Species Annual Report to the governor, legislature and people of Minnesota.

This report provides an overview of program activities, finances, prevention and management efforts, goals, highlights, partnerships, and future needs and plans for individual program areas. This report highlights the accomplishments of the Invasive Species Program and keeps you up to date with new issues facing the program as we work with partners around the state to reduce the impacts of invasive species on Minnesota's outdoor traditions.

Thank you for partnering with the Invasive Species Program this year. We look forward to working with you in 2025 as we continue our work to prevent and manage invasive species to benefit Minnesota's natural resources.

Contents

Highlights from 2024

PREVENTION

- Three zebra mussel detection K9 officers assisted conservation officers and AIS inspectors. The dogs improved the efficiency of conservation officers and inspectors, with faster and more thorough inspections of water-related equipment. The Enforcement Division K9 zebra mussel detection teams provided educational demonstrations at several public events including the Minnesota State Fair. Watercraft inspection staff in partnership with the Enforcement Division and K9 teams conducted a total of 151 inspections at seven AIS check stations held throughout the state.
- DNR conservation officers provided 10,345 hours of AIS enforcement and education.
- DNR watercraft inspection program trainers trained 324 local and tribal government inspectors in 33 in-person trainings before the fishing opener. An additional 198 inspectors attended in-person training before Memorial Day.
- Watercraft inspectors hired by the DNR, and by 60 local and tribal governments with delegated authority from the DNR, inspected 451,551 watercraft in 2024, which makes Minnesota's watercraft inspection program one of the largest in the nation.

Conservation Officer Adam Seifermann and K9 Jet, one of three Zebra Mussel K9 teams in the field in 2024.

- More than 95% of incoming watercraft were in compliance with state laws. Ninety-eight percent of incoming watercraft were found free of plants, invasive animals, mud and water.
- The Minnesota Department of Natural Resources completed the rulemaking process and classified 13 high-risk invasive aquatic plants, fish and invertebrate species and species groups as prohibited invasive species. It is unlawful to possess, import, purchase, transport or introduce prohibited invasive species, except under a DNR-issued permit for disposal, decontamination, control, research or education. The species now prohibited are jumping worms, non-native *Phragmites*, mitten crabs, Nile perch, snakehead fish, walking catfish, yellow floating heart, tench, golden mussels, marbled crayfish, golden clams, tubenose gobies and eastern mosquitofish.
- The invasive species program provided information and resources so that people could better understand jumping worm regulations and help prevent their spread. The program created a new webpage with jumping worm information for businesses, which answers frequently asked questions and provides guidance documents on disposal, working with homeowners, and working with vendors. The program engaged with nursery and landscape industry stakeholders to better understand and address their concerns. The program also coordinated with the Minnesota Department of Agriculture nursery inspectors, the Minnesota Pollution Control Agency, the DNR Enforcement Division and University of Minnesota researchers to provide additional jumping worm training and guidance on the new regulation.
- The Minnesota Legislature appropriated $12 million, as recommended by the Lessard-Sams Outdoor Heritage Council, to the DNR to design, construct, and begin operating and maintaining a structural deterrent for invasive carp at Lock and Dam No. 5 on the Mississippi River, to protect Minnesota's aquatic habitat through an adaptive management approach. The DNR is partnering with agencies with relevant expertise and jurisdiction to begin scoping this project in 2024.

MANAGEMENT

- Invasive Species Program staff issued 422 permits to manage invasive aquatic plants, and the DNR Aquatic Invasive Species (AIS) Management Grant Program funded 125 invasive aquatic plant treatments through 99 grants totaling $409,600.
- Since the state's first known occurrence of signal crayfish (*Pacifastacus leniusculus*) was reported in October 2023 in Lake Winona (Douglas County), no additional signal crayfish have been captured during intensive collaborative trapping efforts by DNR staff, Minnesota Aquatic Invasive Species Research Center (MAISRC) researchers, and a commercial crayfish harvester contracted by Douglas County. To support this response, the DNR received a Rapid Response grant through a new funding opportunity approved by the federal Aquatic Nuisance Species Task Force.
- The DNR financially supported the inventory and management of terrestrial invasive plant species on 1,321 acres of state and adjacent land.
- The DNR published an update to the statewide Invasive Carp Action Plan in 2024, which describes Minnesota's approach to prevention and management of invasive carp. The key purpose of this plan is to slow the spread of invasive carp, minimize their impact, and reduce the likelihood of invasive carp reproducing in Minnesota waters.
- The DNR continued to work with partners throughout the state to implement a coordinated response to nonnative *Phragmites* (*Phragmites australis* subsp. *australis*) in Minnesota. In 2024, Conservation Corps of Minnesota and Iowa staff visited 700 previously treated sites prior to the 2024 treatment season. Nonnative *Phragmites* was not detected at 280 of those sites. DNR contractors visited 638 nonnative *Phragmites* sites in 41 counties. Most of the treated sites were very small. For example, out of the 561 sites where treatment occurred, 470 of them were one-tenth acre or less.

RESEARCH and MONITORING

- DNR invertebrate biologists continued to work with the DNR's Large Lakes and Sentinel Lakes programs to monitor zebra mussel veliger and spiny water flea populations.
- DNR divers continued to contribute days underwater for long-term monitoring of settled zebra mussel populations in Mille Lacs Lake. Since 2021, observed densities have declined and remained relatively stable at around 400 per square foot, approximately one-third of the 2012 peak population.
- A 10+ year retrospective study published by DNR researchers shows that invasive zebra mussels and spiny water flea are having marked ongoing impacts on native zooplankton crustaceans in Minnesota's nine largest walleye lakes, potentially impacting lake fisheries: "A Decade of Change: Crustacean Zooplankton Communities in Nine Minnesota Large Lakes" by Cattoor et al. 2024 (DNR Fisheries Research Unit Special Publication 192).
- The DNR partnered with MAISRC, University of Minnesota Extension and many counties and local partners on an annual statewide search for new populations of starry stonewort, called "Starry Trek." In 2024, 194 volunteers searched 252 Minnesota waterbodies, including 297 public water accesses. No new starry stonewort populations were found.
- The DNR tags, releases and tracks small numbers of invasive carp, to better understand patterns of movement and find additional invasive carp. Sixteen carp captured between April and November were tagged and released. The DNR's tracking program contributed to the 2024 publication of a journal article detailing coordinated upstream movements of invasive carp past open dams during 2023 flooding (Fritts et al. 2024; https://www.nature.com/articles/s41598-024-70076-4). This information will help inform the DNR's approach to prevention and management.

Program Overview

Invasive species have serious economic, environmental and recreational impacts in Minnesota. In 1991, the Minnesota Legislature directed the DNR to establish an Invasive Species Program. The program is tasked with preventing the spread of invasive species and managing invasive aquatic plants and wild animals (Minnesota Statutes, chapter 84D).

In 2024, the Invasive Species Program included 35 full-time positions located around the state, plus affiliated staff whose work contributes to the program. In the summer, the DNR employed 75 additional watercraft inspection staff, and trained and authorized 763 watercraft inspectors employed by local partners.

DNR Operational Order 113, which applies to DNR staff and contractors, provides policies and guidance for including invasive species prevention measures in their work.

The program works with partners to stay aware of invasive species in other areas of North America and the world, understand and manage pathways of spread, and reduce the potential for their introduction and spread in Minnesota.

Examples of key invasive species of concern that have *not* been found in Minnesota include hydrilla and water chestnut, two invasive aquatic plants, and the northern snakehead, an invasive fish.

The program addresses aquatic invasive species in Minnesota, such as Eurasian watermilfoil, purple loosestrife, zebra mussels, spiny waterflea, starry stonewort and invasive carp. Efforts in this area include working to prevent further spread and manage impacts from invasive populations.

The program also addresses terrestrial invasive species on DNR-managed lands and provides information for private landowners and others. The program works to enhance the ability of DNR field staff to prevent or limit the negative impacts on Minnesota's ecology, economy and human health that can result from terrestrial invasive species such as round leaf bittersweet, wild parsnip, buckthorn, garlic mustard, earthworms, emerald ash borer and spongy moth.

GOALS

- Prevent the introduction of new invasive species into Minnesota.
- Prevent the spread of invasive species within Minnesota.
- Reduce the impacts caused by invasive species to Minnesota's ecology, society and economy.

KEY STRATEGIES

1. Helping Minnesota residents and visitors understand their role in preventing the spread of invasive species by using innovative outreach and communications tools to share knowledge of aquatic and terrestrial invasive species and inspire behaviors that help prevent the spread of invasive species in Minnesota.
2. Creating and maintaining effective invasive species regulations across the state and working with enforcement to ensure compliance.
3. Deepening partnerships with local governments, research institutions, interest groups, lake associations, water-related businesses and others.
4. Coordinating watercraft inspection and decontamination with counties, tribal governments, lake associations, resort owners and DNR Enforcement.
5. Coordinating the mapping and reporting of invasive species to have accurate information about their distribution in Minnesota.
6. Verifying and responding to all new reports of possible invasive species as soon as possible.
7. Providing technical and financial assistance for invasive species management efforts.

KEY PARTNERS

DNR invasive species prevention and management activities depend on collaboration with tribes, other states, regional task force panels, local governments including counties, local law enforcement, cities and townships, federal agencies and other partners with similar concerns. Coordinated prevention efforts reduce the spread of invasive species and provide the time needed for research and management that is necessary to achieve a long-term reduction in impacts.

- **The DNR Statewide AIS Advisory Committee (SAISAC).** This committee plays a vital role in reviewing and guiding the AIS prevention and management work of the Invasive Species Program. Members are appointed by the DNR Commissioner. They bring a range of personal and professional experience to the discussion of invasive aquatic plants and animals in Minnesota. Their interest and engagement with other stakeholders informs the program regarding policy, watercraft inspection, outreach, research, operations and other stakeholder interests. Visit mndnr.gov/aisadvisory.
- **The Minnesota Aquatic Invasive Species Research Center (MAISRC)** at the University of Minnesota is a valuable partner, working closely with the program on research and advances in AIS management and related information. MAISRC researchers regularly join Invasive Species Program meetings to discuss the latest research. The DNR's assistant commissioner who oversees the Ecological and Water Resources Division is a member of the Center's Advisory Board CAB. The section manager and the Invasive Species Unit supervisor have monthly coordination meetings with MAISRC's director and assistant director. DNR communications staff meet with MAISRC regularly to discuss collaborative education and outreach opportunities. Many Invasive Species Program staff attend MAISRC's annual showcase. Visit maisrc.umn.edu.
- **The Minnesota Invasive Species Advisory Council (MISAC**) continues to provide a mechanism for interagency and inter-organization communication and collaboration on invasive species issues. The DNR Invasive Species Program collaborated with MISAC members in the implementation of the statewide plan "A Minnesota Management Plan for Invasive Species." As it has since 2005, MISAC produced a wall calendar for 2024 highlighting 12 invasive species and issues of concern in Minnesota. More than 4,000 printed copies are distributed across the state and the calendar is posted online for additional views. Visit mninvasives.org.
- **The Invasive Carp Regional Coordinating Committee (ICRCC)** represents the collective efforts of international, federal, tribal, state and municipal organizations to combat the spread of invasive carp into the Great Lakes. The ICRCC provides oversight and coordination of interagency prevention activities through development and implementation of an annual Invasive Carp Action Plan and a complementary Monitoring and Response Plan. The work of the ICRCC is supported by the Great Lakes Restoration Initiative, as well as partner agency resources. The DNR is an active member of the committee. Visit invasivecarp.us.

- **Minnesota counties.** The Minnesota Legislature provides $10 million of AIS prevention aid directly to Minnesota counties, to help prevent the spread of aquatic invasive species. The Invasive Species Program has two full-time staff dedicated to working with these local programs. Prevention aid funds are allocated based on each county's share of watercraft trailer launches (50%) and watercraft trailer parking spaces (50%). Each county board and/or designated local government decides how to use the funds. Each county submits a copy of its guidelines for use of the funding to the DNR by December 31 of each year.
- **The Minnesota Department of Agriculture (MDA)** is the state regulatory lead for terrestrial invasive plant pests (such as emerald ash borer) and noxious weeds. Visit mda.state.mn.us. The DNR is a member of the Noxious Weeds Advisory Committee convened by the MDA to evaluate plant species for invasiveness, difficulty of management, cost of management, benefits and amount of injury caused by the species. For each species evaluated, the committee recommends to the MDA commissioner whether the species should be placed on a noxious weed list. Visit https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/mnnwac.
- **The Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC)** at the University of Minnesota focuses on science-based solutions to protect Minnesota's prairies, forests, wetlands, and agricultural resources from land-based invasive species. They have active research projects that involve coordination and collaboration with DNR staff. For example, the DNR terrestrial invasive species coordinator works with researchers on jumping worm issues and research needs. Visit https://mitppc.umn.edu/.
- **The DNR Natural Heritage Advisory Committee (NHAC)** advises DNR programs on issues related to sustaining the state's natural heritage and biological diversity in the Division of Ecological and Water Resources. This committee advises the terrestrial work of the Invasive Species Program. Visit https://www.dnr.state.mn.us/nhac/index.html.
- **Conservation Corps of Minnesota and Iowa (CCMI)** has worked with the DNR since 1986 to preserve and improve the natural resources of the State of Minnesota. The Invasive Species Program benefits from CCMI Individual Placement positions providing additional capacity for the program's work.
- College and university researchers, including those at the University of Minnesota, Minnesota State University Mankato, and the University of Georgia.
- Federal Aquatic Nuisance Species Task Force and regional panels, including the Great Lakes Panel on Aquatic Nuisance Species and the Mississippi River Basin Panel on Aquatic Nuisance Species.
- The Upper Mississippi River Invasive Carp Team, the Stop Carp Coalition, Lake Pepin Legacy Alliance, MN-FISH, and Friends of the Mississippi River.
- Federal agencies, including the U.S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA) and the National Park Service (NPS), provide coordination, leadership and expertise on invasive species horizon scanning, risk assessments and distribution mapping. The Invasive Species Program receives federal grants administered by the USFWS and EPA.

