

Photo on cover:

Kylie Cattoor, Natural Resource Specialist, conducts an aquatic vegetation survey using a throw rake in Coon Lake.



ECOLOGICAL AND WATER RESOURCES

500 Lafayette Road, St. Paul, MN 55155-4025
651-259-5100

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

DNR Information Center

Twin Cities: 651-296-6157

Minnesota Toll Free: 1-888-646-6367

Telecommunication device for the deaf (TDD): 651-296-5484

TDD Toll Free: 1-800-657-3929

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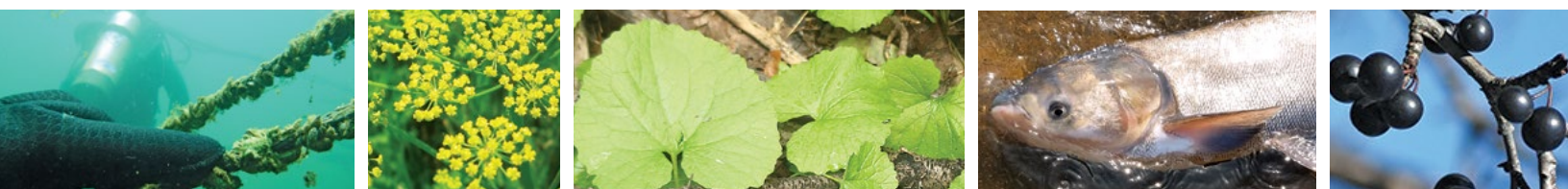
Note from the Program

The Minnesota Department of Natural Resources (DNR) is pleased to submit the 2018 Invasive Species Annual Report to the governor, legislature and people of Minnesota. This report summarizes our efforts to prevent the introduction and spread of invasive species of aquatic plants and animals in Minnesota.

The report provides an overview of program activities, finances, prevention and management efforts, goals, highlights, partnerships, and future needs and plans for individual program areas.

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A Letter from the Invasive Species Program

Welcome to the 2018 Invasive Species Program annual report. The report highlights the accomplishments of the Invasive Species Program and keeps you up to date with the new issues facing the program as we work to reduce impacts of invasive species on Minnesota's outdoor traditions.

Great work was accomplished in 2018, with the help of our partners. Some highlights include:

- In 2018, Invasive Species Program staff issued 388 permits to control invasive aquatic plants, completed 66,833 watercraft inspections and trained 968 local government watercraft inspectors who accomplished an additional 403,167 watercraft inspections. Invasive Species Prevention Planners provided technical support to counties who received AIS prevention aid, while building a community of practice to enable county partners to work together and leverage funds. Staff worked with the public at lake association meetings, the Minnesota State Fair, conferences, and outdoors shows and financially supported the inventory and management of terrestrial invasive species on 6,592 acres of state and adjacent land. Conservation offices completed 11,253 hours of invasive species education and enforcement.
- The DNR's Invasive Species Program secured federal funding to exchange information and collaborate on genetic technologies for biocontrol of invasive species with partners including the University of Minnesota, U.S. Fish and Wildlife Service, and U.S. Geological Survey.
- The DNR worked with Northeast Minnesota partners to share information on a Bloody Red Shrimp (*Hemimysis anomala*) discovery in the Duluth-Superior harbor, and to build capacity and partnerships for future surveillance and detection work in western Lake Superior.
- The Invasive Species Program is working with a contractor to apply Community-Based Social Marketing methodologies to improve our messaging and communication to motivate people to prevent the spread of invasive species.
- The Invasive Species Program completed the first year of a two-year pilot study that evaluates the feasibility of allowing lake service provider businesses to remove water-related equipment with zebra mussels attached from one of three designated lakes. The businesses would be able to reinstall the equipment in the same lake without removing the zebra mussels after the equipment has been seasonally stored, serviced or repaired. Results and final report will be available in 2020.

Thank you for partnering with the Invasive Species Program this year. We look forward to working with you in 2019 as we search for new technologies, create new partnerships, and strengthen current partnerships to protect Minnesota from invasive species.

Heidi Wolf, Invasive Species Program Supervisor
Minnesota Department of Natural Resources

Program Overview

Invasive species have serious economic, environmental and recreational impacts in Minnesota. In 1991, the Minnesota Legislature directed the Minnesota Department of Natural Resources (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 84D).

In 2018, the Invasive Species Program included 22 full-time positions, plus affiliated staff in DNR offices across Minnesota whose work is primarily or partly focused on invasive species. In the summer, the DNR hired 78 watercraft inspection staff.

Program staff work with many partners, including:

- Local government units.
- States, provinces, multi-jurisdictional and national groups.
- Researchers, including the Minnesota Aquatic Invasive Species Research Center and the Minnesota Invasive Terrestrial Plants and Pests Center at the University of Minnesota.
- DNR Aquatic Invasive Species Advisory Committee.

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

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

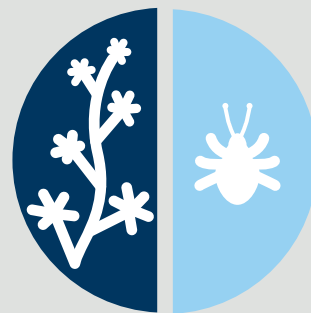
Examples of key invasive species not known to be in Minnesota include:

- Hydrilla, an invasive aquatic plant.
- Water chestnut, an invasive aquatic plant.
- Northern snakehead, an invasive fish.

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

The DNR's prevention and management activities depend on collaboration with other states, local governments including counties, cities and townships, agencies, and other partners with similar concerns. Coordinated prevention efforts reduce the spread of invasive species and buy critical time needed for research and management that may provide long-term control solutions.

The program also addresses terrestrial invasive species on DNR-managed lands and provides information for private landowners. The program works to enhance the ability of DNR field staff to prevent and manage terrestrial invasive species effectively.



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. Creating and maintaining effective invasive species regulations across the state and working with enforcement to ensure compliance.
2. Deepening partnerships with local governments, research institutions, interest groups, lake associations, related businesses and others.
3. Coordinating watercraft inspection and decontamination with counties, tribal entities, lake associations, resort owners and DNR Enforcement.
4. Verifying and responding to all new reports of possible invasive species as soon as possible.
5. Coordinating invasive species management efforts and inventories, and sharing knowledge of aquatic and terrestrial invasive species.

HIGHLIGHTS

- The DNR again partnered with the Minnesota Aquatic Invasive Species Research Center (MAISRC), University of Minnesota Extension, and many counties and local partners, in a statewide search for new populations of starry stonewort. The event, called Starry Trek, involved more than 225 trained volunteers searching 187 Minnesota lakes. One new population of starry stonewort was discovered as a result of Starry Trek: Wolf Lake in Beltrami County.
- The Invasive Species Program completed year two of a Starry Stonewort hand removal project on Grand Lake in Stearns County. So far, these efforts have been successful at preventing starry stonewort from spreading to other areas of the lake. No starry stonewort has been located beyond the known infested/removal area.
- In addition to DNR watercraft inspectors, the DNR provided watercraft inspection training to a record 968 tribal and local government authorized inspectors. This was an increase from 949 trained inspectors in 2017.
- DNR staff supported research at MAISRC by assisting with a project to refine zebra mussel search methods, collecting zebra mussels for a genomics study, providing curly leaf pondweed data to researchers and providing funding for research on starry stonewort impacts to Minnesota ecosystems.
- The DNR submitted a report to the legislature on the potential risks of importing golden shiner minnows into Minnesota.
- The DNR worked with Northeast Minnesota partners to share information on a Bloody Red Shrimp (*Hemimysis anomala*) discovery in the Duluth-Superior harbor, and to build capacity and partnerships for future surveillance and detection work in western Lake Superior.
- The DNR, in partnership with MAISRC and the University of Minnesota Extension, hosted a one-day aquatic plant identification workshop. The workshop was designed for consultants who conduct aquatic plant surveys for hire, many of whom conduct pre- and post-treatment surveys to help assess the effectiveness of invasive aquatic plant management efforts.
- The program worked with partners to develop the DNR's jumping worm web page and complete a species assessment to inform decision-making. Jumping worms (*Amyntas agrestis* and related species) are a new type of invasive earthworm reported in Minnesota. They can be highly damaging to plants and soils. We have a chance to prevent their spread in Minnesota.
- Invasive Species Prevention Planners continued to build a network of support with local aquatic invasive species (AIS) program managers overseeing the use of their counties' AIS prevention aid funds. The planners hosted eight workshops where over 160 participants shared ideas, built relationships, and developed new AIS prevention skills.
- The Invasive Species Program is working with a contractor to apply Community-Based Social Marketing methodologies to improve our messaging and communication to motivate people to prevent the spread of invasive species.
- DNR staff were heavily involved in the Upper Midwest Invasive Species Conference in Rochester, Minnesota. Staff participated in and co-chaired program committees to develop content, recruit presenters and organize sessions for the four-day conference. Staff gave twelve presentations, moderated sessions, led a field trip, assisted with a workshop and staffed an exhibitor booth. This event drew over 700 attendees; it is an important venue for sharing Minnesota's innovative invasive species work.
- DNR's Enforcement Division held nine invasive species check stations around the state. These stations provide an opportunity for conservation officers to talk to people trailering watercraft. Most people (85%) who stopped at the check stations were in compliance with AIS prevention regulations.

Program Finances

TIME FRAME

The other chapters in this report cover activities that took place in calendar year 2018. 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 2018: July 1, 2017 to June 30, 2018.

FUNDING SOURCES

The Invasive Species Program was mostly supported by state funds in fiscal year 2018, with additional funding from the U.S. Fish and Wildlife Service.

State Funds

- \$4,924,000 from a general fund appropriation. Of this amount, \$276,000 supported the terrestrial invasive species program.
- \$3,242,000 from the invasive species account, including the following funding:
 - \$1,335,188 from a \$5 surcharge on watercraft registration (valid for three years) in Minnesota.
 - \$1,117,503 from a \$5 fee on non-resident fishing licenses.

Federal Funds

Funds from the U.S. Fish and Wildlife Service, including those from the Great Lakes Restoration Initiative, support the implementation of the Minnesota State Management Plan for Invasive Species. Federal funds helped support public awareness efforts, enforcement, and watercraft inspections. In fiscal year 2018, expenditures from federal sources totaled \$981,400.