FUTURE NEEDS AND PLANS

1. Continue to investigate invasive species biology, ecology, life history, impacts and potential management measures of species not yet known to be in the state.
2. Continue to assess the risk of spreading AIS through novel and emerging pathways, such as commerce and invasive organisms in trade.
3. Continue to investigate new methods to prevent the spread of invasives and manage species to reduce their negative impacts.
4. Continue to partner with groups to advance the program's goals, including by managing the impacts of invasive species in the state, learning from the results of different management strategies, and applying those lessons learned to future work.
5. Use innovative outreach and communications tools to share knowledge of aquatic and terrestrial invasive species and inspire behaviors that help prevent the spread of invasive species in Minnesota and increase the Program's capacity to reach out to underserved and new audiences.

Program Finances

TIME FRAME

The other chapters in this report mostly include activities from calendar year 2024. However, to provide a comprehensive review of expenditures and to coordinate with the state funding cycle, this chapter refers to expenditures incurred in fiscal year 2024: July 1, 2023, to June 30, 2024.

FUNDING SOURCES

The Invasive Species Program was mostly supported by state funds in fiscal year 2024, with additional funding from federal grants administered by the USFWS and U.S. Environmental Protection Agency (EPA).

State Funds

The Minnesota Legislature appropriated the following funds to the Invasive Species Program in fiscal year 2024 (Minnesota Laws 2023, Ch. 60, Art. 1, Sec. 3, Subd. 3(a):

- $2,831,000 from the State general fund, of which $237,948 supported work on terrestrial invasive species and $2,593,052 supported work on aquatic invasive species.
- $4,222,000 from the invasive species account, which includes $2,778,196 from a $10.60 surcharge on watercraft registration (valid for three years) in Minnesota and $1,107,960 from a $5 fee on non-resident fishing licenses.

Federal Funds

Federal funds, including from the Great Lakes Restoration Initiative (GLRI) and the USFWS, supported the implementation of the Minnesota State Management Plan for Invasive Species. Federal funds helped support public awareness efforts, enforcement (including the zebra mussel K9 program), watercraft inspections, invasive carp management and nonnative *Phragmites* management. The DNR received a Rapid Response grant through a new funding opportunity approved by the federal Aquatic Nuisance Species Task Force to support our response to the signal crayfish discovered in Minnesota in 2023. In fiscal year 2024, the program expended $1,319,590 from federal grants.

FISCAL YEAR 2024 EXPENDITURES

Invasive Species Program expenditures on invasive species activities during fiscal year 2024 (July 1, 2023–June 30, 2024) totaled $6.2 million.

The funds are focused on the prevention and management of invasive species, with inspection/enforcement and management efforts.

Funding for management was spent on the inventory and management of Eurasian watermilfoil, starry stonewort, zebra mussels, flowering rush, invasive carp, invasive *Phragmites* and curly-leaf pondweed.

The table on the following page lists expenditures from the Invasive Species account and the General Fund account, along with spending from other accounts, including grants received from various state or federal funding sources.

FISCAL YEAR 2024 EXPENDITURES

	Invasive Species Account	General Fund	Water Recreation Account	Federal/Other	Total Expenditures	Proportion of Expenditures
Administration	$85,768	$227,359	$9,454	$14,655	$337,236	0.03
State/Regional Coordination	$434,251	$527,472	$51,599	$217,239	$1,230,561	0.13
Education/Public Awareness	$18,395	$104,758	$71,757	$92,540	$287,450	0.03
Management: Aquatic	$387,537	$1,031,265	$39,659	$457,975	$1,916,436	0.19
Management: Terrestrial	--	$109,310	--	--	$109,310	0.01
Inspections/Enforcement	$3,275,651	$1,684,386	$338,644	$537,188	$5,835,869	0.60
Research	--	$57,113	$2,144	--	$59,257	0.01
Total Expenditures	$4,201,602	$2,070,336	$513,257	$1,319,597	$9,776,119	

An Invasive Species Unit summer intern uses the rake on a rope method during an aquatic plant survey.

COST ACCOUNTING

Minnesota Statutes, section 84D.02, subdivision 6 identifies five expenditure categories that must be reported annually: Administration, Education/Public Awareness, Management, Inspections/Enforcement, and Research. A sixth category, State and Regional Coordination, covers a variety of program-wide activities that do not fit easily into one of the five reporting categories required by statute.

ADMINISTRATION includes general office supplies, office rent, telephones, workers' compensation fees, computer support fees, state accounting system fees, departmental operational support costs, as well as clerical and administrative support costs.

EDUCATION/PUBLIC AWARENESS includes staff time, in-state travel expenses, fleet charges, mailings, supplies, printing and advertising costs, and radio and TV time to increase public awareness of AIS. The costs of developing and producing pamphlets, public service announcements, videos and similar material are included, as are the costs of developing and maintaining invasive species information on the DNR website.

MANAGEMENT includes staff time, in-state travel expenses, fleet charges, commercial applicator contracts, and supplies to survey the distribution of AIS in Minnesota and to prepare for, conduct, supervise and evaluate management activities. Funds provided to local government units and organizations to offset the cost of Eurasian watermilfoil, flowering rush and/or curly-leaf pondweed management efforts also are included.

INSPECTIONS / ENFORCEMENT includes the costs that conservation officers incur enforcing invasive species rules and laws, the costs of implementing watercraft inspections at public water accesses, and staff time and expenses associated with promulgation of rules, development of legislation, conducting risk assessments, and other invasive species prevention efforts.

RESEARCH includes staff time, travel expenses, fleet charges, supplies, and contracts with the University of Minnesota and other research organizations to conduct research. These include efforts to develop new or to improve existing management methods, better understand the ecology of invasive species, improve risk assessment tools and evaluate program success.

STATE AND REGIONAL COORDINATION includes general program planning, preparation of state plans and reports, and general invasive species coordination with a wide variety of groups. This category also includes the work of program staff as well as various managers in the Ecological and Water Resources Division who periodically work on invasive species issues. Expenditures primarily represent staff time spent on these activities, as well as staff time and out-of-state travel expenses to work with regional and federal partners on AIS issues; work activities that staff participate in to improve their knowledge and skills, direct staff, or help on other projects; and fleet costs and the cost to purchase and repair boats, trailers, computers and similar items.

Prevention

ACTIVITIES

The Invasive Species Program conducted the following activities to help prevent the introduction and spread of AIS.

- Issued permits for the possession of prohibited invasive species and for certain activities on infested waters with restrictions to reduce the risk of spreading invasive species. Investigated reports of new AIS populations and searched water bodies and public water accesses for aquatic invasive species.
- Provided training to lake service providers.
- Added 13 new species and species group to the list of prohibited invasive species in Minnesota Rule.
- Assisted local, regional and national efforts to prevent the spread of invasive species through trade activities such as food markets, bait dealers, pet stores and aquatic plant dealers.

PERMITS

The DNR has authority to issue permits to allow the public to conduct certain activities with invasive species or in listed infested waters that would otherwise be prohibited under state regulations.

The DNR provides information or training to permittees on how to reduce the risk of spreading AIS. Permit conditions require permittees to take actions to prevent the spread of AIS.

DNR permits related to AIS include:

- Lake service provider permits.
- Infested waters permits.
- Prohibited invasive species permits.
- Bait harvest permits.

A native mussel with attached zebra mussels found in Big Lake, Minnesota.

Lake Service Provider Permits

Legislation authorizing a permit program for lake service providers (LSPs) to help prevent the spread of AIS in the state took effect in 2012. An LSP includes anyone who is paid to decontaminate, rent/lease, install or remove water-related equipment in or from Minnesota waters. Common LSP businesses include marinas, dock and lift installers, resorts and outfitters, local parks departments and lawn irrigation companies.

Lake service provider business owners are required to complete AIS prevention training and receive a Lake Service Provider Permit before conducting work that involves decontaminating, installing, removing or renting water-related equipment from or in state waters. Employees who work for an LSP must also successfully complete a free online training course and receive a training certificate. Permits and certificates are valid for three calendar years.

Total Statewide Certifications and LSP Permits

2,768
Certified LSP employees

967
Permitted LSPs

In 2024, the DNR completed permit training for 536 LSP business owners and managers, issuing 518 permits.

1,084 LSP employees completed online employee certificate training.

967 businesses were permitted LSPs at the end of 2024. The current list of businesses is on the DNR website.

Invasive Species And Infested Waters Permits

People need a permit to divert or transport water from listed infested waters. In 2024, the Invasive Species Program issued 11 individual infested waters permits. Permits for water appropriation and work in public waters issued through the MNDNR Permitting and Reporting System (MPARS) also include invasive species conditions.

People need a permit to possess, transport, sell, purchase or import prohibited invasive species. The Invasive Species Program issued 42 prohibited invasive species permits in 2024 for species other than red swamp crayfish. In addition, 71 people were permitted in 2024 to import and/or possess frozen dead red swamp crayfish for consumption through a general permit.

Individuals can access several general permits on the DNR website, for example: to possess certain preserved specimens of prohibited invasive species for educational purposes; for fire departments using infested waters for training purposes; to transport water for water quality sampling; and to transport certain equipment away from a water body to a cleaning or storage location.

Permits to Harvest Bait from Infested Waters

In Minnesota, commercial bait harvesters need a permit to work in listed infested waters. DNR Fisheries issues permits to licensed minnow dealers who work in infested waters. Permittees must successfully complete AIS training and comply with permit conditions to prevent the spread of AIS. For example, permitted commercial bait harvesters must attach tags to equipment used in infested waters and they may not use that gear in waters other than those identified by the tag.

A boater drains water from a kayak before leaving the public access.

REGULATIONS

Regulations, including laws and rules, are an important part of Minnesota's AIS prevention strategy that complement our education and outreach efforts. The Invasive Species Program works to review and refine state regulations to prevent the introduction and spread of invasive species and to clarify regulations for the public. That includes establishing new and revising existing regulations to address pathways of invasive species spread, designating certain nonnative species as prohibited or regulated invasive species, and listing water bodies as infested with AIS within our existing authorities.

Minnesota state law governing invasive species is primarily located in Minnesota Statutes, chapter 84D. Authorities and prohibitions related to AIS also can be found in chapter 86B, Water Safety and Watercraft; chapter 97C, Fishing; and chapter 103G, Waters of the State. The administrative rules related to invasive species are primarily found in Minnesota Rules, chapter 6216.

Past annual reports of the program are also a good source of summaries of changes to statute and rule related to invasive species; many of these are available from the Minnesota Legislative Reference Library. The most recent reports are available on the DNR website.

In 2024, an invasive species rulemaking process was completed, classifying 13 high-risk species and species groups as prohibited invasive species. Prohibited invasive species are illegal to possess, import, purchase, sell, propagate, transport or introduce without a permit from the DNR. Most of the species became prohibited on February 20, 2024, except for jumping worms which became prohibited invasive species on July 1, 2024.

The newly prohibited species include

- **Aquatic plants**
  - common reed – non-native subspecies (*Phragmites australis* subspecies *australis*, not including *Phragmites australis* subspecies *americanus)*
  - yellow floating heart (*Nymphoides peltata*)
- **Fish**
  - eastern mosquitofish (*Gambusia holbrooki*)
  - Nile perch (*Lates niloticus*)
  - snakehead fish (*Channidae* family)
  - tench (*Tinca tinca*)
  - tubenose gobies (any fish belonging to the genus *Proterorhinus*)
  - walking catfish (*Clariidae* family)
- **Invertebrates**
  - golden clam (*Corbicula fluminea*)
  - golden mussel (*Limnoperna fortunei*)
  - jumping worms (*Amynthas* and *Metaphire* species)
  - marbled crayfish (marmorkrebs; *Procambarus virginalis* or *Procambarus fallax forma virginalis*
  - mitten crabs (*Eriocheir* species)

The reasons for listing the species are summarized below.

Mitten crab, Nile perch, snakehead fish, walking catfish

The mitten crab, Nile perch, snakehead family and walking catfish family were added to the list of prohibited invasive species in Minnesota for consistency with the federal injurious wildlife species list. Due to a reinterpretation of this federal law in 2017, the U.S. Fish and Wildlife Service does not have the jurisdiction to prohibit the interstate transport of species on the federal injurious wildlife species list within the continental U.S. but maintains an authority to prohibit interstate commerce of state-banned species. By listing these federally injurious wildlife species–and incorporating the federal injurious wildlife list of fish, mollusks and crustaceans–Minnesota will help to close regulatory gaps in the Great Lakes region.

Yellow floating-heart, tench, golden mussel, marbled crayfish (marmorkrebs)

The Conference of Great Lakes and St. Lawrence Governors and Premiers Aquatic Invasive Species Task Force has released two lists of “least wanted” aquatic invasive species in the Great Lakes basin, most recently adding several species in 2018. Many of these species were already on Minnesota’s list of prohibited invasive species, and by adding yellow floating-heart, tench, golden mussel and marbled crayfish (marmorkrebs), all of the current “least wanted” species are now on prohibited invasive species in Minnesota.

Golden clam

Populations of golden clams have already established in some Minnesota waters. Golden clams are likely to have negative economic impacts and may also have negative impacts on native mussel fauna. The U.S. Fish and Wildlife Service identifies this species as a high risk.

Tubenose gobies (any fish belonging to the genus *Proterorhinus*)

The western tubenose goby is already listed as a Prohibited Invasive Species in Minnesota and there are several other species in the genus that are difficult to distinguish from one another. None of these species are native to North America.

Eastern mosquitofish

Eastern and western mosquitofish have both been stocked for mosquito control and have both been invasive in places they were introduced. The two species were once considered subspecies of a single species. Western mosquitofish are listed as Prohibited Invasive Species in Minnesota. Adding eastern mosquitofish to the list of prohibited invasive species reduces the risk that this close relative would be introduced to the state.

Jumping worms

Jumping worms include multiple species in the *Amynthas* and *Metaphire* genera and have documented impacts on soils and plants. While some species are known to be present in some Minnesota urban areas, most of Minnesota is not known to have any of the jumping worm species. Jumping worms were previously classified as unlisted nonnative species which cannot be released into a free-living state, but without regulation as a prohibited invasive species, they could still be sold. Listing these species strengthen regulations to make sure that worm species that are allowed to be sold are not contaminated with jumping worms and reduce the potential spread of jumping worms in the state. The DNR has worked with individuals and organizations that work with soil, mulch, compost or other materials that may harbor jumping worms on best management practices surrounding cleaning equipment, heat treatment of compost and other actions.

Non-native subspecies of *Phragmites* (common reed)

The nonnative subspecies of *Phragmites* has impacts such as forming monocultures in wetlands and reducing habitat for native plant and animal species. The prohibited invasive species classification does not apply to Minnesota's native subspecies of *Phragmites.* The impacts of the non-native subspecies of *Phragmites* have led the DNR to take a statewide leadership role with this species. The DNR invasive species program applied for and received federal funding from a GLRI grant administered by the USFWS to begin to implement control of nonnative *Phragmites* on a statewide level, through a comprehensive plan.

The DNR has been working with the Minnesota Department of Agriculture, the Minnesota Pollution Control Agency, the University of Minnesota and the approximately 10 wastewater treatment plants in the state that currently use non-native *Phragmites* for dewatering biosolids to develop a plan for coordinated control across the state. The Minnesota Department of Agriculture regulates non-native *Phragmites* as a Prohibited Noxious Weed on the Control List with an exemption for wastewater treatment plants. The DNR and the Minnesota Department of Agriculture are working together to continue to develop best practices to reduce offsite spread and to coordinate permitting for these facilities.

INVASIVE SPECIES IN TRADE

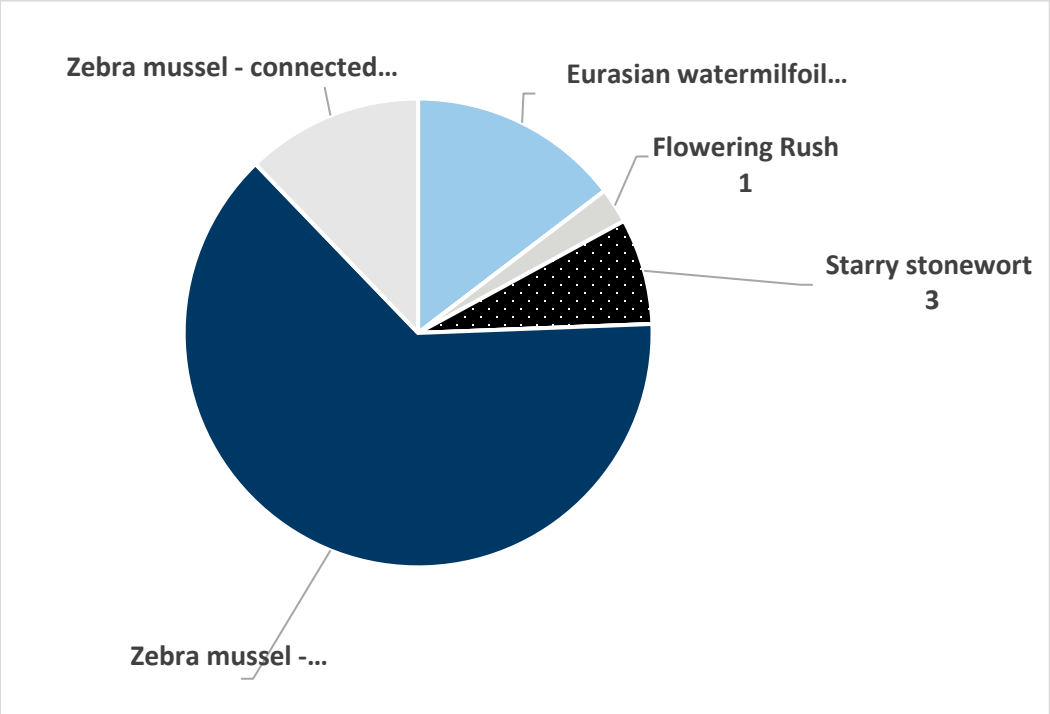
Global trade drives invasive species introductions to Minnesota and the United States. There are trades built on the movement and possession of live plants and animals which have historically led to invasive species introductions. The DNR invasive species program received GLRI funding to support a new position focused on trade and commerce pathways for invasive species introduction. Some of this work includes:

- Developing educational materials for pet store owners, aquatic plant dealers, and hobbyists.
- Assisting national efforts to draft model regulatory language to address priority gaps for AIS in commerce.
- Assisting national quick response efforts to prevent the spread of AIS through trade.
- Creating and updating multiple websites focusing on the trade pathways.
- Partnering with a UMN researcher to study the social dimensions of trade pathways.
- Attending multiple trade shows, auctions and conferences.
- Coordinating prevention planning with other jurisdictions.
- Contacting out of state sellers to estimate the potential of AIS introductions.

INFESTED WATERS

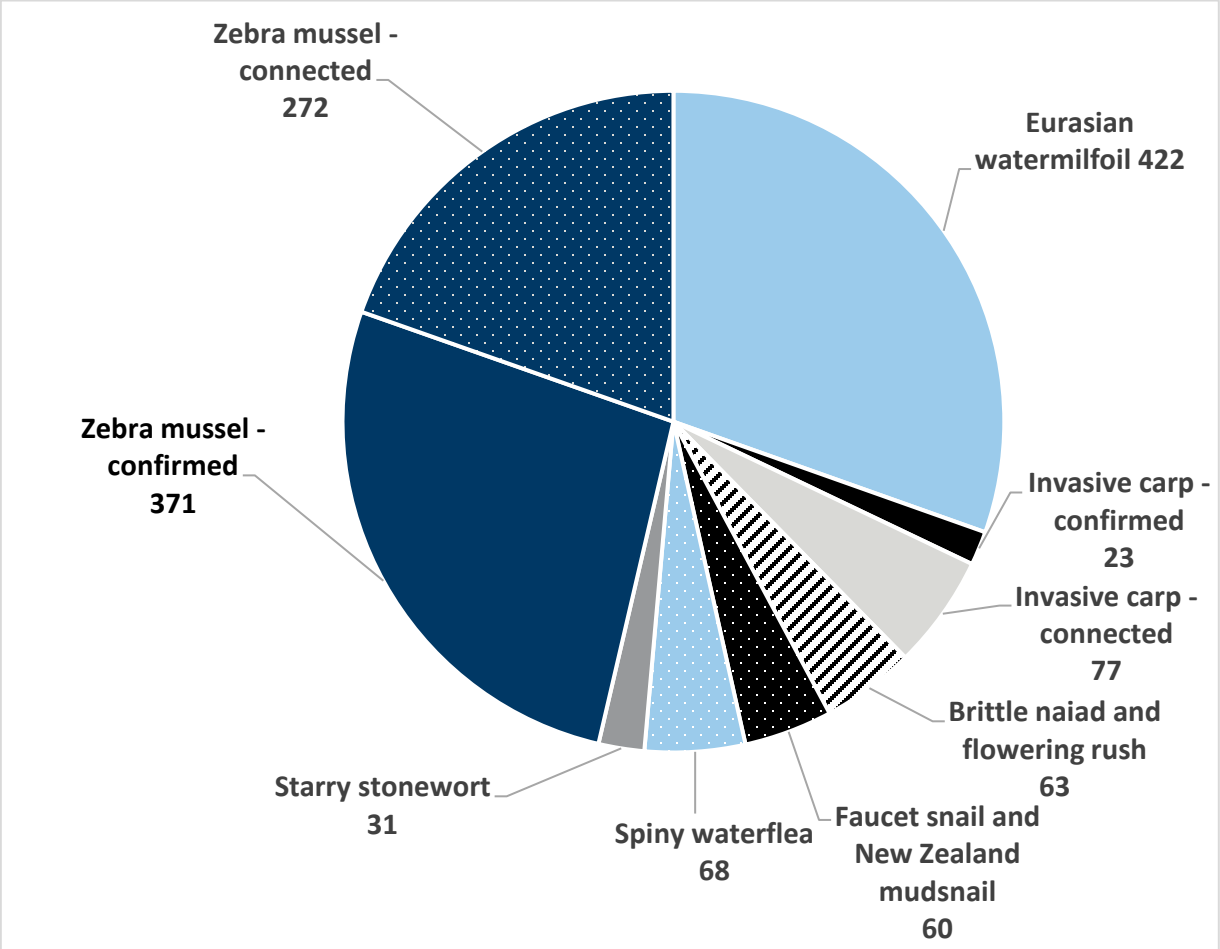
The DNR will add a lake, river, pond, or wetland to the infested waters list if it contains certain AIS that could spread to other waters. The DNR may also list a lake, river, pond or wetland as infested if it is connected to a body of water where AIS are present. To reduce the risk of spreading AIS, activities like bait harvest, commercial fishing, and water use are managed differently in infested waters.

NEW WATER BODIES LISTED AS INFESTED IN 2024



For more information on waters listed in 2024, see Appendix B.

TOTAL WATER BODIES LISTED AS INFESTED



Not included in the summary chart:

- One lake is listed as infested with red swamp crayfish, though red swamp crayfish have not been detected there since 2016.
- Lake Superior, the St. Louis River estuary, and other Superior tributaries are listed as infested with Viral Hemorrhagic Septicemia Virus (VHS), Eurasian ruffe, round goby and white perch.

Education and Public Awareness

In 2024, DNR staff engaged with a broad range of audiences to educate them about the risks of invasive species and how to prevent their spread.

ACTIVITIES

- Developed strategic communication messages.
- Produced and distributed informational materials.
- Attended and handed out educational materials at special events, such as the Minnesota State Fair.
- Maintained the DNR website, created social media posts and video content, and worked with media outlets through news releases and interviews with radio, newspaper and television outlets.
- Gave presentations at local, state and national meetings and responded to numerous requests for information.
- Secured new capacity, partnering with the Conservation Corps of Minnesota and Iowa (CCMI), focused on program communications.

Strategic Communications

CCMI Communications Position

For the first time, the Invasive Species Program had a CCMI corpsmember position to provide full-time communications assistance. Working closely with program staff and DNR communications staff, this position was particularly effective in enhancing collaboration with the Statewide Aquatic Invasive Species Advisory Committee and the Minnesota Aquatic Invasive Species Research Center. This position increased program capacity to share informative posts about AIS on social media and worked to maintain up to date information on the website, and also led a communications campaign to remind people to not release goldfish or other pets into the wild.

The Invasive Species Program has found this additional capacity very valuable and plans to continue this position in 2025.

Visitors to the DNR building at the Minnesota State Fair learn how to clean their boat and equipment using the "Muck Hunt" interactive game.

Promoting Behavior Change

The Invasive Species Program, in consultation with behavior change experts, continued to utilize "community-based social marketing" (CBSM) methodologies to promote invasive species prevention behaviors in Minnesota. (https://www.dnr.state.mn.us/invasives/ais/prevention/behavior-change.html). The DNR continued to work with local partners to help leverage CBSM in their communities.

The "Engaging Bait Shops" project continued to provide behavior change-based materials (posters, stickers, fliers) for distribution at bait shops that sell minnows and events. Seven local programs participated in the pilot (up from last years' six), reaching out to local bait shops to share outreach materials and assess staff AIS knowledge, attitudes and outreach needs.

Participating bait shops encouraged customers to sign a poster demonstrating their pledge to never release bait and were given pledge stickers and information cards showing how they can prevent the spread of AIS. Materials were distributed at 27 bait shops and at seven 44 events. The DNR will continue to work with local partners to improve and expand this effort.

The DNR expanded its work with lake associations and local governments to deploy a standardized interpretive dive sign at dive access sites. Local organizations can print the signs and install them with permission from access owners. This work supports behavior change because it provides consistent messaging on AIS prevention strategies for divers in the right place and time, making it easier for them to take action.

Informational Materials

The program continued to assess and revise informational materials for public distribution and created new materials and updated existing ones, including:

- An AIS prevention drying cloth for boaters.
- An interpretive sign providing guidance to SCUBA divers about AIS prevention steps.
- A manual for AIS volunteers.

Digital versions of many AIS outreach materials can be found online.
https://www.dnr.state.mn.us/invasives/ais/outreach.html

The Invasive Species Program provided content and advertising for the 2024 Minnesota Fishing Regulations handbook. Available in five languages, it includes information about AIS laws and watercraft inspections, species identification information, advertising to remind anglers to help prevent the spread of AIS, and information about the infested waters list. More than 850,000 copies of the 2025 fishing regulations will be distributed beginning in March and will also contain invasive species content and advertising.

Special Events

Staff co-hosted booths with partners at several festivals and fairs to promote public awareness and actions to prevent the spread of invasive species. Hundreds of publications, license holders and temporary tattoos were distributed.

The Invasive Species display area in the DNR Building at the 2024 Minnesota State Fair got a boost from a major metro television feature. The story included the interactive "Muck Hunt" video game. It was designed for people to have fun while learning about invasive species prevention actions. Players can use different hand-held tools to clean off a boat, ATV and boots on screen. Messaging focused on the steps people can take to prevent the spread of terrestrial and aquatic invasive species. DNR staff and volunteers worked the informational tables and distributed publications, license holders, boot brushes and temporary tattoos, featuring six invasive species prevention designs.