Invasive Species Account Deficits

The Minnesota Legislature created the Invasive Species Account in the state treasury to prevent the introduction of new invasive species to Minnesota, prevent the spread of invasive species within Minnesota and to reduce the impacts of invasive species on Minnesota's environment, society and economy. The funds currently come from a \$5 surcharge on each 3-year watercraft registration, a \$5 fee on each non-resident fishing license and a \$750,000 transfer from the water recreation account. In 1990, the Minnesota Legislature authorized a \$2 surcharge on three-year watercraft registrations to support invasive species management. The Legislature increased the surcharge to \$5 (or \$1.67/year) in 1993, and the surcharge has not increased for 25 years.



Because the surcharge on watercraft registrations has not increased in 25 years, the Invasive Species Account can no longer support as many activities of the Invasive Species Program. Some of the activities affected by this budget shortfall include DNR watercraft inspectors and invasive species control grants. The program has provided grants for the control of Eurasian watermilfoil and/or curly-leaf pondweed since 2006, but was unable to offer these grants in 2018. Using federal funds, the DNR was able to fund four grants to support the monitoring of starry stonewort control projects. The DNR's watercraft inspection program was cut significantly, with the goal to hire 146 watercraft inspectors reduced to a goal of hiring 92 watercraft inspectors for the 2018 season.

FISCAL YEAR 2018 EXPENDITURES

Expenditures on AIS activities during fiscal year 2018 (July 1, 2017 - June 30, 2018) totaled \$9,085,300.

The pie chart on the following page provides a broad look at how aquatic invasive species (AIS) funding was spent in fiscal year 2018. The focus on Inspections/Enforcement, along with Education/Public Awareness, and Management/Control reflects the priority the DNR places on efforts to prevent the spread of invasive species and to help manage the problems those species cause.

Funding for Management/Control was spent on Eurasian watermilfoil, starry stonewort, zebra mussels and curly-leaf pondweed inventory and control, as well as grants for starry stonewort management monitoring.

COST ACCOUNTING

Minnesota Statutes 2018, section 84D.02, subdivision 6 identifies five expenditure categories that must be reported annually: Administration, Education/Public Awareness, Management/Control, Inspections/Enforcement, and Research. A sixth category, State and Regional Coordination, covers a variety of program-wide activities that do not fit easily into the five reporting categories required by statute.

ADMINISTRATION includes general office supplies, office rent, telephones, workers' compensation fees, computer support fees, the state accounting system fees, departmental operational support costs, as well as clerical and administrative support costs. Staff leave time (time used for holidays, sick leave, and vacation) has been apportioned across all categories based on the proportion of staff time invested in that category.

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's website.

MANAGEMENT/CONTROL 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 control activities. Funds provided to local government units and organizations to offset the cost of Eurasian watermilfoil 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 efforts to prevent the introduction of additional invasive species into Minnesota.

RESEARCH includes staff time, travel expenses, fleet charges, supplies, and contracts with the University of Minnesota and other research

organizations to conduct research studies. These studies include efforts to develop new or to improve existing control methods, better understand the ecology of invasive species, improve risk assessment tools, and evaluate program success.

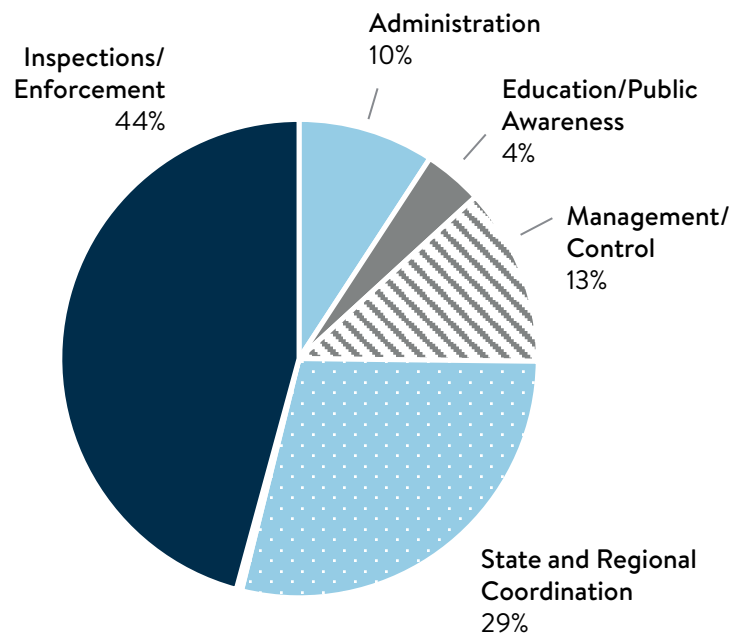
STATE AND REGIONAL COORDINATION includes general program planning, preparation of state plans and reports, and general invasive species coordination with a wide variety of groups. This category also includes the work of program staff as well as various managers in the Ecological and Water Resources Division 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 skills, direct co-workers, or help on other projects; as well as fleet costs and the cost to purchase and repair boats, trailers, computers, and similar items.

INVASIVE SPECIES PROGRAM SPENDING

The table below lists expenditures from the Invasive Species Account and General Fund account, along with spending from other accounts including grants received from various state or federal funding sources, such as the U.S. Fish and Wildlife Service.

The terrestrial invasive species program expended \$276,000 in fiscal year 2018. The work was funded exclusively from the general fund.

The program spent \$3,181,000 from the Invasive Species Account in fiscal year 2018; slightly less than the \$3,242,000 appropriated by the Legislature. This is the first year of the biennium, so unspent funds from year one will roll forward to the second year. General Fund expenditures were \$4,675,000; slightly less than the \$4,924,000 appropriated by the Legislature. Unspent funds from the General Fund will roll forward into the second year of the biennium.



FISCAL YEAR 2018 INCOME

State and Local Funding Invasive Species Account	\$3,242,000
State and Local Funding General Fund	\$4,924,000
State and Local Funding Local Contributions	\$56,000
Federal Funding: Implement State Management for Aquatic Nuisance Species ...	\$2,051,239 in Fiscal Year 2018

FISCAL YEAR 2018 EXPENDITURES

	Invasive Species Account	General Fund	Heritage Enhancement	Local Contributions	Federal/Other	Total Expenditures
Administration	\$323,000	\$468,000			\$46,000	\$837,000
State/Regional Coordination	\$895,000	\$1,328,000	\$251,000		\$133,000	\$2,607,000
Education/Public Awareness	\$47,000	\$261,000			\$53,000	\$361,000
Management/Control: Aquatic	\$54,000	\$651,000		\$56,000	\$210,000	\$971,000
Management/Control: Terrestrial		\$174,000				\$174,000
Inspections/Enforcement	\$1,862,000	\$1,760,000			\$536,000	\$4,158,000
Research: Aquatic		\$33,000			\$4,000	\$37,000
Total Expenditures	\$3,181,000	\$4,675,000	\$251,000	\$56,000	\$982,000	\$9,145,000
Totals include local match for Invasive Aquatic Plant control.						Federal expenditures by category.



Prevention

GOALS

- Prevent the spread of aquatic invasive species (AIS) within Minnesota.
- Prevent the introduction of new invasive species to the state.

HIGHLIGHTS

- Invasive species staff prevented the introduction and spread of new AIS in Minnesota by working with partners locally, statewide, regionally, nationally, and internationally. The DNR's invasive species prevention work includes outreach, enforcement, regulations and permitting, collaboration and coordination.

Prevention Activities

In 2018, invasive species staff:

- Led trainings for local government staff, lake associations and lake consultants on early detection monitoring and aquatic plant identifications. Invasive species staff hosted an Aquatic Plant Identification Workshop for consultants in Minnesota who conduct aquatic plant surveys for hire. The DNR partnered with the University of Minnesota Extension and the Minnesota Aquatic Invasive Species Research Center.
- Surveyed lakes for AIS and reviewed reports from lake users about suspected AIS.
- Searched for zebra mussels and other AIS on water-related equipment on lakes and at public water accesses. Staff occasionally worked with a DNR Enforcement AIS detection dog.
- Built relationships with local program managers utilizing their county's AIS Prevention Aid funds. Invasive species staff provided technical guidance on AIS prevention and management activities.
- Increased public awareness of AIS by sharing expertise with radio, newspaper and television outlets.



Photo on left:

Emelia Hauck-Jacobs, Natural Resource Specialist, takes GPS points to track locations of starry stonewort in Grand Lake.



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 training to permittees on ways to reduce the risk of spreading AIS. Permit conditions require permittees to take actions to prevent the spread of AIS.

The DNR permits related to AIS include:

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

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.

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 a lake service provider must also successfully complete a free online training course and receive a training certificate. Permits and certificates are valid for three calendar years.

The Lake Service Provider Program offered classroom and online permit training, as well as online employee certificate training.



658 LSP owners trained



1,453 LSP employees trained



620 LSPs permitted

In 2018, the DNR completed the first year of a pilot study to evaluate the feasibility of allowing lake service provider businesses to remove water-related equipment from one of three designated lakes (Lake Minnetonka, Gull Lake and Cross Lake) with zebra mussels attached, and to reinstall the equipment to that same lake without removing the zebra mussels after the equipment has been seasonally stored, serviced or repaired. Highlights include:

- Three outreach meetings with area lake service providers to collect input in planning and tagging processes for the pilot study.
- Direct calls, letters and follow-up emails to over 100 eligible lake service provider businesses to explain the pilot study process and recruit participants.
- Four training sessions for participating lake service providers, watercraft inspectors and conservation officers on study protocols and procedures.
- Regular individualized communication, data sharing, support and trouble-shooting for participants.

The DNR will submit an interim report to the Minnesota Legislature on January 15, 2019. The full study will be complete in December 2019 and the final report shared with the Legislature in 2020.

2018 Activities

- DNR staff completed 15 in-person permit trainings for 95 lake service provider business owners and managers. Staff trained an additional 563 business owners and managers online, issuing 620 permits.
- 1,453 lake service provider employees completed mandatory online certificate training.
- 1,049 businesses were permitted lake service providers at the end of 2018. Current list of businesses is on the DNR website.
- Completed the first year of a LSP pilot study to evaluate reinstallation of equipment without removal of zebra mussels after seasonal storage, service or repair.

Future Plans

- Continue to update and customize training for lake service provider businesses.
- Complete pilot study.

INVASIVE SPECIES AND INFESTED WATERS PERMITS

People need a permit to divert or transport water from listed infested waters (Minnesota Rules, part 6216.0500). In 2018, the Invasive Species Program issued seven infested waters permits. Permits for water appropriation and work in public waters issued through the DNR's 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 31 prohibited invasive species permits in 2018.

Individuals can access several general permits on the DNR website, for example: to possess certain preserved specimens of prohibited invasive species; 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 from infested waters. 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.

In general, people cannot harvest bait for personal use from waters listed as infested with aquatic invasive species.