AIS Management Program Consultant Wendy Crowell instructs how to identify aquatic plants at the 2024 Aquatic Plant Identification training hosted by the Minnesota DNR, the University of Minnesota Extension, and MAISRC.

The Invasive Species Program co-hosted an Aquatic Plant Identification Training with University of Minnesota Extension and MAISRC. Staff and researchers throughout the state collected, sorted and identified over 80 plant species to be used in the training. Attendees included nine consultants, 15 local government staff that conduct aquatic plant surveys and 16 volunteers interested in building identification skills.

Public Engagement

Staff participated in conferences, workshops, trainings, school events, water festivals and many other special events throughout the year to educate the public. Program staff also made presentations to lake associations and community groups to answer questions and discuss invasive species issues and activities.

Staff responded to numerous inquiries about a wide range of topics including aquatic invasive invertebrates, terrestrial invasives, aquatic invasive plants, invasive carp, invasive species regulations, management methods, native aquatic species and individual lake issues. In several instances, regional invasive species specialists followed up with field surveys.

Web/Digital

DNR communications specialists, including a full-time CCMI AIS communications specialist, continued the integration of news and media relations, web, social media, publications and graphic design, public access signs, advertising and public interactions.

Increasing social media messaging to bolster AIS awareness and education was one focus of the program this year. AIS-related social media messaging was released regularly (~3 per month) on the DNR's Instagram and Facebook pages. Posts from the AIS program had 630,124 exposures and received 12,463 engagements in 2024. Social media content was also shared by local partners to broaden reach.

The "What you should do" section of the AIS program website was restructured to facilitate an easier web user experience and provide a centralized location for activity-based invasive species prevention information. The new webpages provide AIS guidance and best practices for specific water-related activities, making it easier for web users to find AIS information tailored to how they recreate.

New species webpages were also created for yellow floating heart and red-eared sliders. Yellow floating heart has been popular for cultivation in water gardens, but the DNR changed its regulatory classification in 2024, making it illegal to buy, sell or possess. A web page was made to provide a place to refer Minnesotans to with information about the species, its classification change and proper disposal and control methods.

Red-eared sliders, a popular species in the pet trade, are becoming more common in Minnesota waterbodies, and their ecological damage is evident. A web page was created in collaboration with the DNR nongame wildlife experts to provide information about the species to the public.

Promotion of the Pledge to Protect Minnesota Waters campaign continued. Anyone 18 or older can visit the Pledge to Protect Minnesota Waters website (mndnr.gov/AISPledge) to take the pledge and upload a photo, if desired. The pledge affirms that participants will follow Minnesota's "Clean, Drain, Dispose" laws and will encourage others to do so. Regardless of the activity—boating, paddling, fishing, moving shoreline equipment, using recreational gear on the water, or caring for aquarium pets or water gardens—everyone can pledge to do their part and take several simple actions to prevent the spread of AIS. As of December 2024, 839 people have taken the pledge. The program will continue to promote this webpage through various methods, partnerships and events.

Media Relations

In 2024, the program continued to expand placement of more stories about innovations and new steps to reduce the spread of invasive species. In 2024, the DNR issued 29 news releases with an invasive species focus.

DNR news releases about new AIS confirmations focused on the unique dynamics of each lake and river. News releases created greater awareness of proactive steps the program is taking, such as aggressive actions to prevent the spread of invasive carp, advances in research and technologies, and the broad range of partnerships with stakeholders across the state and nation. Additionally, the Enforcement Division conducted media interviews on the importance of AIS regulation compliance.

Invasive carp got particular attention in 2024, with one of the DNR's largest media audiences ever for an online news conference about the Invasive Carp Action Plan update and the Lock and Dam 5 deterrent project, detailed in the Invasive Aquatic Animals – Invasive Carp chapter of this report.

Enforcement

ACTIVITIES

The Enforcement Division continued to emphasize invasive species enforcement as priority work and a core responsibility. The Enforcement Division continues to focus its efforts on enforcement and education, both critical tactics in preventing the introduction and spread of invasive species.

In 2024, DNR conservation officers conducted the following activities to enforce Minnesota's invasive species statues and rules.

Conservation Officer Mike Krauel with the K9 zebra mussel detection dog Bolt.

ENFORCEMENT CONTACTS (Citations/Warnings)

Numbers of enforcement contacts vary due to officer staffing levels, public compliance, length of open-water season, local law enforcement involvement and outreach efforts. In 2024, numbers from check stations show an 88% compliance rate with AIS regulations. It should be noted that Enforcement Division's hours spent on invasive species will likely increase, due in part to the introduction of three new AIS K9 teams in 2025 and additional opportunities for focused invasive species enforcement activities.

NUMBER OF CITATIONS AND WARNINGS BY YEAR

	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015
Citations issued	39	57	58	39	61	98	95	127	123	244
Warnings	252	321	310	266	365	485	476	557	671	911

AQUATIC INVASIVE SPECIES CHECK STATIONS (SPRING TO FALL 2024)

To date in 2024, DNR Conservation Officers have completed seven roadside check stations around the state to inspect watercraft and watercraft equipment transported in Minnesota. Conservation Officers also dedicated time to numerous AIS assignments around busy holidays and fishing openers.

Statewide Open Water Season Enforcement Results

Review of past data from DNR Enforcement check stations shows the compliance with invasive species regulations has generally risen every year since the first year of check stations back in 2012.

Three new K9 zebra mussel detection dogs joined the Enforcement Division in December 2024.

Watercraft Inspections

ACTIVITIES

In 2024, the DNR watercraft inspection program conducted the following activities to help prevent the introduction and spread of AIS in Minnesota:

- Educated watercraft users and the public about aquatic invasive species, laws, and prevention best practices.
- Inspected and decontaminated watercraft following standardized protocols.
- Collected standardized watercraft inspection, decontamination, compliance, violation and other data via a mobile application.
- Trained staff of tribal and local governments with delegated authority to conduct watercraft inspections and decontaminations.
- Trained AIS volunteers.

State and Local Programs Working Together

Minnesota's watercraft inspection program is one of the largest in the nation.

- The DNR employed 40 Level 1 and 35 Level 2 watercraft inspectors in 2024; Level 2 watercraft inspectors can provide decontamination in addition to inspecting watercraft.
- Local governments (LGUs) and tribal governments can partner with the DNR through a delegation agreement. This agreement allows governments to hire authorized watercraft inspectors to support local watercraft inspection programs. There were 60 active delegation agreements during the 2024 season. These programs hired an additional 763 watercraft inspectors. This compares with 66 active delegation agreements and 810 local government watercraft inspectors in 2023.

The DNR trains all watercraft inspectors through a hybrid learning system consisting of online training, in-person training and protocol manuals. In addition to the 40 Level 1 and 35 Level 2 DNR staff who received in person training in 2024, three DNR Trainers also trained 625 Level 1 LGU or tribal government inspectors at 62 in-person trainings and 94 Level 2 inspectors at 29 in person trainings. Including online training, a total of 763 local government and tribal staff received Level 1 training; 197 of those also received Level 2 training in 2024.

All watercraft inspectors follow standard protocols and collect the same data through a mobile application. Watercraft inspectors hired by the DNR, and by 60 entities with delegated authority from the DNR, inspected 451,551watercraft in 2024. This number is similar to previous years, which were 469,038 in 2023 and 439,770 in 2022.

Transportation of Invasive Species

Boaters in Minnesota must remove drain plugs from watercraft and livewells to reduce the risk of transporting AIS like spiny waterflea or zebra mussel larvae, as required by the state's "drain plug law." People in Minnesota also may not transport aquatic plants under most circumstances. This helps prevent the spread of invasive plants as well as other AIS that can be attached to plants, such as zebra mussels.

In 2024, watercraft inspectors observed that a majority of people arriving at accesses were in compliance with state AIS prevention laws.

- Ninety-seven percent of people arrived at accesses with drain plugs removed from their watercraft, in compliance with state drain plug laws.
- Ninety-eight percent of people arrived at accesses with watercraft and trailers that were free of aquatic plants, invasive animals, mud or water.
- Zebra mussels were found on 163 incoming watercraft (2023 had 225 occurrences). Five were at water bodies not known to be infested with zebra mussels.

DNR-authorized watercraft inspectors took the following actions to follow up with the few individuals who were in violation of state laws:

- Instructed owners not to launch until watercraft passes inspection.
- Forwarded zebra mussel violations to DNR Enforcement for follow-up.
- Required decontamination prior to launching for any watercraft with vegetation or attached zebra mussels attempting to enter a water body. Decontamination methods include hand removal, draining, hot water treatment and/or high-pressure rinse.

Level 2 Inspector Matt Dwelly conducts an engine decontamination on a pontoon boat's outboard motor in 2022.

Decontamination Units

DNR-trained staff offer free decontamination services at dozens of public water accesses. The staff follow specific decontamination protocols using hot water to kill AIS and, if necessary, using high-pressure water to remove attached AIS. During the boating season, boaters can find decontamination times and locations at www.mndnr.gov/decon.

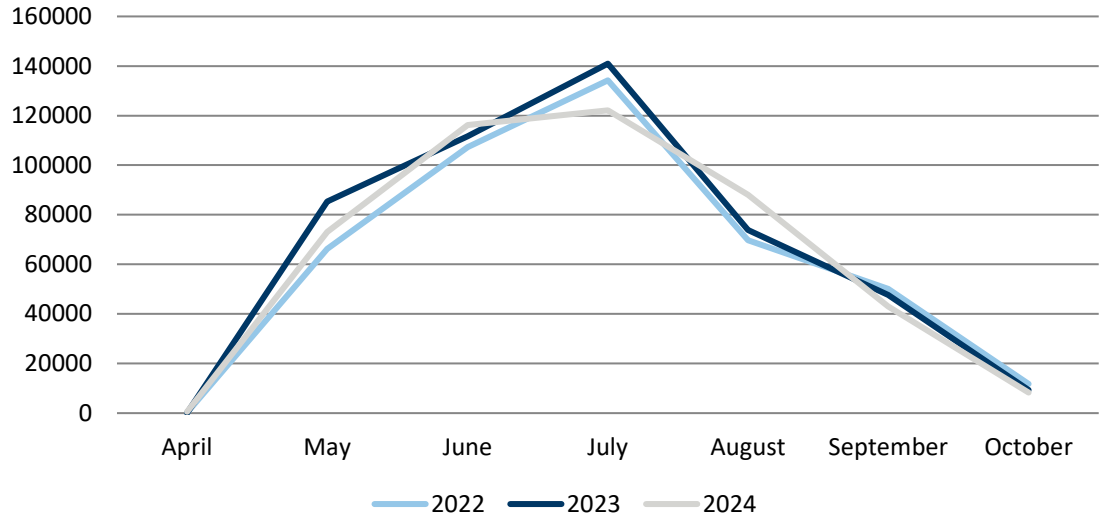
DNR Level 2 watercraft inspectors performed 1,743 decontaminations with 26 portable decontamination units strategically located at high-use watercraft accesses on zebra mussel-infested water bodies. Local inspection programs operated an estimated 49 decontamination units in addition to DNR-operated units and decontaminated an additional 2,367 watercraft.

2024 was the first full year of operations for the first state-owned, on-demand hot water decontamination unit at Big Bog State Recreation Area near Upper Red Lake. Watercraft inspectors used the unit to complete 143 decontaminations over 287.75 hours of inspection. Compared to portable decontamination units that must be towed to by trailer to the inspection site each day, the on-demand unit was more efficient (no transport required) and more effective because it provides very consistent hot water temperatures. Next year, the DNR will post additional signs around the on-demand decontamination unit to explain its function. The Invasive Species Program will continue to look for opportunities to implement new technologies like on-demand decontamination in Minnesota.

Volunteer Training

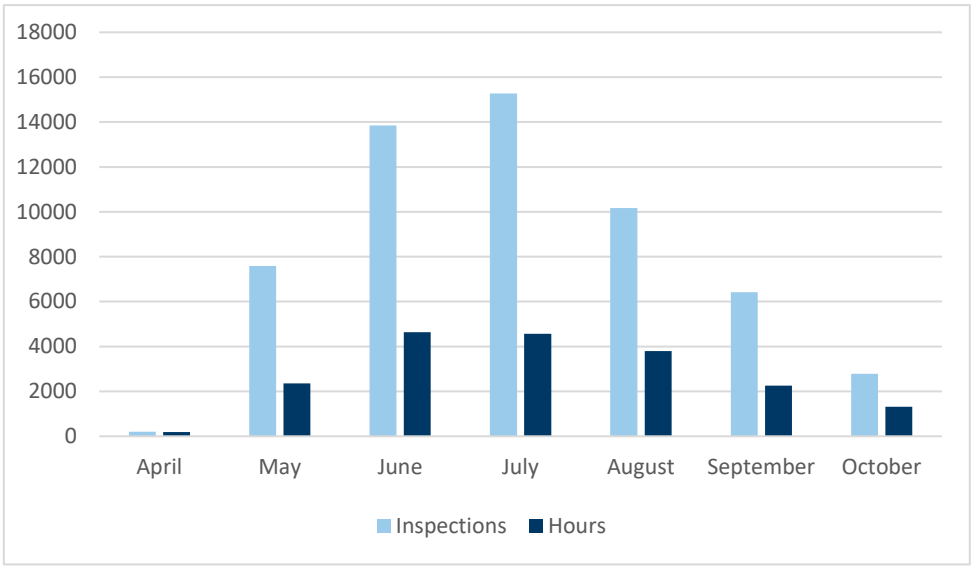
The DNR conducts AIS volunteer training sessions to teach people how to educate watercraft users at waters where they live or recreate. Typically, volunteers receive classroom training every three years, with an online refresher course each year between classroom training. In 2024, 33 people received in-person training.

AUTHORIZED WATERCRAFT INSPECTIONS PER MONTH 2022 – 2024



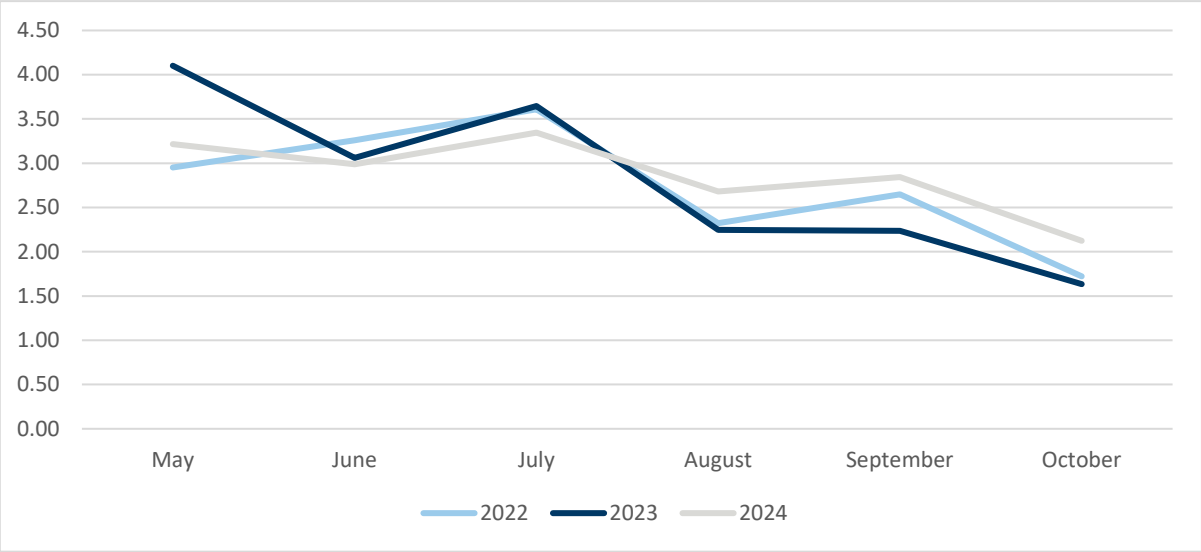
This chart includes data from DNR and DNR-authorized watercraft inspections, which start in early April, peak in July and decline in October when most inspection programs end and boating activity slows.

DNR INSPECTIONS AND HOURS PER MONTH AT PUBLIC WATER ACCESSESS IN 2024



Inspections are performed statewide from April through October. The number of inspections peak in July, while staff presence remains fairly consistent.

DNR INSPECTIONS PER HOUR, BY MONTH AT PUBLIC ACCESSES



DN*R inspections per hour have followed a consistent pattern each year since 2022.*

NUMBER OF DNR WATERCRAFT INSPECTIONS BY REGION

DNR Region	2024	2023	2022	2021	2020	2019	2018	2017
Northwest - 1	11,722	14,006	11,947	18,102	18,121	19,437	13,539	17,857
Northeast - 2	8,286	5,951	6,625	7,560	7,093	8,152	7,266	11,413
Central - 3	3,2299	30,214	26,167	35,874	27,797	40,623	43,653	51,513
Southern - 4	3,984	2,573	2,943	5,038	3,778	2,550	2,375	4,041
Total Inspections	56,291	52,744	47,682	66,574	56,813	70,762	66,833	84,824

NUMBER OF DNR WATERCRAFT INSPECTIONS

	2024	2023	2022	2021	2020	2019	2018	2017
Inspections	56,291	52,744	47,682	66,574	56,813	70,762	66,833	84,824
Inspection Hours	19,107	17,891	16,876	22,755	19,509	25,451	21,826	29,400
Inspections per Hour	2.95	2.65	2.83	2.93	2.91	2.78	3.06	2.88

Aquatic Invasive Species Prevention Aid

ACTIVITIES

In 2024, DNR AIS prevention planners partnered with counties to help prevent the introduction and spread of AIS in Minnesota by:

- Providing technical support to local governments and their partners.
- Hosting workshops to learn from peers and experts and build stronger relationships.
- Maintaining a community of support among local governments doing AIS prevention work.

Technical support

Provided technical support to local governments and their partners as they developed, implemented and evaluated their AIS prevention strategies. For example:

- Provided feedback on guidelines, including plans and resolutions, to the 83 Minnesota counties that qualify to receive AIS prevention aid funds.
- Provided information on DNR AIS programs (e.g., public engagement, watercraft inspection, trade pathways, invasive aquatic plant management and behavior change). This included updating key resources and promoting available support from the DNR on the AIS Prevention Aid webpage http://www.dnr.state.mn.us/invasives/ais/prevention/index.html.
- Provided technical support and a connection to the DNR at county AIS task forces and advisory committees.
- Developed guidance documents and online resources, hosted workshops and provided presentations to relay information to counties and their stakeholders.
- Provided feedback on communications materials developed by local AIS program managers to promote consistent messages about AIS and prevention steps (e.g., Clean, Drain, Dispose).
- Completed an annual update of the metrics template, which provides a voluntary way for local AIS program managers and their partners to track accomplishments and demonstrate how AIS Prevention Aid is making a difference in their communities. Fifty-three counties submited a template summarizing their work in 2023, which included jobs created, partnerships, funds leveraged, watercraft inspected, water bodies surveyed, and invasive species managed, along with pictures and stories of success.

AIS Prevention Planner Tina Fitzgerald working at the Invasive Species Booth in the DNR building at the Minnesota State Fair.

Engaged local governments and partners

- Maintained a network and community of support by continuously updating a primary contact list of county AIS program managers online and encouraged contacts to use the list to collaborate with one another. DNR prevention planners used the list to disseminate timely and relevant information about AIS prevention aid funding and requirements, including new resources, innovative activities, learning/collaboration opportunities and DNR program updates.
- Hosted annual workshops for local AIS program managers and stakeholders to share their AIS prevention experiences, discuss successes and challenges, support collaborative efforts, broaden knowledge on AIS issues and build stronger inter-county relationships.
- Hosted a series of four 2 1/2-hour online meetings In February and March, each on a specific topic of interest. Meetings began with a few short presentations, primarily from local programs, which were followed by a facilitated discussion. Topics of interest were new approaches, partnerships, learn from experts, and public engagement. The online workshops attracted 70 to 90 attendees each.
- Hosted southern and northern collaboration in-person workshops in April. More than 40 staff and stakeholders involved in developing and implementing local AIS programs attended. These attendees included, but were not limited to, local and tribal government staff overseeing an AIS prevention aid or local AIS programs, watercraft inspection staff, local AIS task force and committee members, state and federal agency staff, regional and statewide partners, non-government organizations, and representatives from academia and private businesses.
- Provided information about the AIS Prevention Aid program and general AIS education to groups such as AIS task forces, lake associations, college courses and youth events.
- Connected local AIS program managers interested in conducting new AIS projects with AIS experts and other local organizations with experience implementing similar projects. Often these connections evolved into multi-county collaborative initiatives.

AIS Prevention Planner Doug Jensen gives a presentation at the Upper Midwest Invasive Species Conference in Green Bay, Wisconsin.

Invasive Aquatic Plant Management

ACTIVITIES

In 2024, Invasive Species Program staff worked to manage nuisances caused by invasive aquatic plants, to monitor their effects, and to evaluate the results of management by:

- Offering grants for the management of invasive aquatic plants.
- Issuing permits for the selective control of invasive aquatic plants.
- Providing technical support for adaptive management efforts.
- Participating in innovative management projects.

Management

Invasive aquatic plant management is an attempt to reduce the abundance or distribution of an invasive plant in a waterbody or wetland. Sometimes this work is done to help prevent the spread of that species to other waterbodies. The DNR's invasive aquatic plant management program supports efforts to minimize the harmful effects caused by invasive plants while also protecting natural resources and their use in the state. The program uses adaptive management to continually improve our efforts to reach these goals.

Plant management is complex, and reductions in invasive plants often require long term and resource-intensive efforts. Management that involves either mechanical removal of plants or application of herbicides to public waters requires a permit from the DNR. Permits may be issued to property owners, lake organizations and local governments. DNR Aquatic Invasive Species specialists worked with permit applicants and contractors to provide permits for work, advice on best management practices for treatments and assistance in monitoring the results of management projects.

Management Grants and Permits

Eurasian watermilfoil, curly-leaf pondweed and flowering rush

The three most commonly managed aquatic invasive plant species have been in the state for many decades. Curly-leaf pondweed (*Potamogeton crispus*) was first noted in Minnesota in 1910, flowering rush (*Butomus umbellatus)* in 1968 and Eurasian watermilfoil *(Myriophyllum spicatum)* in 1987.

The DNR supports the management of these species through the issuance of permits for their management, grants to help cover the costs and support for research into new management methods. In 2024, the DNR issued 422 Invasive Aquatic Plant Management Permits, 356 of which were for Eurasian watermilfoil and/or curly-leaf pondweed.

Eurasian watermilfoil

Grants

The Invasive Species Program has provided grants for management of Eurasian watermilfoil, curly-leaf pondweed and/or flowering rush since 2006. In recent years, the DNR has included starry stonewort management in the list of allowable projects. In 2024, the DNR made $409,600 in grants available. Grants were selected by lottery of all applicants with higher priority assigned to (1) waterbodies that did not receive funding in 2023 and (2) waterbodies with new infestations of starry stonewort. In 2024, the DNR provided 99 grants that funded 125 invasive aquatic plant treatments to local partners such as lake associations, watershed districts and lake improvement districts.

INVASIVE AQUATIC PLAN T MANAGEMENT PERMITS ISSUED BY REGION IN 2024

Species	Northwest	Northeast	Central	Southern	Total
Curly-leaf pondweed	24	21	147	35	227
Eurasian watermilfoil	8	19	82	16	125
Curly-leaf pondweed and Eurasian watermilfoil			3		3
Eurasian watermilfoil and starry stonewort	1				1
Eurasian watermilfoil and flowering rush					
Flowering rush	3		10		13
Brittle naiad					
Java water dropwort				1	1
Nonnative *Phragmites*	2	1	20	5	28
Purple loosestrife	1				1
Starry stonewort	8	1	10	1	20
Yellow iris	1		1		2
Flowering rush and nonnative *Phragmites*			1		1
Total	48	42	274	58	422

Technical support and innovative management efforts

Invasive species staff provided technical and field support and desk reviews of larger or innovative management proposals throughout the state. This included reviewing lake vegetation management plans, pretreatment surveys of lakes and post treatment surveys of areas that were treated. Results of these surveys, along with surveys from consultants and other cooperators, pesticide application records, and pesticide residue samples were reviewed to determine the effectiveness and selectivity of the management efforts. This information is used to continue to improve aquatic invasive species management in the state.

Starry stonewort

Starry stonewort (*Nitellopsis obtusa*) was first detected in Minnesota in 2015 and has now been confirmed in 31 waterbodies in the state. AIS management is most effective early, when spread is limited, so efforts to manage starry stonewort are especially valuable at this time. DNR Invasive Species Program staff have worked on several innovative management techniques since it's discovery in Minnesota. Treatment methods have included chemical treatment with herbicides or algaecides, Diver Assisted Suction Harvesting (DASH), suction dredging, and hand pulling followed by chemical treatment. Combination treatments, using harvesting by SCUBA divers followed by chemical treatments, have been found to be successful in small areas.

In 2024, a new innovative method to control starry stonewort was tested. In August of 2023, a small population was found growing by the public water access in Long Lake in Hubbard County. In response, the site was treated with a copper herbicide later that year. However, in the following spring starry stonewort was again found in that same area. Invasive species staff in the northwest region partnered with the Long Lake Association to test a new method to manage the remaining portion. They installed a biodegradable burlap barrier over 60 square feet of lake bottom to smother the starry stonewort. While bottom barriers are typically prohibited in Minnesota because they limit gas exchange and can pose a boating traffic hazard, special permission was given because the burlap fabric used is gas permeable and biodegradable, minimizing those risks. Five layers of burlap fabric were held down with sandbags made with the same material. The site was checked every two weeks by SCUBA divers. The barrier was very effective at controlling the starry stonewort, though a small number of plants grew through the material and had to be manually removed. The ongoing SCUBA surveys also located some starry stonewort growing outside the covered area. That one-half acre area was treated with a combination of copper and hydrothol 191.

DNR Invasive species staff and a volunteer from the Long Lake Association surveyed the area in Long Lake where the burlap fabric was put down to manage starry stonewort growth. SCUBA, snorkeling and a kayak were used to check for regrowth of starry stonewort through the barrier and in the surrounding area.

Nonnative *Phragmites*

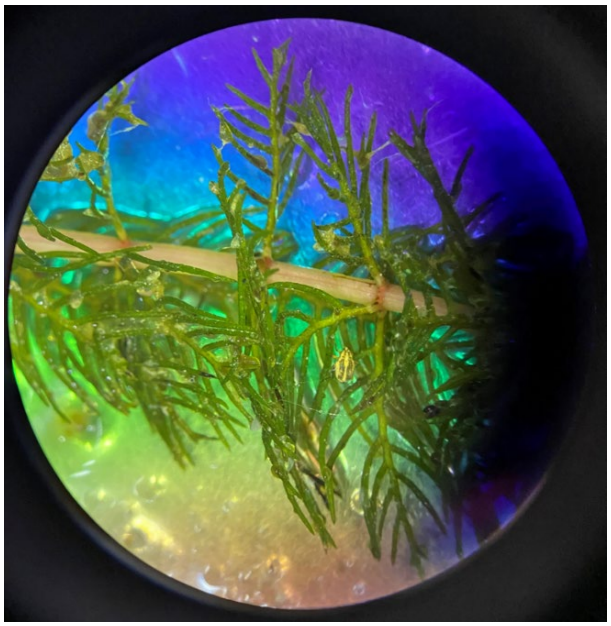
The overall statewide response to nonnative *Phragmites* is coordinated by University of Minnesota funded in part by the DNR Invasive Species Program through a GLRI grant. Cooperators on this project include the Minnesota Department of Agriculture, counties, private landowners, the Minnesota Department of Transportation, the U.S. Fish and Wildlife Service, Soil and Water Conservation Districts, professional herbicide applicators and other stakeholder groups.