Regulations

Regulations, including laws and rules, are an important part of Minnesota's AIS prevention strategy. 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 AIS 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 AIS is primarily located in Minnesota Statutes, chapter 84D; however, authorities and prohibitions related to aquatic invasive species 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 AIS 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.

Photo upper left:

Dock installers removing customer dock and boat lift for the season.

PREVENTION

During the 2018 Regular Session of the Minnesota Legislature, several changes were proposed to invasive species laws, including provisions that would have:

- Made permanent an expired provision to allow anglers to use cast nets to harvest gizzard shad for bait from infested waters, and making some small changes to that program.
- Allowed commercial fishermen to reuse nets after they have been decontaminated, and expanded tagging of commercial fishing nets to include starry stonewort.
- Expanded the Gull Lake and Cross Lake pilot studies to allow enrolled lake service provider permittees to utilize any water access site on those lakes as part of the program, and extended the deadline for the Lake Service Provider Feasibility Report to 2020 to match the end of the pilot program.

These policy changes were included in the omnibus supplemental budget bill (HF4099/SF3656), which the Legislature passed and the Governor vetoed. These changes did not become law in 2018.

RULE CHANGES IN 2018

We changed several rules to be consistent with current statute and to make technical corrections.

We made the following changes to update rule so that it is consistent with statute:

- Replaced the requirement to publish the infested waters list in the State Register with a requirement for the commissioner to provide access to a copy of the listed infested waters.
- Removed requirements to drain watercraft when leaving only certain infested waters, because current statute requires that people remove drain plugs from equipment when leaving all water bodies, not only infested waters.
- Made the definition of Eurasian watermilfoil consistent with the definition in statute.
- Allowed for issuing prohibited invasive species permits for the purpose of decontamination.

Photo above:

Natural resource specialists attend a training.



We made the following technical corrections:

- Updated sources of nomenclature for scientific and common names of several invasive species.
- Corrected and updated scientific names for several invasive species.

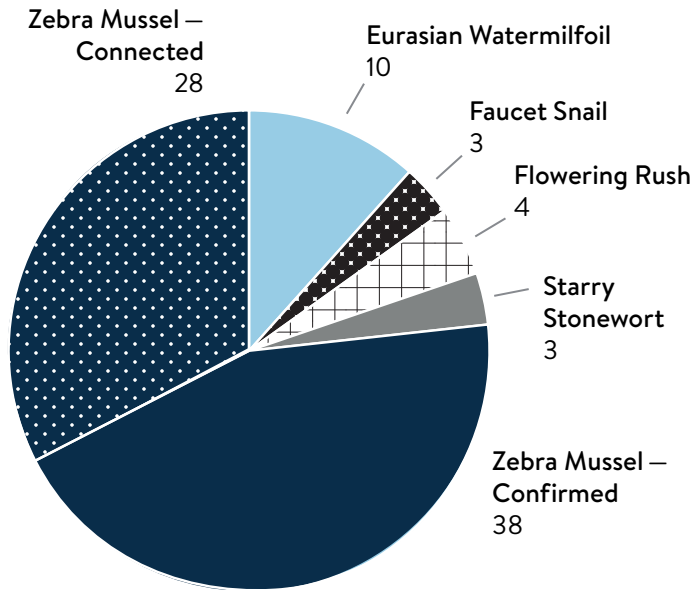
We changed the word “list” to “designate” so that “designate” refers to the process of classifying species as invasive and “list” refers to the process of listing water bodies as infested. This returned parts of rule to the terms used before a 2014 change.

Infested Waters

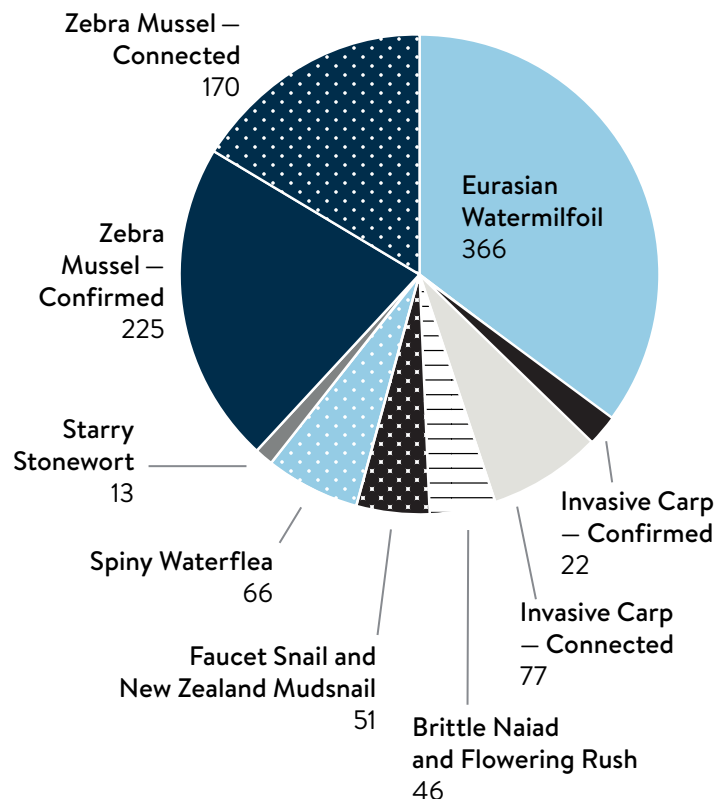
The DNR will add a lake, river, pond or wetland to the infested waters list if it contains certain AIS that could spread to other waters. The DNR may also list a lake, river, pond or wetland as infested if it is connected to a body of water where an aquatic invasive species is present. To reduce the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

For more information on waters listed in 2018, see Appendix B.

WATER BODIES LISTED AS INFESTED IN 2018



TOTAL WATER BODIES LISTED AS INFESTED



Not included in the summary chart:

- One lake listed as infested with red swamp crayfish.
- Lake Superior, the St. Louis River estuary, and other Superior tributaries are listed as infested with VHS, round goby, ruffe and white perch.

PARTNERSHIPS

The Invasive Species Program partners with other people and organizations in Minnesota, regionally, and nationally to help prevent the introduction and spread of AIS.

Invasive Species Program staff represent the state on two regional panels of the federal Aquatic Nuisance Species Task Force: the Great Lakes Panel on Aquatic Nuisance Species and the Mississippi River Basin Panel on Aquatic Nuisance Species. These panels provide an opportunity to share Minnesota's prevention priorities with other jurisdictions in those regions, and to hear about emerging aquatic invasive species threats in locations further downstream to inform adaptive management actions in Minnesota.

Minnesota also participates in the Conference of Great Lakes and St. Lawrence Governors and Premiers AIS Task Force, which released a list of "least wanted" AIS in the Great Lakes region in 2013. In 2018, five more species were added to that list:

- Tench (*Tinca tinca*)
- Marmorkreb or marbled crayfish (*Procambarus fallax forma virginalis*)
- New Zealand mud snail (*Potamopyrgus antipodarum*)
- European frogbit (*Hydrocharis morsus-ranae*)
- Yellow floating heart (*Nymphoides peltata*)

These "least wanted" lists raise awareness of the threats that specific AIS pose to the Great Lakes region and encourage coordinated action to prevent their introduction and spread.

Invasive Species Program staff also coordinates with partners such as Minnesota Sea Grant and the Minnesota Aquatic Invasive Species Research Center. The U.S. Fish and Wildlife Service provides funding to AIS prevention projects and provides scientific expertise about the risk of AIS to Minnesota.

FUTURE NEEDS AND PLANS

Over the next year, the DNR will continue to:

- Work with partners and stakeholders to plan and implement prevention activities.
- Monitor the distribution of AIS in the state.
- Assess the risk of spreading AIS during different activities.
- Improve and refine the DNR's AIS prevention program and supporting regulations.



Education and Public Awareness

GOALS

- Help Minnesota residents and visitors understand their role in preventing the spread of aquatic invasive species (AIS).
- Provide the public with clear actions to prevent the introduction and spread of AIS through an understanding of the laws and recommended practices.
- Heighten understanding of aquatic invasive species' potential negative impacts on natural resources that are central to Minnesota's ecology, economy, recreation, identity and overall quality of life.
- Increase awareness of the DNR's AIS research, management and prevention efforts, and inform stakeholders, the public and other agencies of available training, funding and educational resources.

HIGHLIGHTS

- The DNR's Invasive Species Program took the next step in an integrated approach focused on positive messaging to build community norms around desirable behaviors. Expanding on this Community-Based Social Marketing model, the program contracted with an expert research group to determine which behaviors would have the greatest impact on AIS prevention and the barriers and benefits associated with those behaviors. The DNR will use this information to improve invasive species messaging and communications and share it with local AIS program managers and surrounding states.
- Program staff worked with DNR Creative Services Unit staff to gather and catalog a large and widely distributed collection of photos, and developed guidelines to help staff shoot higher quality photos in the field. They conducted a series of photo shoots that included prevention activities at public accesses, decontamination, and a conservation officer and K9.
- The program redesigned web pages for the online Guide to Aquatic Invasive Species, focusing on invasive aquatic animals and plants.

Photo on left:

DNR Photographer Deborah Rose captures a boater cleaning aquatic species from his watercraft.

Strategic Communications

DNR information officers continued the integration of news and media relations, web, publications and graphic design, public access signs, advertising and public interactions. Communications staff joined with others engaged in Community-Based Social Marketing for a presentation and discussion at the Upper Midwest Invasive Species Conference.

Informational Materials

The program continued to assess and revise informational materials for public distribution. Staff created:

- A Eurasian watermilfoil identification card.
- A bag tag for divers, for distribution at dive shops and clubs.
- Updated species decals for signs posted at public accesses where invasive species have been confirmed.
- Invasive species temporary tattoos to hand out at the Minnesota State Fair and other events.
- A drawstring backpack, featuring the service-marked “Clean In, Clean Out” icon and the program’s website.

Staff updated invasive species content and advertising for the Minnesota Fishing Regulations handbook. The handbook 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 900,000 copies of the fishing regulations will be distributed beginning in February.

Advertising

The program continues its research into the most effective traditional and new media advertising channels. Future advertising campaigns will be driven by and reflect the results of the Community-Based Social Marketing project.

Web/Digital

The program took a major step in its web communications, with a redesign of web pages for specific AIS. The redesign brought consistency and an improved format. Web pages focus on species description, classification, control methods and resources. The new web page format was updated in conjunction with the DNR’s migration to responsive design that makes web content easy to read and use on smartphones and tablets.

The program is increasingly making use of the DNR’s social media accounts. These efforts are typically coordinated with media events or other major public information efforts.