Management efforts focused on "clearing counties" by targeting management in areas of the state with a limited number of small infestations. To track the spread of nonnative *Phragmites* and to evaluate treatment effectiveness, the DNR hired two CCMI corpsmembers to monitor treated sites and to locate new populations of nonnative *Phragmites*. In 2024, they monitored 911 sites throughout the state These sites included documenting 193 new populations and revisiting 718 previously known populations, many of which had been treated in previous years. These surveys occurred before the 2024 management season so that DNR contractors could focus their efforts on sites where invasive *Phragmites* was known to occur. Of those sites the CCMI staff revisited, 280 had no invasive *Phragmites* present.

In 2024, DNR contractors visited a total of 631 nonnative *Phragmites* sites in 41 counties. Of those, 568 sites were treated with herbicide. Treated sites were mostly small; 470 of them were one-tenth of an acre or smaller. At the 63 sites visited but not treated, 14 sites had no nonnative *Phragmites* found. The remaining 49 sites were not treated because the contractors could not access the *Phragmites* at the site, largely due to flooding.

Eurasian watermilfoil biocontrol

Over the past 25 years attempts have been made to use the native milfoil weevil *(Euhrychiopsis lecontei)* to manage Eurasian watermilfoil. In 2024, DNR invasive species specialists observed damage on Eurasian watermilfoil plants from the weevil in Clear Lake in Meeker County. These insects graze and burrow into the stems of Eurasian watermilfoil, harming the plants and causing some die off. In Clear Lake, the grazing and burrowing of the insects appeared to harm some plants and cause others to die off. Past research by University of Minnesota scientists found that these insects can reduce the nuisances caused by Eurasian watermilfoil in limited circumstances. Follow-up studies will investigate these native aquatic insects and their potential as biocontrol agents of Eurasian watermilfoil.



The milfoil weevil, Euhrychiopsis lecontei, a native aquatic beetle, is a potential biological control agent for invasive Eurasian watermilfoil (Myriophyllum spicatum).

Invasive Aquatic Animals – Invertebrates

ACTIVITIES

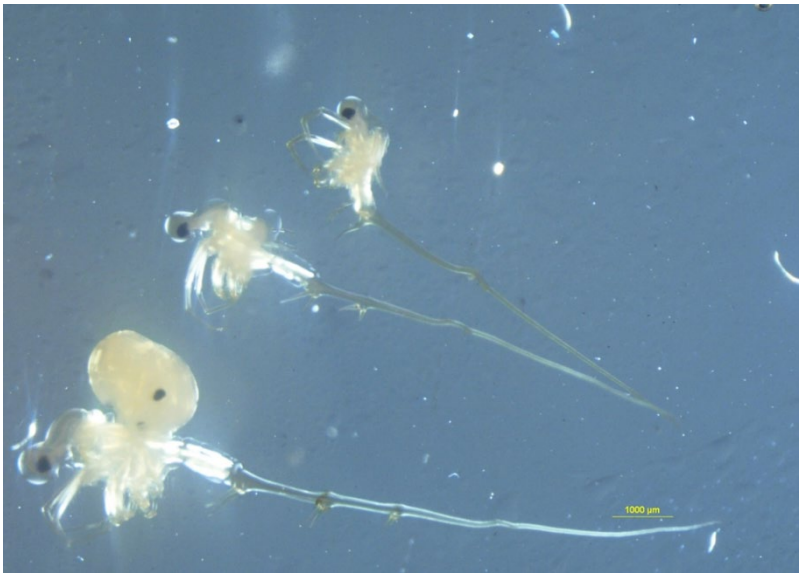
In 2024, DNR staff worked to manage nuisances caused by invasive aquatic invertebrates and to monitor their effects by:

Research, long-term monitoring and management

- Continuing long-term monitoring and analyses of zebra mussel veliger (immature stages) and spiny water flea populations and their impacts on native zooplankton.
- Continuing 19 years of long-term monitoring of settled zebra mussels in Mille Lacs Lake.
- Delineating the spatial extent and abundance of signal crayfish, a new invasive species in Minnesota.
- Investigating native aquatic invertebrates as potential biocontrol agents of an invasive aquatic plant.
- Working with stakeholders to set guidelines and develop innovative technologies for dewatering and pumping of zebra mussel infested waters.
- Updating Minnesota's prohibited invasive species list with AIS invertebrates that have recently been introduced or are not yet known to be in the state.
- Verifying AIS invertebrate records in the database.

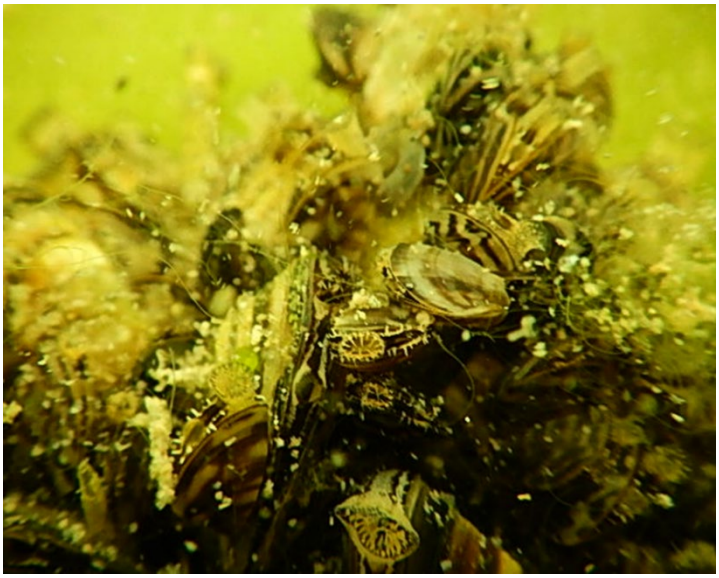
Technical assistance

- Updating list of priority AIS invertebrates and evaluating research proposals in partnership with MAISRC.
- Enhancing zebra mussel monitoring procedures in partnership with Voyageurs National Park.



Predaceous spiny water fleas compete with perch and other lake fish for native zooplankton prey: neonate stage with one pair of barbs on spine (top), transitional stage with two pairs of barbs on spine (middle), and mature female with protruding brood chamber, developing embryos and three pairs of barbs on spine (bottom), Lake of the Woods, LOTW County.

Research and Monitoring



Filter-feeding zebra mussels compete with native zooplankton for their main food source, phytoplankton (mainly algae suspended in the water column)

EWR staff continued to monitor zebra mussel veliger and spiny water flea populations in nine of Minnesota's largest lakes; four with zebra mussels (Cass, Leech, Red, Winnibigoshish), two with spiny water fleas (Kabetogama, Vermilion) and three with both zebra mussels and spiny water fleas (Lake of the Woods, Mille Lacs, Rainy).

A retrospective study by DNR researchers released as a special publication, "A Decade of Change: Crustacean Zooplankton Communities in Nine Minnesota Large Lakes" by Cattoor et al. 2024 (DNR Fisheries Research Unit Special Publication 192), shows that invasive zebra mussels and spiny water flea are having marked ongoing impacts on native zooplankton crustaceans in Minnesota's nine largest walleye lakes, potentially affecting lake fisheries. Lake invasions by zebra mussels, spiny water flea or both were associated with declines in zooplankton populations and alterations of zooplankton assemblages (i.e., species composition). Each lake responded differently depending on AIS type, characteristics of invasion (timing and magnitude) and the zooplankton assemblage. Spiny water fleas consume small-bodied, slow, herbivorous native cladocerans (water fleas), while zebra mussels can outcompete large native daphnia (water fleas) and calanoids (copepods) for their main food source, phytoplankton (algae and cyanobacteria suspended in the water column).

Long-term monitoring of settled zebra mussel populations in Mille Lacs Lake continued in 2024. The 2024 overall density was 424 per square foot. The population peaked at 1,296 per square foot in 2012 but has since fallen and remained around 400 per square foot since 2021.

DNR staff continued to monitor zebra mussel veliger populations in two of the Sentinel Lakes; Lake Carlos, where zebra mussel populations are abundant and were discovered in 2009, and Tenmile Lake, where adult zebra mussels have not been found but small numbers of veligers have been documented from plankton samples in 2019, 2022 and 2023.

Invasive Species Program staff monitor zebra mussel veligers during winter dewatering of Canisteo mine pit in Itasca County.

DNR staff are monitoring the development of innovative sand bed filter technology employed as a component of a permanent mine pit dewatering project. The Canisteo mine pit has a confirmed zebra mussel population, so dewatering the mine pit uses methods to reduce the risk of transporting and spreading zebra mussels. When complete, the filter system will function without the need for pumps or power. The system design can potentially be applied elsewhere to help alleviate high-water conditions in lakes around Minnesota while reducing the risk of further AIS spread.

DNR Invasive species specialists partnered with local governments, private companies, and lake associations to develop and implement strict guidelines for pumping and use of zebra mussel infested waters that minimize the risk of spread. Guidelines include allowing pumping only during periods when immature zebra mussels (veligers) are not present, i.e., when water temperatures are consistently below 48°F, regular monitoring of veligers during periods when pumping occurs, and/or the use of filtration systems that remove veliger-sized particles from the pumped water.

Since 10 invasive signal crayfish were caught by a commercial harvester in October 2023 in Lake Winona, Douglas County, no additional signal crayfish have been captured during collaborative trapping efforts conducted by DNR staff, MAISRC researchers, and a commercial crayfish harvester contracted by Douglas County using its state-funded AIS prevention aid. The search for signal crayfish has included intensive spring trapping in Lake Winona, where the signal crayfish were first captured, and monthly follow-up trapping in Winona and seven connected or nearby lakes. To increase the chances of detecting signal crayfish, MAISRC researchers are also analyzing eDNA samples collected from Winona and other regional lakes.

Defensive display by a non-native, seven-inch-long female signal crayfish, Winona Lake,

DNR invertebrate biologists and invasives species specialists continued to verify AIS reports submitted to the database.

Technical Assistance

DNR biologists continued to provide technical assistance, expertise and input on AIS invertebrate project proposals ranging from zebra mussels to freshwater golden clams and rusty crayfish, as well as the evaluation of new AIS for potential inclusion on the MAISRC priority species list.

DNR staff provided technical assistance and information to Voyageurs National Park staff to develop an enhanced sampling program for zebra mussels in Rainy Lake and other lakes. DNR staff will screen for post-veliger zebra mussel stages in samples collected in Voyageurs National Park lakes.

Invasive Aquatic Animals - Invasive Carp

ACTIVITIES

In 2024, DNR staff worked with partners to manage invasive carp populations and to monitor their movements by:

- Monitoring invasive carp and tracking their movements.
- Removing invasive carp from the Mississippi River using intensive netting.
- Updating the Minnesota Invasive Carp Action Plan.
- Convening an interagency project team to advance scoping for the Lock and Dam 5 Deterrent Project.

New Detections of Adult, Juvenile and Larval Invasive Carp

Multiple methods to monitor invasive carp are used in Minnesota:

- The DNR and other agencies may detect invasive carp during traditional fisheries monitoring programs.
- The DNR tags, releases and tracks limited numbers of invasive carp to better understand patterns of movement and find additional invasive carp. We work in partnership with the USFWS, Wisconsin Department of Natural Resources and the University of Minnesota to gather as much tracking data as possible.
- The DNR and other agencies conduct sampling targeted at all life stages of invasive carp.
- The DNR contracts with commercial fishing businesses and monitors the commercial catch from other businesses.
- The DNR follows up on all reports of suspected sightings and captures of invasive carp.
- USFWS and other agencies share the results of eDNA surveys with the DNR.
- The DNR coordinates with researchers on modeling to determine key locations and actions for invasive carp monitoring and management.

DNR staff demonstrate their new electrofishing boat at an outreach event. This new boat will be used for invasive carp population surveys and to herd invasive carp toward nets for capture.

INVASIVE CARP CAPTURES IN 2024

Location	Species	Date of Capture	Number	Method of Capture	Notes
Mississippi River Pool 5A	Silver Carp	2/13/2024	81	Contracted Commercial Seine	Removed
Mississippi River Pool 5A	Bighead Carp	2/13/2024	1	Contracted Commercial Seine	Removed
Mississippi River Pool 5A	Silver Carp	2/14/2024	1	Contracted Commercial Seine	Removed
Mississippi River Pool 8	Silver Carp	3/13/2024	2	Multi-Agency Capture Event	Tagged and released
Root River, MSR Pool 8	Grass Carp	4/30/2024	5	Contracted Commercial Gillnet	Removed
Mississippi River Pool 8	Silver Carp	5/6/2024	3	Contracted Commercial Gillnet	Tagged and released
Root River, MSR Pool 8	Grass Carp	5/7/2024	3	Contracted Commercial Gillnet	Tagged and released
Mississippi River Pool 8	Silver Carp	5/8/2024	1	Contracted Commercial Gillnet	Tagged and released
Root River, MSR Pool 8	Silver Carp	5/23/2024	2	Contracted Commercial Gillnet	Tagged and released
Mississippi River Pool 5A	Silver Carp	6/3/2024	1	Contracted Commercial Gillnet	Tagged and released
Mississippi River Pool 8	Grass Carp	7/25/2024	1	Contracted Commercial Gillnet	Removed
Mississippi River Pool 2	Silver Carp	7/30/2024	2	Contracted Commercial Gillnet	Tagged and released
Mississippi River Pool 2	Silver Carp	7/30/2024	4	Contracted Commercial Gillnet	Removed
Mississippi River Pool 8	Silver Carp	11/7/2024	2	Contracted Commercial Seine	Tagged and released
Mississippi River Pool 2	Silver Carp	11/25/2024	1	Contracted Commercial Seine	Removed

The invasive carp monitoring crew received 24 encounter reports from the public in 2024. All reports were investigated, and all reports were determined to be species other than invasive carp, based on follow-up conversations and photos.