Media Relations

In 2018, the program continued to expand placement of more stories about innovations and new steps to reduce the spread of invasive species. Along with information about new AIS confirmations, news releases created greater awareness of increasing compliance with AIS laws, aggressive treatment of starry stonewort, advances in research and technologies, and the broad range of partnerships with stakeholders across the state. Better photos and more video shot by invasive species specialists in the field greatly enhanced public storytelling. Media events at the DNR Central Office and at the scene of new invasive species confirmations helped connect reporters and their audiences more directly with this important news.



Shows and Fairs

Along with the innovative interactive projection introduced last year at the Minnesota State Fair, staff revamped the fair exhibit to generate more traffic and remove several older displays. Staff and volunteers gave away 1,000 drawstring backpacks each day during the fair, along with new temporary tattoos, fishing license holders and other items.

Staff participated in conferences, county fairs, sports and outdoor shows, water festivals, and many other special events throughout the year to educate the public and distribute literature and information. Staff also made presentations to lake associations and community groups to answer questions and discuss invasive species issues and activities.

PARTNERSHIPS

Statewide Aquatic Invasive Species Advisory Committee

This committee plays a vital role in reviewing and guiding the work of the Aquatic Invasive Species Program. Members are appointed by the DNR Commissioner. They bring a range of personal and professional experience to the discussion on preventing the spread and managing impacts of invasive plants and animals in Minnesota. Their interest and engagement with other stakeholders informs the program regarding policy, outreach, research, operations, and other stakeholder interests. Visit mndnr.gov/aisadvisory.

Minnesota Aquatic Invasive Species Research Center

The Minnesota Aquatic Invasive Species Research Center at the University of Minnesota is a valuable partner, working closely with the program on research and advances in AIS management and related information. Many Invasive Species Program staff attended the center's annual showcase and explored new ways to work together. Visit maisrc.umn.edu.

Minnesota Sea Grant

Minnesota Sea Grant continues to partner with the DNR, Wildlife Forever, U.S. Fish and Wildlife Service, National Park Service, U.S. Forest Service and other organizations to help prevent the spread of invasive species. Through scientific research and public education programs, Minnesota Sea Grant works to enhance Minnesota's coastal environment and economy. Visit seagrant.umn.edu.

Wildlife Forever

The nonprofit organization leads the Stop Aquatic Hitchhikers! campaign in Minnesota and works with multiple partners to post highway billboards, print ads and PSAs throughout Minnesota and across the country. Visit wildlifeforever.org.

FUTURE NEEDS AND PLANS

- Find new ways to optimize both paid and earned media in the face of a rapidly changing media climate.
- Deepen engagement with Community-Based Social Marketing experts and trained partners and staff across the state to more effectively build community norms and encourage desirable behaviors.
- Develop and use surveys, pilot testing and focus group instruments to better understand and measure effectiveness of communication efforts.
- Continue to teach Invasive Species Program staff about plain language, Community-Based Social Marketing, electronic information accessibility and other communication techniques.
- Continue to work collaboratively with Minnesota Aquatic Invasive Species Research Center, Minnesota Sea Grant, Wildlife Forever and other stakeholders to pursue research and outreach funding through National Sea Grant, the Great Lakes Restoration Initiative, U.S. Fish and Wildlife Service, foundations and other sources.

Photo on left:

Allison Gamble, Invasive Species Specialist, staffs an informational booth at the Upper Midwest Invasive Species Conference



Enforcement

GOALS

- Provide advanced training to conservation officers and train local law enforcement to effectively enforce aquatic invasive species (AIS) laws.
- Analyze the DNR's AIS laws and work with stakeholders on legislative issues to give Enforcement necessary tools to assist in AIS prevention.
- Continue to emphasize AIS as priority work and a core responsibility.
- Work with lake associations, user groups and media to raise awareness about controlling the spread of invasive species. This includes attending statewide public input meetings to maintain and increase dialog with concerned stakeholders.
- Continue inspections by conservation officers to reduce the risk of spreading AIS by water-related equipment. Assist Level 1 and Level 2 watercraft inspectors at public access sites and investigate violations reported by inspectors.
- Continue to analyze data, develop protocols and secure equipment to administer AIS checkpoints safely and effectively.
- Investigate pathways for spreading AIS such as equipment and watercraft, food markets, bait dealers, aquatic plant dealers, etc.
- Train and educate commercial entities to increase compliance with invasive species regulations.



Photo on left:

A conservation officer helps a boater clean aquatic species from his watercraft. Conservation officers provided 11,253 hours of AIS enforcement and education in 2018.

HIGHLIGHTS

- DNR conservation officers provided 11,253 hours of AIS enforcement and education.
- The Enforcement Division conducted media interviews on the importance of AIS regulation compliance.
- The Enforcement Division’s three zebra mussel detection canine officers assisted conservation officers and inspectors. The dogs improved the efficiency of conservation officers, with faster and more thorough inspections of water-related equipment. The canine teams provided educational demonstrations at the Minnesota State Fair, Aquatic Invaders Summit and several other public events.
- Six conservation officers, designated as Water Resource Enforcement Officers, continued to dedicate a significant portion of their work toward aquatic invasive species enforcement.
- Conservation officers staffed AIS booths and conducted demonstrations at major sport and outdoor shows.
- Enforcement pilots worked with the Minnesota Seaplane Association to develop recommendations to prevent the spread of AIS by seaplanes.
- Enforcement pilots assisted the DNR’s Fish and Wildlife Division with spraying hybrid invasive cattails.



ENFORCEMENT CONTACTS (CITATIONS/WARNINGS)

Numbers vary due to officer staffing levels, public compliance, length of open water season, local law enforcement involvement and outreach efforts.

Citations/Warnings	2013	2014	2015	2016	2017	2018
Citations issued	406	343	244	123	127	95
Warnings issued	733	847	911	671	557	476



AQUATIC INVASIVE SPECIES CHECK STATIONS (SPRING TO FALL 2018)

The Minnesota Department of Natural Resources uses roadside check stations to inspect watercraft and watercraft equipment transported in Minnesota to detect and prevent the spread of AIS in state waters.

County	Number of Inspections	Operational Hours	Violation Delay (in minutes)	No Violation Delay (in minutes)	Criminal Citation	Warning	Civil Citation	Violation Rate
Lake of the Woods	47	4	0	2.83	0	0	0	0%
Lake of the Woods	35	4	0	3.60	1	5	0	17%
Pine	34	4	4	2	0	1	0	2%
St. Louis	365	5	0	3.30	13	41	0	15%
Wabasha	13	4	0	0	0	4	0	31%
Martin	47	5	7	3	7	7	7	28%
LeSueur	19	4	8	3.93	2	2	0	21%
Aitkin	42	4	4	2	1	3	0	9.52%
Ortonville	10	3	0	3.60	0	0	0	0%
Statewide Totals and Averages	612	37	2.56	2.70	24	63	7	15%

Statewide Open Water Season Enforcement Results

Compliance with invasive species regulations at Enforcement check stations remains steady from 86% in 2015 to 82% in 2016, and 84% in 2017 to 85% in 2018. Compliance at check stations has sharply increased from 63% in 2012.

PARTNERSHIPS

Enforcement of Minnesota's invasive species regulations is essential to preventing their spread into and across Minnesota. Conservation officers continue to work with lake associations, local governments, user groups and other DNR divisions to assist in controlling the spread of invasive species.

FUTURE NEEDS AND PLANS

The Enforcement Division continues to focus its efforts on enforcement and education, both critical tactics in preventing the introduction and spread of invasive species.

We will continue to monitor and evaluate our actions to provide the most effective measures available. We will work with the public and private entities on legislative issues to provide Enforcement with the tools necessary to prevent the spread of AIS.

We will continue to emphasize invasive species Enforcement as priority work and a core responsibility.

Photo on upper left:

Conservation Officer Brent Grewe and zebra mussel-sniffing K9 Shelby inspect a watercraft at Gray's Bay Public Access on Lake Minnetonka.

Photo on lower left:

Pilots with the DNR's Enforcement Division assist with spraying hybrid invasive cattails.



Watercraft Inspections

GOALS

- Conduct watercraft inspections at public water accesses throughout Minnesota and require watercraft users to decontaminate their watercraft if aquatic invasive species (AIS) or water are found.
- Increase public awareness about AIS and reduce the potential for boaters to transport species between water bodies.
- Increase education efforts with stakeholder and user groups.
- Distribute information at events throughout the state.
- Hire 46 Level 1 and 46 Level 2 watercraft inspectors.

HIGHLIGHTS

- In previous years, the goal was to hire 146 watercraft inspectors. In 2018, this goal was reduced to 92 inspectors. The DNR hired 78 watercraft inspectors for the 2018 season.
- Trained 968 local government inspectors at 51 Level 1 training classes and 23 Level 2 training classes.
- DNR and local government watercraft inspectors completed a record high 470,000 incoming and outgoing watercraft inspections.
- Added information to the 2018 Fishing Regulations booklet describing why there are watercraft inspections and what to expect from watercraft inspectors.
- 269,000 incoming watercraft were in compliance with state laws. Two percent of incoming watercraft were found with plants, invasive animals, mud or water.
- 97% of incoming watercraft arrived in compliance with state drain plug laws.

Photo on left:

A DNR watercraft inspector checks a boat for aquatic invasive species. Watercraft inspectors completed a record high 470,000 inspections in 2018.

Transportation of Invasive Species

Boaters in Minnesota 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, like zebra mussels.

In 2018, watercraft inspectors observed that the majority of people arriving at accesses were in compliance with state AIS prevention laws. DNR-authorized watercraft inspectors took the following actions to follow-up with the few individuals that were in violation of state laws.

- 97% of people arriving at accesses had removed drain plugs from their watercraft. Only 3% (9,081) of the watercraft inspected had drain plugs in when they arrived at the access.
- 98% of people arrived at accesses with watercraft and trailers that were free of aquatic plants. Only 2% (4,966) of watercraft arrived at an access with vegetation attached, compared with 4,463 in 2017.
- Watercraft inspectors found zebra mussels on 226 incoming watercraft (2017 had 205 occurrences). Forty-six were at water bodies not known to be infested with zebra mussels. Watercraft inspectors instructed owners not to launch until all zebra mussels had been removed. In some cases, removal is done at the access. Zebra mussel violations are forwarded to DNR Enforcement for follow-up.

- Watercraft inspectors 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 or a high-pressure, hot water treatment.