In 2024, 110 invasive carp were captured in Minnesota and border waters. Sixteen of those fish were tagged and released to gather data on invasive carp movements. Tagged fish have directly led to the removal of over 400 invasive carp from Minnesota waters since 2017. Of the 110 captured, 108 were captured by commercial fishers and two during a multi-agency operation to test methods for capture.

Flooding in spring 2023 and in June 2024 caused dams on the Mississippi River to open, allowing fish including invasive carp to move upstream. Data from invasive carp tagged downstream of Minnesota by the USFWS indicate that tagged invasive carp moved upstream to Minnesota during these flood events. In 2024, the USFWS, USGS and the DNR combined tagging data to publish a scientific journal article that shows the strong link between open dams during flooding and upstream movement of invasive carp: https://www.nature.com/articles/s41598-024-70076-4. Many of the tagged fish that moved upstream in 2023 have since moved downstream and out of Minnesota waters, but the remaining tagged fish are being used to target invasive carp for capture.

Invasive Carp Tracking

Tagging invasive carp allows the DNR to better understand the movements of individual fish and leads researchers and managers to other invasive carp.

Tagged fish are actively tracked when river conditions allow. Two additional invasive carp field staff were added at the DNR Lake City Fisheries Office in 2024 to expand our ability to track fish and deploy contracted commercial fishing.

A total of 16 invasive carp were tagged in Minnesota waters in 2024. Eight silver carp and three grass carp were tagged in Mississippi River Pool 8. Five of these (including the three grass carp) were tagged in May at the mouth of the Root River, which empties into Pool 8 south of La Crescent. Little is known about the seasonal use of tributaries by invasive carp in the Upper Mississippi River. Locations such as the Root, Zumbro, Wisconsin and Chippewa Rivers are of interest for further investigation into the role they play and their potential as capture sites. Two additional silver carp were tagged in Pool 8 in November 2024. One silver carp was tagged in Pool 5A in 2024. Two silver carp, captured by following other tagged invasive carp that moved upstream during June 2024 flooding, were tagged in Pool 2. Four additional invasive carp were removed from Pool 2 during that sampling event.

The first invasive carp tagged by DNR, a bighead carp from the St. Croix River tagged in 2017, was observed moving from the St. Croix into Pool 2 of the Mississippi River this year. The battery in the tag from that fish expired this year, after providing years of data that led to several invasive carp captures.

A silver carp tagged by DNR in 2023 in the St. Croix River spent 2024 moving between Pool 4 and the St. Croix. DNR tagged its first two invasive carp in Pool 2 this year. They remained in Pool 2 and provided data that suggest Pig's Eye Lake may be a location to target for fishing in the summer months.

A silver carp captured in May 2024 is tagged to allow the DNR to track its movements.

The DNR coordinates with partners including the Wisconsin DNR, the University of Minnesota and the USFWS to share data about detections of tagged fish. Many have since moved downstream out of the state, but the remaining fish are being used to inform detection and removal efforts. The DNR is working with the Wisconsin DNR and the USFWS to maintain and expand the receiver network that detects tagged fish in the Upper Mississippi River Basin to provide more detailed location data.

The USFWS also collaborates extensively with the DNR to assist with implanting tags into captured invasive carp, and has provided tags, staff time and funding in support of the Minnesota invasive carp program. The DNR has received funding to maintain its dedicated tracking crew in 2025.

DNR Invasive Carp Field Lead Kayla Zankle and contracted commercial fishers pull in a large seine net in attempt to capture invasive carp.

Developing Invasive Carp Capture Techniques

The DNR has partnered with the USGS to develop and test methods for invasive carp capture. The low-density population of invasive carp and large complex river systems in Minnesota present unique challenges to capturing invasive carp. This project began in spring 2021, when the Modified-Unified Method (MUM) was first deployed in Pool 8 of the Mississippi River. The project has since evolved to include other sites and techniques specifically designed for use with a low-density invasive carp population. As a general approach, agency staff block off areas of the river with large nets while using sound and electricity to herd fish into nets for capture. The goal of this project is to develop methods that can be quickly deployed and integrated into the DNR's regular sampling to maximize capture of invasive carp.

Other partners integral to this project include the USFWS, Wisconsin DNR, NPS, and Wild Rivers Conservancy. These valuable partnerships expand the DNR's capability to respond to the presence of invasive carp by providing staff and equipment support as well as additional information and expertise.

The DNR and USGS co-led an operation to test new technologies for invasive carp capture on March 4-13, 2024. Multiple sites were sampled in Mississippi River Pools 5-8. Three new technologies developed by USGS were successfully deployed:

- Floating gill nets that entangle jumping carp.
- Speakers attached to a buoy to help direct invasive carp movement.
- Remotely operated kayaks that can be used for surveys, herding fish and likely more uses.

The new technologies were successfully deployed and retrieved, but it proved challenging to prompt the carp to jump. Two silver carp were captured, tagged and released during the operation. One was captured in a floating gill net and one in a block net (a wall of netting used to block off an area). These fish were captured using an alternative approach to herding, applying more stimulus than was used at other sampling sites. Staff from the DNR, USGS, the USFWS and the Wisconsin DNR worked together to herd, capture and tag the two invasive carp. This project is being paused to re-evaluate the experimental goals and study design.

The DNR and USGS plan to continue testing other methods for invasive carp capture. For example, in 2025, the DNR and USGS will try to determine if using algae baits results in invasive carp congregation; if it does, those baits could aid in fish capture. Lessons learned from testing are being applied to the DNR's standard sampling. Data on movement patterns from tagging and tracking, eDNA detections and standard sampling will be important to enhancing our ability to capture invasive carp. The DNR will continue to use the best available science and information to guide targeted detection and capture efforts.

Minnesota Invasive Carp Action Plan

In 2023, the DNR contracted with USGS to lead a participatory process using structured decision-making (SDM) to evaluate options for invasive carp prevention and management in the Mississippi River. The SDM process brought together stakeholders and invasive carp experts in a transparent, inclusive and comprehensive process to evaluate options to address invasive carp. A combination of virtual workshops, in-person meetings and individual exercises were used to gather information from participants. The process produced valuable information on stakeholders' values and goals for invasive carp management in

Minnesota. Suites of management actions were evaluated, considering those goals, to provide recommendations to DNR.

The information from the participatory process was used to update the statewide Minnesota Invasive Carp Action Plan. The update was published in January 2024. This plan focuses on the actions the DNR and other organizations can take to slow the spread of invasive carp, minimize their impact and reduce the chance of invasive carp reproducing in Minnesota waters. This ten-year plan remains a working document that addresses immediate needs and supports longer term solutions, and the DNR will continue to update the plan as needed to reflect new technologies, scientific advancements and changes to the status of invasive carp in the state.

A combination of management actions will be needed to slow invasive carp migration into Minnesota and minimize the impact of the invasive carp that are present in Minnesota. Removal of invasive carp is identified as a key management strategy in this plan. A variety of deterrents have been developed since the 2014 update of this plan, but the efficacy of any given deterrent will vary by location, conditions and deterrent type. In addition to potential deterrents and other actions to prevent spread through connected river systems, this plan includes actions related to outreach and communication and coordination, which can also help address other pathways for introduction of invasive carp, such as in contaminated live baitfish. This plan also includes actions related to monitoring to support effective responses to invasive carp in Minnesota and identifies research opportunities for the development of more effective management and control tools.

The updated action plan is available online at www.mndnr.gov/invasivecarp.

Prevention and Management

Following the recommendation of the Lessard-Sams Outdoor Heritage Council, the Minnesota Legislature appropriated $12 million to the DNR from FY 2025-FY 2029 to fund activities to protect the upper Mississippi River from invasive carp. The award is to design, construct and begin the operation and maintenance of a structural deterrent for invasive carp at Lock and Dam No. 5 on the Mississippi River through an adaptive management approach (Minnesota Laws, 2024 Regular Session, Ch. 106, Art. 1, Sec. 2, Subd. 5(aa)).

Lock and Dam 5 presents both challenges and opportunities, because invasive carp pass through when the dam gates open, but the gates open less frequently than at most other dams in Minnesota. Accordingly, the DNR and project partners are pursuing a comprehensive approach to address the upstream passage of invasive carp across the entirety of Lock and Dam 5. The first step is to implement a lock deterrent with a trap and sort system to remove invasive carp that are deflected by the deterrent.

Longer term, the DNR and project partners are interested in deterrents for the dam gates for use when the dam gates are open; such deterrents will need to be developed. Downstream removal will continue to be essential, to reduce abundance and reduce the risk of reproduction occurring below the deterrent system.

The DNR is partnering on the Lock and Dam 5 Deterrent Project with agencies with relevant expertise and jurisdiction including the USFWS, U.S. Army Corps of Engineers, USGS and Wisconsin DNR. The team began scoping the project in July 2024. The legislative appropriation language requires an engineering design for the lock deterrent to be completed no later than June 2026, with installation no later than June 2029.

The Minnesota legislature awarded the DNR $1.72 million in FY 2024 and FY 2025 for invasive carp prevention and management. These funds are being used for: (1) a feasibility study of options for selective native fish passage at Minnesota locks and dams, (2) a study to optimize flow through dam gates to prevent invasive carp movement when gates are not fully out of the water, (3) adding staff to the invasive carp crew, (4) a hands-on training trip to an area with more invasive carp for staff to learn about capture methods in use in those high-density invasive carp populations, (5) additional tagging and contracted commercial fishing for invasive carp removal, and (6) purchasing needed equipment.

Through USFWS invasive carp grants and DNR Fisheries program funds, the DNR was able to purchase a dedicated electrofishing boat in 2024. This boat will be useful to conduct standardized monitoring as part of national efforts to monitor for changes in invasive carp abundance. It will also be used to stun and herd invasive carp toward nets for capture.

Research

Invasive carp continues to be a priority for MAISRC. Please visit the MAISRC website for past, current and future projects: www.maisrc.umn.edu.

Environmental DNA

The USFWS leads environmental DNA (eDNA) sampling for invasive carp. The DNR uses eDNA data as a monitoring tool that may indicate changes in the relative abundance of invasive carp. Most recent and past results can be viewed at https://fws.maps.arcgis.com/apps/dashboards/52b22abe9c4d4575adfe851a946f444d.

In the Mississippi River, in 2024, eDNA sampling occurred in Pool 8 as part of a study to evaluate sampling methods. Results from that study are not yet available. Invasive carp are regularly captured in Pool 8, and the monitoring data from eDNA helps the DNR track relative changes in invasive carp abundance in this pool over time.

In the Minnesota river, eDNA sampling occurred below Granite Falls Dam in May 2024. No invasive carp eDNA was detected in any of the 88 samples taken. Invasive carp have been captured and removed below Granite Falls Dam; this location is monitored because it is the furthest extent that invasive carp can travel upstream in the Minnesota River.

Two sites in the St. Croix River were sampled for eDNA in May 2024. Of the 114 eDNA samples taken at the Boom Site just upstream of Stillwater, one tested positive for silver carp DNA. This location had four positive eDNA detections out of 110 samples in 2022, and no detections in 2023. The DNR regularly samples for invasive carp in the St. Croix River and has removed both bighead and silver carp from the river. Invasive carp DNA was not detected in any of the 88 samples taken further upstream, just below Taylor's Falls, the furthest extent that invasive carp can travel in the St. Croix River.

Silver Carp reproduction

The DNR worked with USGS in 2024 to model silver carp reproduction in Pools 1-9 of the Mississippi River. USGS results from the FluEgg model, which simulates reproduction below each lock and dam in the system and uses a hydrologic model to simulate transport of eggs and larvae downstream, are pending. This information will help the DNR target egg and larval monitoring efforts and inform management to prevent reproduction from occurring.

DNR Invasive Carp Specialist Brian Glasow holds a bighead carp removed during contracted commercial fishing operations in Pool 6 of the Mississippi River. Data from tagged fish led the DNR to target this location.

Terrestrial Invasive Species Program

ACTIVITIES

In 2024, DNR staff worked to manage and prevent the spread of terrestrial (land-based) invasive species by:

- Completing the rulemaking process and listing jumping worms as prohibited invasive species effective July 1, 2024, and by providing additional outreach and resources on jumping worms.
- Enhancing the ability of DNR staff to effectively manage terrestrial invasive species on DNR-managed lands.
- Engaging partners in invasive species prevention, management, inventory, outreach, communication and research.

Prevention

- Jumping worms (*Amynthas agrestis* and related species) are an emerging invasive earthworm threat in Minnesota that damage plants and soils. They are called "jumping worms" because of their unusual behavior: when disturbed, they move like a snake and sometimes appear to jump. The Invasive Species Program continued to work with partners to examine how regulations, research and outreach can prevent jumping worm spread in Minnesota. Visit https://www.dnr.state.mn.us/invasives/terrestrialanimals/jumping-worm/index.html.
- The Invasive Species Program worked to provide information and resources so that people could better understand the regulation and prevent the spread of jumping worms. The program created a new webpage with jumping worm information for businesses answering frequently asked questions and providing guidance documents on disposal, working with homeowners, and working with vendors. The program also coordinated with the Minnesota Department of Agriculture nursery inspectors, the Minnesota Pollution Control Agency, the DNR's Enforcement Division and University of Minnesota researchers to provide additional jumping worm training and guidance on the new regulation.
- The program led the Invasive Species Operational Order 113 Committee, an interdisciplinary team that works to engage DNR divisions in prevention and management efforts. The committee wrote articles for the DNR Spotlight newsletter, provided field season reminders, and shared prevention resources and trainings.