Decontamination Units

The Watercraft Inspection Program hires Level 2 watercraft inspectors to decontaminate watercraft with high-pressure, hot-water wash units. DNR staff used 23 portable wash units around the state to perform 1,927 decontaminations. Local inspection programs operated an estimated 34 decontamination units in addition to DNR operated units. Partner units decontaminated an additional 2,918 watercraft. DNR decontamination units were located at high-use watercraft accesses on zebra mussel-infested water bodies.

DNR Volunteer Training

The Watercraft Inspection Program conducts AIS volunteer training sessions to teach people how to educate watercraft users at waters where they live or recreate. In 2018, there were 23 AIS volunteer training sessions, training 111 volunteers. In the last three years, 373 people have received training. Volunteers receive classroom training every three years, with an online refresher course each year between classroom training. Volunteers must pass a yearly background check.

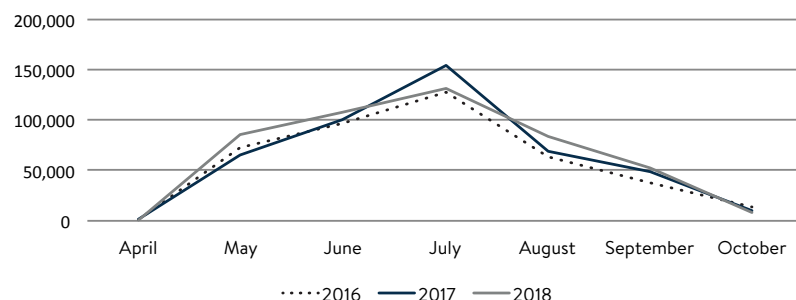
NUMBER OF DNR WATERCRAFT INSPECTIONS

Inspections	2018	2017	2016	2015	2014	2013
Inspections	66,833	84,824	102,445	103,500	119,000	123,000
Inspection Hours	21,826	29,400	38,000	35,000	49,550	66,800
Inspections per Hour	3.06	2.88	2.70	2.96	2.42	1.84

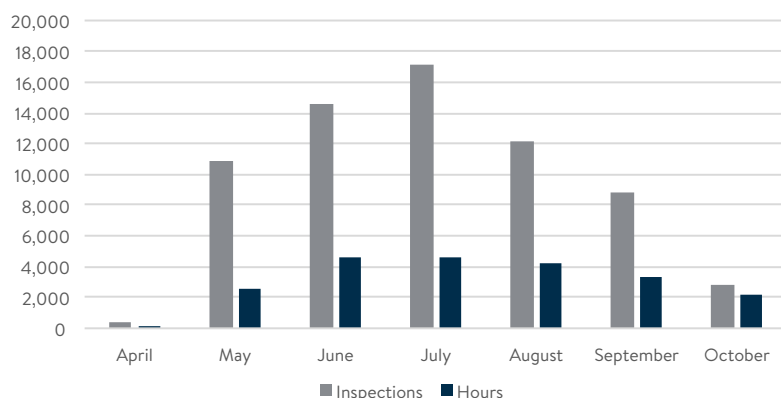
NUMBER OF DNR WATERCRAFT INSPECTIONS BY REGION

DNR Region	2018	2017	2016	2015	2014	2013
Northwest - 1	13,539	17,857	23,575	20,250	26,500	28,500
Northeast - 2	7,266	11,413	13,770	12,450	14,100	17,900
Central - 3	43,653	51,513	62,150	67,800	74,900	72,600
Southern - 4	2,375	4,041	2,950	3,000	3,600	4,000
Total Inspections	66,833	84,824	102,445	103,500	119,100	123,000

AUTHORIZED WATERCRAFT INSPECTIONS PER MONTH DURING THE 2016 TO 2018 FIELD SEASONS

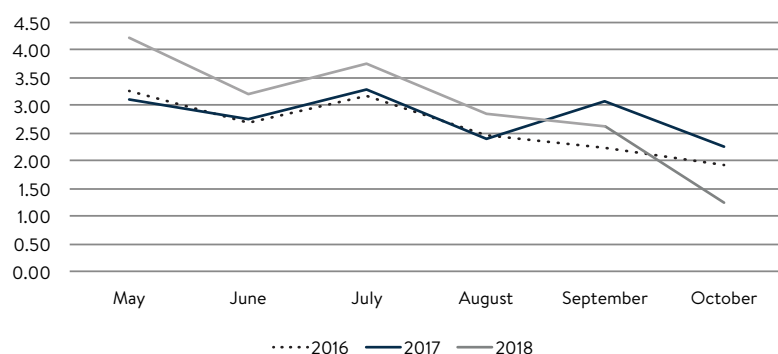


DNR INSPECTIONS COMPLETED PER MONTH, COMPARED TO THE NUMBER OF HOURS WORKED AT ACCESSES STATEWIDE



DNR INSPECTIONS PER HOUR, BY MONTH AT PUBLIC WATER ACCESSES DURING THE SEASON

The figure does not include drive time.



PARTNERSHIPS

Local and Tribal Governments

Local 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 2018 season, which allowed an additional 968 watercraft inspectors to be hired. This is an increase from 58 active delegation agreements and 949 trained inspectors in 2017.

The local and tribal government employees follow the DNR's watercraft inspection process using DNR survey questions. The findings are reported to the Watercraft Inspection Program through a statewide watercraft inspection mobile application.

FUTURE NEEDS AND PLANS

In 2019, the Watercraft Inspection Program will work with partners to increase access coverage and inspection consistency in Minnesota. This year set the record for the most authorized inspectors. As these numbers grow, increased communication with partners is essential. The program will improve volunteer training materials and manuals to match existing authorized inspection manuals and to meet document accessibility requirements.

Program staff are developing training modules to engage trainees and improve inspections at public accesses. Additional materials, guidance and tools will be available to local inspection partners for their staff during the open water season.

The program will review 2018 data to refine the survey process and adjust the hours and days spent at watercraft accesses to try to increase our inspections per hour. The program will train people to conduct AIS education at local watercraft accesses and work to expand the number of partnerships with tribal and local governments in an effort to increase total watercraft inspection capacity throughout the state.



Aquatic Invasive Species Prevention Aid

The Minnesota Legislature provides \$10 million directly to Minnesota counties to help prevent the spread of aquatic invasive species: AIS Prevention Aid. The 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 proceeds to the DNR by December 31 of each year. The DNR Invasive Species Program has two full-time staff dedicated to working with these local programs.

GOALS

- Annually review and document county aquatic invasive species (AIS) plans and resolutions.
- Provide opportunities for local government staff to share and learn from one another's collective experiences.
- Provide opportunities for local government staff to maintain strong relationships with stakeholders such as local governments, state and federal agencies, nonprofits, businesses, lake associations, outdoor recreation groups, etc.
- Provide technical support and training to local governments and their partners as they develop, implement and evaluate their local AIS prevention strategies.

HIGHLIGHTS

- Facilitated four regional workshops and four learning sessions statewide, attracting over 160 attendees. Workshops and sessions were designed to help local AIS program managers and their partners be more successful in their AIS prevention work.
- Worked with counties to revise a metrics template designed to capture data and stories about local AIS prevention programs. This information helps demonstrate the statewide impact of the AIS Prevention Aid.
- Started a Community-Based Social Marketing project. The project results will help organizations improve their communication strategies to promote AIS prevention behaviors. The project will also identify ways to promote positive social norms around AIS prevention in Minnesota.



Photo on left:

Mark Ranweiler, Assistant Invasive Species Specialist, demonstrates aquatic plant identification on the shores of Lake Le Homme Dieu. This activity was part of a DNR-hosted summer learning session for county aquatic invasive species leads.

Technical support

- Provided technical support to local governments and their partners as they develop, implement and evaluate their local AIS prevention strategies.
- Received and provided feedback on guidelines (resolutions and plans) from the 83 Minnesota counties receiving funds.
- Provided information on DNR AIS programs (e.g. public outreach, watercraft inspection, invasive aquatic plant management, community-based social marketing). This included updating key resources and promoting available support from the DNR on the AIS Prevention Aid webpage (mndnr.gov/invasives/ais/prevention).
- Played an advisory role on county AIS Task Forces and Advisory Committees.
- Developed passive (guidance documents, online resources) and active (workshops, presentations) ways to relay information to counties and their local stakeholders.
- Provided feedback on communication materials developed by local AIS program managers to promote consistent messages about AIS and prevention steps (e.g. Clean, Drain, Dispose).
- Revised a template of metrics based on comments received from counties. The template 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.

Engaged local governments and partners

- Maintained a network of support by continuously updating a primary contact list of county AIS program managers online and encouraged them to use the list to collaborate with one another.
- Held four regional workshops around the state in January and February. The 100 attendees included 57 local government staff representing 39 counties, 28 people from partner organizations, and 15 DNR staff. The workshops brought neighboring counties together to share their AIS prevention experiences, discuss successes and challenges, support collaborative efforts, and build stronger inter-county relationships.
- Hosted four learning sessions around the state in August and September. The 65 attendees were represented by 28 counties, 16 partner organizations, and DNR staff. Topics covered included: working with resorts on AIS prevention, working with businesses, how to support your watercraft inspectors, alternatives to releasing aquarium pets, AIS monitoring techniques, and hands-on aquatic plant identification. Counties shared information with other local AIS program managers on projects they implemented. Projects included youth education, monitoring programs, new infestation response planning, grant programs, and more.
- Presented AIS Prevention Aid information to a variety of audiences such as the DNR's Statewide AIS Advisory Committee and the Upper Midwest Invasive Species Conference. Provided general AIS education to groups such as lake associations and youth events.



PARTNERSHIPS

- Along with multiple partners representing local governments, lake associations, and nonprofits, the two DNR planners participated in two civic governance pilot projects in Ramsey and Cass counties. The projects promoted the community's common good by addressing complex public policy issues like AIS.
- Continued to provide technical support to a group of AIS leads from the 12 counties that receive the most AIS Prevention Aid. This self-organized group meets to brainstorm ideas on how they can work together to have a greater statewide impact.

Photo above:

Kylie Cattoor, Natural Resources Specialist, demonstrates aquatic invasive species monitoring techniques at a DNR-hosted learning session at Lake Ann.

FUTURE NEEDS AND PLANS

AIS Prevention Aid funded programs are diverse, at different stages of development and implementation, and cover a spectrum of AIS activities. As the needs of the programs change, so will the technical support provided.

- Work to improve online resources, like the DNR's Local Aquatic Invasive Species Prevention Aid web page, to provide a "one-stop shop" of resources local governments and their partners can use to develop and implement their programs.
- Support implementation of local projects that use Community-Based Social Marketing strategies.
- Continue to support communication and collaboration among local program managers about AIS prevention strategies. For example, continue to host regional workshops and learning sessions.
- Continue to provide technical support, tools, and resources to help local governments achieve their goals and run successful AIS prevention programs.



Invasive Aquatic Plant Management

GOALS

- Reduce the impacts of invasive aquatic plants on Minnesota's ecology, society and economy.
- Prevent the spread of invasive aquatic plants within Minnesota.

We are committed to working with our partners to meet these goals by:

- Providing technical assistance to individuals and organizations.
- Permitting management with herbicides or mechanical control.
- Providing grants to help fund costs of control done by partners as funding allows.
- Supporting and using research that leads to improved aquatic invasive species control techniques.

HIGHLIGHTS

- In 2018, starry stonewort (*Nitellopsis obtusa*) was discovered in three lakes in Minnesota. The DNR, in cooperation with local and county organizations, funded aggressive treatment of two discovered populations. Further surveys of the third infestation are planned for 2019. Funding was provided in part by a Great Lakes Restoration Initiative grant. Results of those treatments are promising; they successfully reduced the abundance of starry stonewort in the treated areas to very low levels. To date, starry stonewort has not been eradicated in any water body in the United-States.
- To understand the effectiveness of starry stonewort control methods, the DNR requires post-treatment monitoring. In 2018, the DNR gave out \$13,000 in grants to help fund monitoring programs.
- Invasive Species Program staff evaluated the effectiveness of a new herbicide, ProcellaCOR™. Over the yearlong treatment, the herbicide successfully removed Eurasian watermilfoil from the 12-acre treatment area.

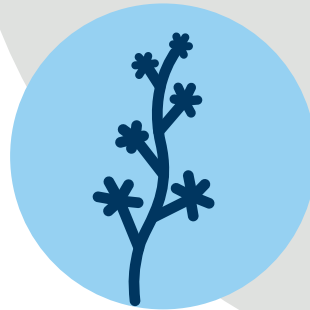


Photo on left:

April Londo, Natural Resource Specialist, holds starry stonewort. Hand-removal of the invasive species was conducted on Grand Lake.

Management

Invasive aquatic plant management is an attempt to reduce the abundance or distribution of an invasive plant in a waterbody. The DNR's invasive plant management program supports efforts to minimize harmful effects caused by invasive plants, while also protecting natural resources. The program works to preserve and enhance the native aquatic plant community for the ecological benefits those plants provide. Sometimes, invasive plant management is done to help prevent the spread of that species to other uninfested waterbodies.

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. Permit applications are accepted through the Minnesota DNR Permitting and Reporting System (MPARS). Commonly managed aquatic plants include:

- Eurasian watermilfoil (*Myriophyllum spicatum*)
- Curly-leaf pondweed (*Potamogeton crispus*)
- Purple loosestrife (*Lythrum salicaria*)
- Flowering rush (*Butomus umbellatus*)

The Invasive Species Program has provided grants for the control of Eurasian watermilfoil and/or curly-leaf pondweed since 2006. Due to fewer revenues coming into the Invasive Species Account than the enacted budget and the fact that the AIS surcharge has not been increased in 25 years, the program was not able to offer invasive species control grants in 2018.

In 2018, the DNR confirmed starry stonewort (*Nitellopsis obtusa*) in three lakes in Minnesota: Medicine Lake in Hennepin County, Pleasant Lake in Wright County, and Wolf Lake in Beltrami County. Starry stonewort was first confirmed in Minnesota in Lake Koronis and connected Mud Lake in Stearns County in August 2015. Since the initial discovery, treatment methods have included herbicide application, Diver Assisted Suction Harvesting (DASH), suction dredging, and hand-pulling.

Control efforts were conducted on Medicine Lake and Pleasant Lake in 2018. There were 15 acres of starry stonewort in Medicine Lake. The DNR, in cooperation with Three Rivers Park District, treated the area with a series of copper sulfate and hydrothol

INVASIVE AQUATIC PLANT MANAGEMENT PERMITS ISSUED PER SPECIES

Species	2014	2015	2016	2017	2018
Curly-leaf pondweed	131	168	148	184	216
Eurasian watermilfoil	83	110	102	110	114
Curly-leaf pondweed and Eurasian watermilfoil	4	5	9	12	26
Flowering rush	9	10	5	8	14
Purple loosestrife	1	0	3	1	2
Non-native Phragmites	0	0	3	2	3
Yellow iris	0	0	2	2	2
Starry stonewort	0	0	7	6	13
Brittle naiad	0	0	0	2	0

INVASIVE AQUATIC PLANT MANAGEMENT PERMITS ISSUED FOR CURLY-LEAF PONDWEED OR EURASIAN WATERMILFOIL OR BOTH

DNR Region	2014	2015	2016	2017	2018
Northwest	18	17	15	26	30
Northeast	12	38	28	38	31
Central	157	199	185	205	250
Southern	31	29	31	37	45
Total	218	283	259	306	356

191 treatments. The treatments reduced starry stonewort to very low levels. Pleasant Lake had about 16 square feet. The DNR, in cooperation with the Wright County Soil and Water Conservation District and the Wright County Department of Parks and Recreation, hired professional divers to hand-pull the area. The remaining plants were treated with a copper-based algaecide. That treatment was successful in reducing the amount of starry stonewort in the treatment area. Additional surveys in Wolf Lake are planned for 2019.

Invasive Species Program staff evaluated a new herbicide to manage Eurasian watermilfoil, ProcettaCOR™. A 12-acre area in Lake Jane, in Washington County, was treated. The frequency of Eurasian watermilfoil fell from 72% to 1% 45 days after treatment, with only one plant found outside the treatment area. There was no decrease in native aquatic plant diversity or abundance in the treatment area.

Staff 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 the management project.

PARTNERSHIPS

Mike Verhoeven, a graduate student working with Dr. Dan Larkin at the University of Minnesota, made significant progress on a project studying how environmental factors, such as water clarity and winter snow cover influences curly-leaf pondweed abundance and the effectiveness of herbicide treatments of curly-leaf pondweed. They synthesized data provided by DNR staff and other management organizations from 60 lakes in Minnesota; 19 with herbicide treatments and 41 that had not been treated. Initial results were presented at the Upper Midwest Invasive Species Conference in October 2018.

The DNR again participated with MAISRC and the University of Minnesota Extension, along with counties and local partners, for a statewide search for waters infested with starry stonewort. The event, called Starry Trek, involved more than 225-trained volunteers searching 187 Minnesota lakes. One waterbody, Wolf Lake in Beltrami County, was confirmed as infested with starry stonewort.

FUTURE NEEDS AND PLANS

- Continue to work with stakeholders and refine issuing permits and grants for the control of invasive aquatic plants.
- Work with partners to manage invasive aquatic plants.
- Monitor the distribution of invasive aquatic plants in the state, with emphasis on verification of reports of new occurrences.
- Assess risks posed to Minnesota by various nonnative aquatic plants.
- Improve our understanding of the ecology and management of invasive aquatic plants, including non-native *Phragmites*, the macroalgae starry stonewort, and hybrids of Eurasian watermilfoil, by continuing to work with researchers. Support from watershed districts and other partners will continue to be very important.
- Review and revise best management practices for herbicide treatment of aquatic invasive plants, in light of results from ongoing research and pilot projects.



Photos above: A series of photos showing an aquatic vegetation survey using a throw rake.



Invasive Aquatic Animals — Zebra Mussels

GOALS

- Prevent the introduction of zebra mussels to lakes and rivers in Minnesota.
- Support, assist and conduct research on zebra mussel ecology, biology, life history and other aspects to help manage and prevent spread.

HIGHLIGHTS

- Invasive Species Program staff conducted zebra mussel surveys on Lake Marion, in Dakota County, as follow-up to treatment completed in the fall of 2017. A six-acre area near the public access was treated with EarthTecQZ®. Following the treatment, DNR biologists did not find adult zebra mussels, but did find veligers in the lake.
- Zebra mussel surveys continued in White Bear Lake in 2018 as part of an ongoing population monitoring study. Zebra mussel densities were similar to those in 2017 (20,000-50,000 per 10 square meter), indicating that the rate of zebra mussel population growth may be slowing in that lake. This is the fourth year of the study.



Photo on left:

A diver points to a stick covered in zebra mussels in an abandoned mine pit in Cuyuna Country State Recreation Area. This water body was confirmed to have zebra mussels after an alert diver notified the DNR in 2016.

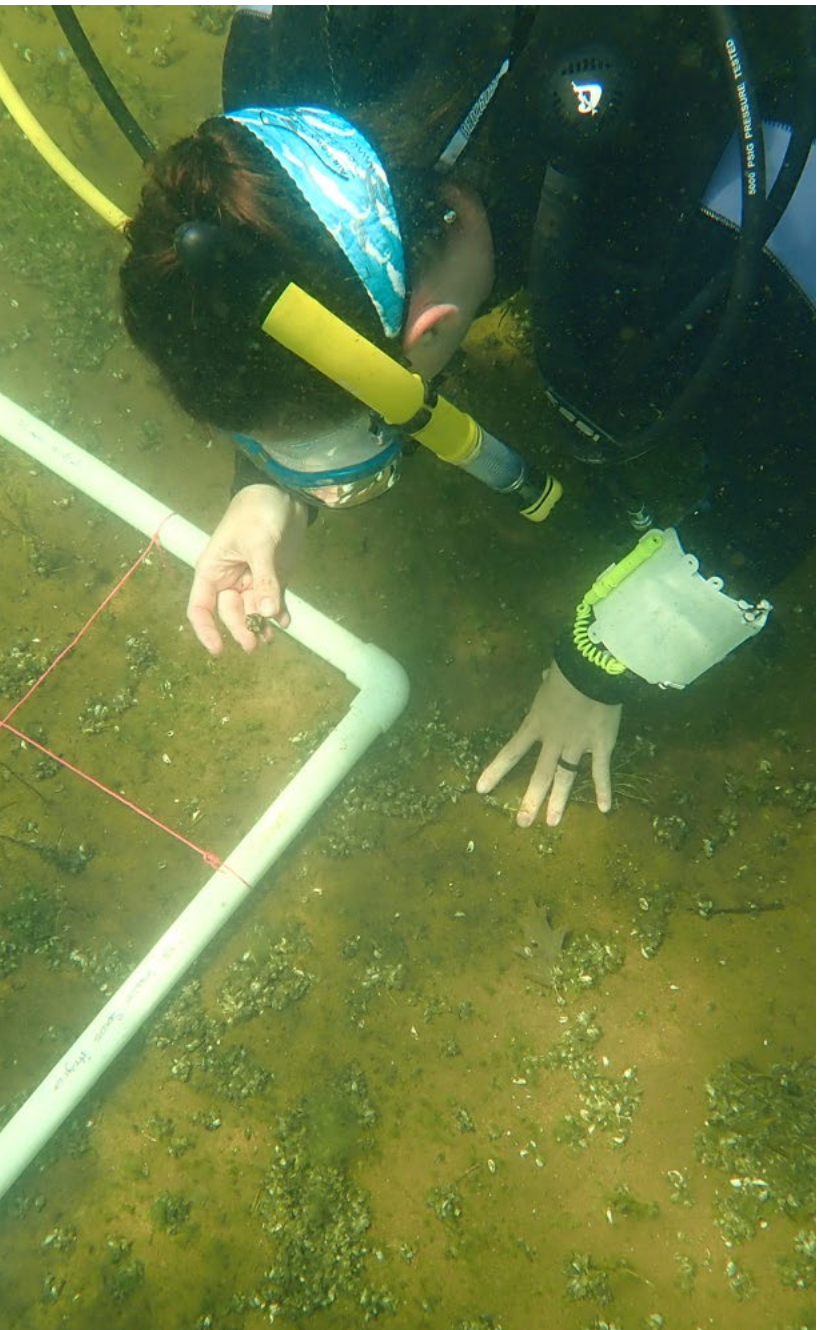


Photo above:

April Londo, Natural Resource Specialist, uses a quadrant to survey zebra mussel populations in White Bear Lake.