Jumping worms were regulated as prohibited invasive species effective July 1, 2024.

Research

The Invasive Species Program collaborated with University of Minnesota researchers leading research projects that focus on detecting jumping worms, documenting their impacts, understanding their survival and pathways of spread, and studying potential management methods. Research funding for this project was supported by the Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC), through an appropriation from the Environment and Natural Resources Trust Fund.

The Minnesota Invasive Terrestrial Plants and Pests Center (MITPPC) at the University of Minnesota focuses on science-based solutions to protect Minnesota's prairies, forests, wetlands and agricultural resources. Funding for this work is provided by the Environment and Natural Resources Fund. In total, 13 projects active in 2024 involved coordination and collaboration between MITPPC researchers and DNR staff. Visit mitppc.umn.edu to view current research projects.

Management and Inventory

The Invasive Species Program initiated a funding program in 2006 for the management and inventory of terrestrial invasive plant species on state-managed lands. DNR divisions and regions spent $109,310 in fiscal year 2024 for high priority activities. Priorities include treatment of early detection of invasive plants and management in high quality habitats. The funds were also used to purchase equipment for managing invasive plants such as herbicide sprayers, saws and loppers.

The following species were inventoried and/or managed in fiscal year 2024 projects: Amur silvergrass, black locust, bull thistle, burnet saxifrage, Canada thistle, common buckthorn, common tansy, crown vetch, Japanese barberry, garlic mustard, Japanese knotweed, leafy spurge, non-native bush honeysuckles, non-native *Phragmites*, pale swallow-wort, round leaf bittersweet, Siberian elm, spotted knapweed and wild parsnip.

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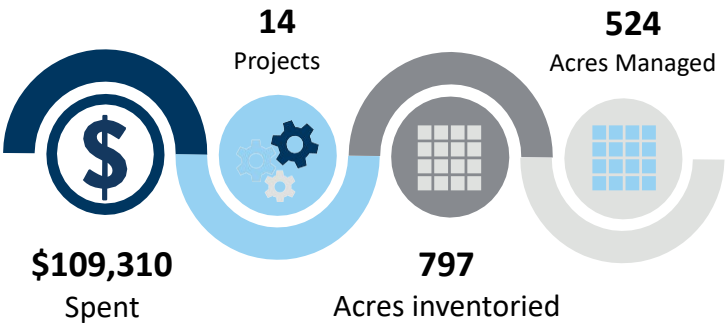


FUNDING HISTORY AND RESULTS

Fiscal Year	Dollars Spent	Acres (Inventoried and Managed)	Number of Projects
2015	$270,674	12,994	26
2016	$192,339	5,501	23
2017	$219,834	5,755	21
2018	$173,824	6,592	24
2019	$245,727	6,186	21
2020	$165,735	2,331	24
2021	$159,857	3,728	28
2022	$105,451	1,875	14
2023	$184,101	4,046	26
2024	$109,310	1,321	14

Outreach and Communication

The 2024 Minnesota State Fair terrestrial invasive species display showcased temporary tattoos, signage and display materials. Visitors learned about using boot brushes to prevent the spread of invasive plants, how to prevent the spread of invasive insects by not moving firewood and how to avoid introducing jumping worms to their yards. The interactive game “Muck Hunt” was improved for smoother game play. In this game, visitors use tools to virtually clean invasive species off equipment. They remove mud, weed seeds and earthworm egg cases from an ATV and hiking boots. The game emphasized the message “PlayCleanGo”.

The program continued to promote the reporting of invasive species locations. Reporters include state agency staff, interested residents, county agricultural inspectors and cooperative weed management area partners. DNR staff assisted in sharing information about reporting, making reports and verifying reports before they are made public.

DNR terrestrial invasive species webpages are an important resource for the public. Key webpages include the terrestrial invasive plants homepage, buckthorn webpages, additional invasive plant webpages and the jumping worm webpage.

DNR staff regularly responded to reports of jumping worms by coordinating identification, reporting and follow up actions. DNR staff communicated with other state agencies, industry, master gardeners and researchers about jumping worm best management practices and continued to update information available about jumping worms.

The DNR uses messages in collaboration with the national PlayCleanGo program. PlayCleanGo is built around partnering and using consistent messaging to prevent the introduction and spread of invasive species. Visit playcleango.org.

Ecological and Water Resources Division Districts by County

Northwest Region
North District: Beltrami, Cass, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau and Wadena counties

South District: Becker, Clay, Douglas, Grant, Mahnomen, Norman, Otter Tail, Pope, Stevens, Traverse and Wilkin counties

Northeast Region
East District: Carlton, Cook, Lake and St. Louis counties

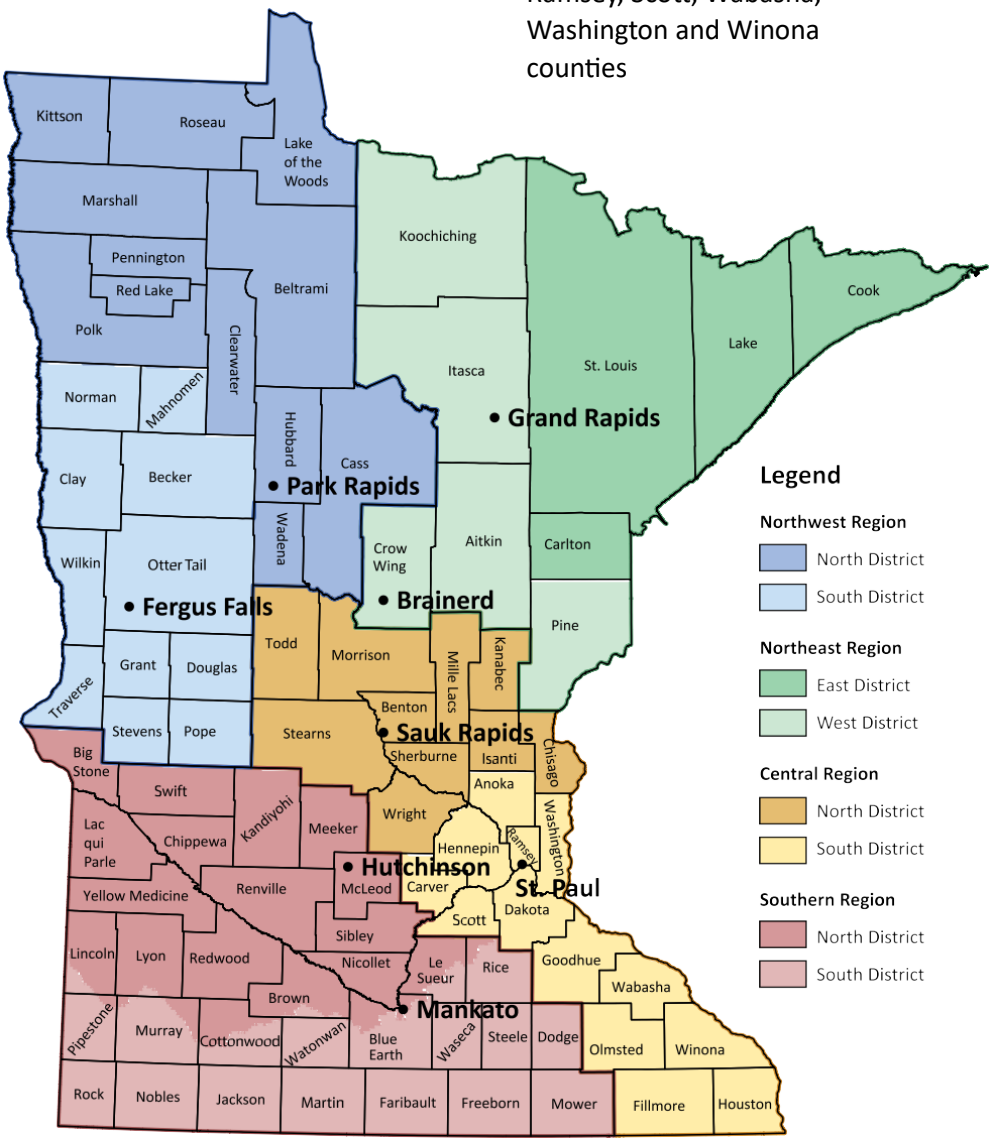
West District: Aitkin, Crow Wing, Itasca, Koochiching and Pine counties

Central Region
North District: Benton, Chisago, Isanti, Kanabec, Mille lacs, Morrison, Sherburne, Stearns Todd and Wright counties

South District: Anoka, Carver, Dakota, Fillmore, Goodhue, Hennepin, Houston, Olmsted, Ramsey, Scott, Wabasha, Washington and Winona counties

Southern Region
North District: Big Stone, Brown, Chippewa, Cottonwood—north of the Minnesota River, Kandiyohi, Lac qui Parle, LeSueur—north of the Minnesota River, Lincoln, Lyon, McLeod, Meeker, Nicollet, Redwood, Renville, Sibley, Swift and Yellow Medicine counties

South District: Blue Earth, Cottonwood—south of the Minnesota River, Dodge, Faribault, Freeborn, Jackson, LeSueur—south of the Minnesota River, Martin, Mower, Murray, Nobles, Pipestone, Rice, Rock, Steele, Waseca and Watonwan counties



Appendix A. INVASIVE SPECIES PROGRAM STAFF

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Appendix B. WATER BODIES LISTED AS INFESTED IN 2024

This table includes all water bodies added to the infested waters list in 2024. Explanations of the last two columns are below:

Year species was first confirmed, or connected water body: Either 1) the year in which the DNR first confirmed a population of the aquatic invasive species in the water body, or 2) "connected" to indicate that we listed the water body because it is connected to a water body where the aquatic invasive species has been confirmed; this column may also contain the name and/or Lake ID number of the connected, confirmed water body.

Lake ID number: an identifying number the DNR uses for lakes. Ponds and wetlands that are not on the public waters inventory are listed with "none" in the number column. Most rivers and streams on the public waters inventory are listed without a number or "NA" in the number column; some river pools are identified with a Lake ID number.

Water body name	County or counties	Listed for aquatic invasive species	Year listed as infested	Year species was first confirmed, or connected water body	Lake ID number
Ann	Sherburne	zebra mussel	2024	2024	71-0069
Bass	Wright	zebra mussel	2024	2024	86-0234
Big Carnelian	Washington	zebra mussel	2024	2024	82-0049
Big Swan	Meeker	zebra mussel	2024	2024	47-0038
Buffalo	Becker	zebra mussel	2024	2024	03-0350
Byllesby	Dakota	zebra mussel	2024	2024	19-0006
Cannon River from Lake Byllesby to the confluence with the Mississippi River	Multiple (Dakota, Goodhue)	zebra mussel	2024	connected to Byllesby (19-0006)	NA
Cedar	Morrison	zebra mussel	2024	2024	49-0140
Charlotte	Todd	zebra mussel	2024	2024	77-0120
Clear	Washington	zebra mussel	2024	2024	82-0163
Cornelia (North)	Hennepin	Eurasian watermilfoil	2024	2024	27-0028-01
Eagle	Sherburne	zebra mussel	2024	2024	71-0067
East Twin	Lyon	zebra mussel	2024	2024	42-0070
First Silver	Otter Tail	zebra mussel	2024	2024	56-0302

Water body name	County or counties	Listed for aquatic invasive species	Year listed as infested	Year species was first confirmed, or connected water body	Lake ID number
Foot	Kandiyohi	zebra mussel	2024	connected to Willmar (34-0180)	34-0181
Freeborn	Douglas	zebra mussel	2024	2024	21-0162
Grove	Pope	zebra mussel	2024	2024	61-0023
Hanging Horn	Carlton	Eurasian watermilfoil	2024	2024	09-0038
Heilberger	Otter Tail	zebra mussel	2024	2024	56-0695
Knaus	Stearns	Eurasian watermilfoil	2024	2024	73-0086
Lee	Clay	zebra mussel	2024	2024	14-0049
Leek (Trowbridge)	Otter Tail	flowering rush	2024	2024	56-0532
Leon	Otter Tail	zebra mussel	2024	2024	56-0480
Marion	Otter Tail	zebra mussel	2024	2024	56-0243
Middle Cullen	Crow Wing	starry stonewort	2024	2024	18-0377
Middle Fork Crow River downstream of Green Lake (34-0079)	Kandiyohi, Meeker	zebra mussel	2024	connected to Green (34-0079)	NA
Mooney	Hennepin	Eurasian watermilfoil	2024	2024	27-0134
North Fork Crow River downstream of Lake Koronis	Stearns, Wright	zebra mussel	2024	connected to Koronis (73-0200)	NA
North Long	Crow Wing	Eurasian watermilfoil	2024	2024	18-0372
Pokegama	Itasca	starry stonewort	2024	2024	31-0532
Potato	Hubbard	zebra mussel	2024	2024	29-0243
Quarry Hill	Olmsted	Eurasian watermilfoil	2024	2024	55-0023
Rice	Hennepin	zebra mussel	2024	2024	27-0116
Ringo	Kandiyohi	zebra mussel	2024	2024	34-0172
Rush	Crow Wing	starry stonewort	2024	2024	18-0311
Swan	Kandiyohi	zebra mussel	2024	connected to Willmar (34-0180)	34-0186

Water body name	County or counties	Listed for aquatic invasive species	Year listed as infested	Year species was first confirmed, or connected water body	Lake ID number
Toad	Becker	zebra mussel	2024	2024	03-0107
Turtle River Lake	Beltrami	zebra mussel	2024	2024	04-0111
Union	Polk	zebra mussel	2024	2024	60-0217
West Leaf	Otter Tail	zebra mussel	2024	2024	56-0114
White Sand	Crow Wing	zebra mussel	2024	2024	18-0379