Photo above right:

Zebra mussels can be many sizes. A quarter helps show the varying sizes.

Photo far right:

Kylie Cattoor, Natural Resource Specialist, uses a quadrant to survey zebra mussel populations in White Bear Lake.



Research

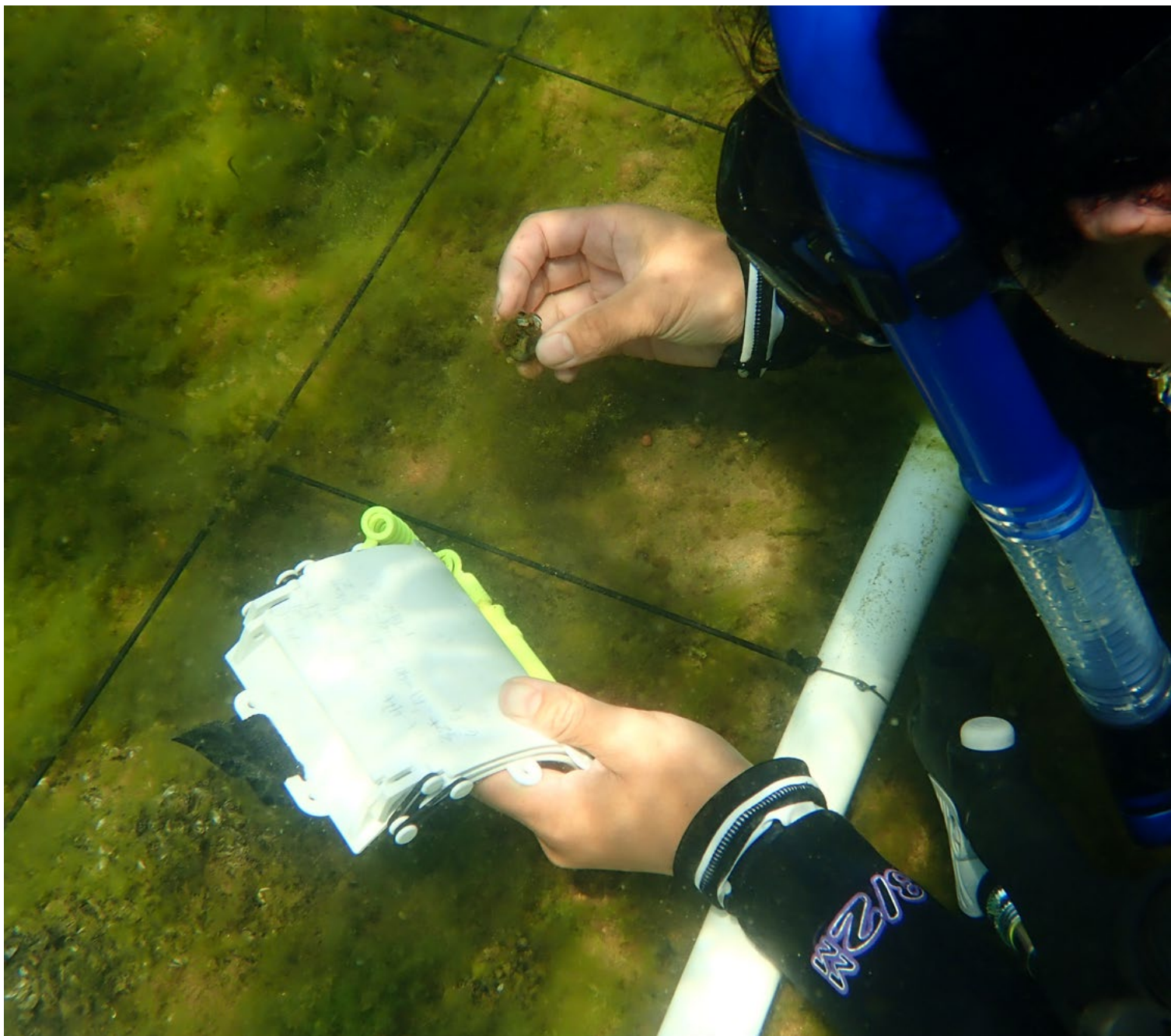
DNR biologists continue to explore connections between rising water temperatures and zebra mussel veliger densities in order to refine our management of activities like bait harvest on lakes with known zebra mussel populations. Sampling continued on study lakes with the addition of a new lake. This work will help more clearly define the early season veliger risk in lakes.

DNR biologists continued monitoring zebra mussels in lakes throughout Minnesota. Notable work included:

- Monitored the zebra mussel population size in White Bear Lake.
- Continued research monitoring number and size of zebra mussels in Green Lake.
- Continued monitoring zebra mussel and veliger presence in Lake Marion.
- Continued to assist in monitoring for zebra mussels in Ruth Lake.

Volunteer Zebra Mussel Monitoring Program

Volunteers with the Zebra Mussel Monitoring Program monitor lakes or rivers for zebra mussels. They regularly look at docks, lifts, boats, recreational equipment, shorelines and other objects. Volunteers provide important help in tracking zebra mussel distribution throughout the state. People who live and recreate on lakes in Minnesota are often the first to discover and report new zebra mussel populations.



PARTNERSHIPS

Minnesota Aquatic Invasive Species Research Center — University of Minnesota

DNR biologists continued to provide technical assistance, expertise and input on project proposals, priority species list development and publications from zebra mussel research.

FUTURE NEEDS AND PLANS

- Examine potential uses of pesticides to control zebra mussels as opportunities arise.
- Monitor, with partners, the post-treatment efficacy of previous control projects.
- Work with stakeholder groups to provide control advice and education.



Invasive Aquatic Animals — Invasive Carp

GOALS

- Prevent or limit range expansion of invasive carp (bighead, black, grass, and silver carp) at strategic locations.
- Monitor Minnesota waters for changes in population sizes, range expansion and reproduction.
- Accelerate research on control strategies.

HIGHLIGHTS

- The agency updated stakeholders at the Minnesota Invasive Carp Forum in the spring.
- Working to recapture the Bighead carp tagged in 2017 resulted in capturing and euthanizing two new bighead carp.
- Minnesota State University — Mankato completed a three-year project evaluating invasive carp deterrent feasibility in the Minnesota River. A final report was submitted to the DNR and will help guide and modify invasive carp management efforts in the Minnesota River Basin.

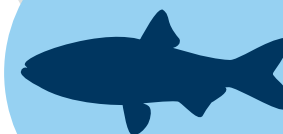


Photo on left:

A captured bighead carp. The carp is one of two that were captured by the DNR in the spring of 2018 in the St. Croix River.

New Detections of Juvenile and Adult Invasive Carp

The DNR relies on six methods to detect and monitor the expansion of invasive carp into Minnesota:

- Traditional fisheries monitoring programs.
- Targeted sampling.
- Contracted commercial fishing.
- Monitoring the commercial catch.
- Public reported sightings.
- Tagging.

The DNR received 13 reports from people who suspected they had seen an invasive carp in 2018. The DNR investigated all reports in person, by phone or by email. None of the 13 reports were confirmed as an invasive carp:

- Seven reports were confirmed not to be invasive carp based on photographs.
- Five reports were unlikely to be invasive carp based on discussions with the people that submitted reports.
- One report was unlikely to be an invasive carp but follow-up sampling was conducted and no additional carp were captured.

Methods Used to Capture Invasive Carp in 2018

Location..... **St. Croix River**
Species..... **Bighead Carp**
Date **5/11/2018**
Number Caught **2**
Method of Capture..... **Commercial Fisher**

Location..... **Minnesota River**
Species..... **Bighead Carp**
Date **9/25/2018**
Number Caught **1**
Method of Capture..... **DNR Personnel**

Invasive Carp Tracking

The Minnesota Legislature granted the DNR the authority to tag an invasive carp for research. This would allow the DNR to better understand the movements of individual fish and possibly lead researchers to other invasive carp. The DNR tagged one bighead carp on July 28, 2017 in the St. Croix River; the male fish was 42.5 inches and weighted 37.5 pounds. Fish biologists tracked its movement using active boat tracking and the passive receiver array present in the river system. The fish moved upstream and downstream regularly between Stillwater and Afton State Park, except for one four-day period where the fish swam into the Mississippi River, then returned to the St. Croix River. The fish spent most of its time in Lake St. Croix.

Efforts to capture the bighead carp began in November 2017. Over two days, the DNR and contracted commercial fishermen deployed 7,250 feet of gillnet, an hour of electrofishing, and 12,000 feet of large mesh commercial gillnets, but were unable to recapture the tagged fish.

In the spring of 2018, the DNR continued to track the bighead carp. Due to high water and the location of the carp, the DNR was unable to recapture the tagged fish. The DNR did capture and euthanize two additional bighead carp.

Researchers continued to monitor and locate the tagged fish. Fisheries crews deployed capture efforts in the fall to recapture the tagged fish or other potential carp in the area. Due to the depth of the water, no carp were caught. The behavior of the tagged fish is similar to its actions in 2017.

Prevention Efforts

In response to the risk of carp in the Minnesota River watershed, DNR Fisheries identified aquatic resources for protection. Two sites were chosen to protect lake systems in the Le Sueur River watershed. The first site on Mayhew Creek is an open-ditch, electrical grid to protect Elysian and Buffalo lakes. The second site, on an unnamed creek, is a culvert electrical array to protect Madison and Eagle lakes. Both sites were commissioned and operational in December 2018.

Photo on right:
Construction crew installing an open-ditch, electrical barrier during the fall of 2018 in the Le Sueur River watershed to protect upstream lake resources.



PARTNERSHIPS

Minnesota Aquatic Invasive Species Research Center — University of Minnesota

Dr. Peter Sorensen's lab continued lock and dam evaluation work in 2018. This research will help understand how sound and other barriers installed at lock and dam systems on large rivers can effectively prevent upstream movement of invasive carp. The lab tagged and tracked fish at Lock and Dams 2 and 8 to help understand fish movements around these structures. Researchers worked with U.S. Fish and Wildlife staff out of La Crosse, Wisconsin to assess fish behavior around speaker systems at Lock and Dam 8. Scientists are working on analyzing and publishing the data. A final report will be submitted to the DNR by December 31, 2018.

Minnesota State University — Mankato

The DNR contracted with Minnesota State University - Mankato to evaluate invasive carp deterrent feasibility in the Minnesota River. University partners completed the three-year project and produced the final report in 2018. The report describes the hydrologic and geomorphic characteristics of the Minnesota River including channel migration rates, flood plain inundation, bathymetry, and sediments. The project examined biological data to identify habitats that are suitable for invasive carp. The final report will help guide and modify invasive carp management efforts in the Minnesota River Basin.

University of Minnesota — Duluth

Dr. Al Mensinger's lab is evaluating the feasibility of using complex noise at Mississippi River Lock and Dam 5 to deter upstream movement of invasive carp. The lab purchased equipment and gathered limited data

in 2017 and interviewed experts to understand the feasibility of an acoustic system from engineering, biological, and physical landscape perspectives. In 2018, the lab began collecting soundscape data that will help inform the final analysis. The final report is due by the end of 2018.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service leads eDNA (environmental DNA) sampling for invasive carp. In 2018, water samples were collected from the Mississippi River down river from Minnesota and in the St. Louis Estuary. There were zero positive results for bighead and silver carp in the St. Louis Estuary. Results are at fws.gov/midwest/fisheries/edna.html.

Upper Mississippi River Collaboration

The DNR is an active partner in a multi-state and federal agency collaboration working on preventing the expansion and reducing the impacts of invasive carp. This workgroup works at an Upper Mississippi River basin level rather than the individual state level to develop projects and strategies to meet objectives. This includes a system-wide detection and evaluation program, implementing a commercial harvest program at the reproduction front, and developing a deterrent strategy. The DNR represents the collaboration at federal briefings, meetings, and conferences.

FUTURE NEEDS AND PLANS

Funding is needed for additional prevention, monitoring and response projects, as identified in the Minnesota Invasive Carp Action Plan.



Terrestrial Invasive Species Program

GOALS

- Improve or enhance the ability of DNR staff to effectively manage terrestrial (land-based) invasive species on DNR-managed lands through prevention, management and inventory, outreach and communication, and research.
- Prevent or limit the negative impacts on Minnesota's ecology, economy and human health that can result from terrestrial invasive species such as Oriental bittersweet, wild parsnip, buckthorn, garlic mustard, earthworms, emerald ash borer and gypsy moth.
- Prevent and manage terrestrial invasive species to protect and/or restore habitats for wildlife species, especially those species in greatest conservation need.

HIGHLIGHTS

Prevention

The program completed a draft classification summary for non-native jumping worms. Jumping worms (*Amyntas agrestis* and related species) are a new type of invasive earthworm that are now reported in Minnesota and damage plants and soils. They are called “jumping worms” because of their unusual behavior—active when disturbed, they move like a snake and sometimes appear to jump. The program worked with partners to develop and launch the DNR's jumping worm web page and complete a species assessment to inform decision-making. We have a chance to prevent their spread in Minnesota. Visit mndnr.gov/invasives/terrestrialanimals/jumping-worm.

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. Funds are dispersed to DNR divisions and regions. Priorities include treatment of early detection invasive plants and management on high quality habitats.

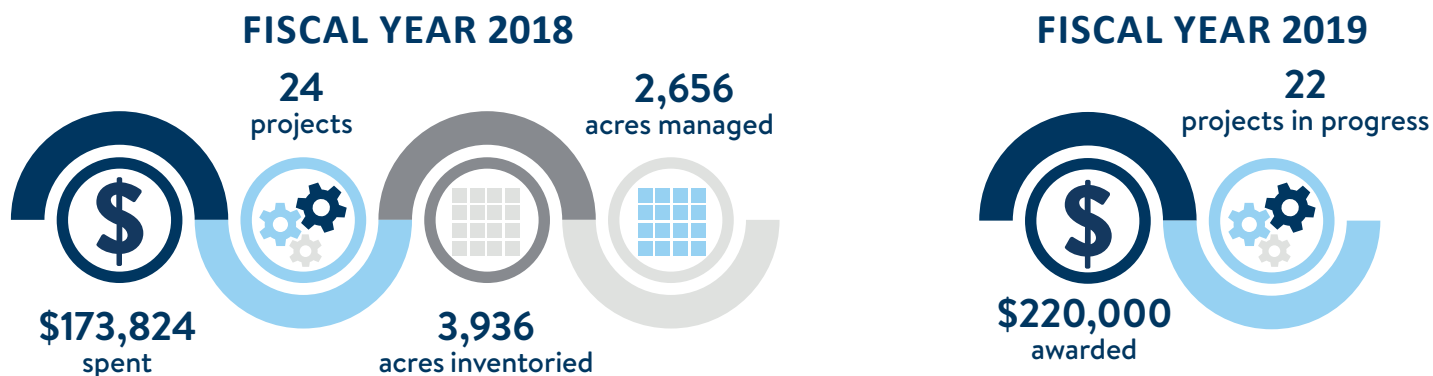


Photo on left:

A species of jumping worm (Amyntas agrestis) with a dead lady slipper plant from a Vermont nursery. Jumping worms change the soil and give it the granulated look of coffee grounds.

Photo courtesy of:

Josef Gorres, University of Vermont



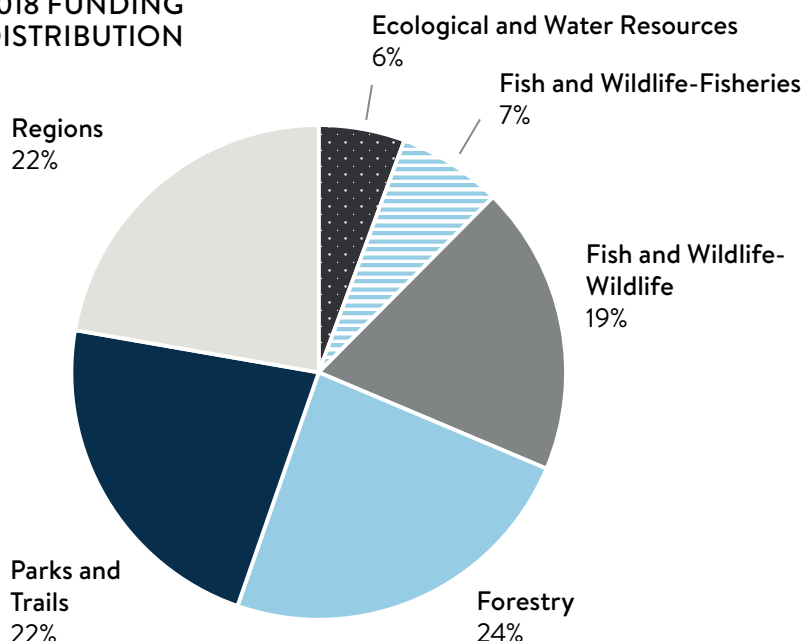
FUNDING HISTORY AND RESULTS

Fiscal Year/s	Dollars Spent	Acres (Inventoried and Managed)	Number of Projects
2006-2007	\$365,000	27,375	31
2008	\$435,660	26,523	32
2009	\$610,807	40,000 est.	47
2010	\$606,777	27,955 + 40,000 from aerial survey	42
2011	\$438,000	18,258	33
2012	\$178,340	24,989 + 13,500 from aerial survey	26
2013	\$160,000	7,547	22
2014	\$144,249	11,860	18
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	\$220,000 (awarded)	In progress	22

The following species were inventoried and/or managed in fiscal year 2018 projects:

Amur maple, bird's foot trefoil, black locust, bull thistle, burdock, Canada thistle, common buckthorn, common teasel, cow vetch, crown vetch, cutleaf teasel, dame's rocket, garlic mustard, glossy buckthorn, hairy vetch, Japanese barberry, Japanese hops, Japanese and Bohemian knotweed, leafy spurge, meadow knapweed, moth mullein, motherwort, multiflora rose, non-native honeysuckle, Oriental bittersweet, poison hemlock, Russian olive, Siberian elm, Siberian peashrub, spotted knapweed, tansy, wild parsnip

FISCAL YEAR 2018 FUNDING DISTRIBUTION



Outreach and Communication

The Minnesota State Fair invasive species display brought invasive species prevention messages to many state fair visitors.

The Terrestrial Invasive Species Program used committee involvement, direct communication and newsletter articles to contact stakeholders with an interest in jumping worm regulation.

Research

Garlic mustard biological control research and the United States permitting process continue to move forward. In 2017, the Technical Advisory Group for Biological Control Agents of Weeds recommended that the root mining weevil, *Ceutorhynchus scrobicollis* be released for the biological control of garlic mustard in the United States. In 2018, the U.S. Department of Agriculture (USDA) worked with the petitioners and the U.S. Fish and Wildlife Service (USFWS) on the next regulatory steps. The University of Minnesota completed additional research on the weevil and rare plants and submitted a formal response document to the USDA and USFWS in August 2018. Research was supported by the Minnesota Terrestrial Invasive Plants and Pests Center, through an appropriation from the Environmental and Natural Resources Trust Fund. In August 2018, the first *C. scrobicollis* were released in Canada by the Canadian Department of Agriculture and AgriFood.

PARTNERSHIPS

Minnesota Department of Agriculture

The Minnesota Department of Agriculture (MDA) is the state regulatory lead for terrestrial invasive plant pests (such as emerald ash borer and gypsy moth) 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 control, cost of control, 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 mda.state.mn.us/plants/pestmanagement/weedcontrol/mnnwac.

Minnesota DNR's Forest Health Program

The Minnesota DNR's Forest Health Program in the Forestry Division is responsible for surveys, evaluations, and impact assessments of forest pests and diseases as well as technical assistance on tree and forest health and invasive species. Visit dnr.state.mn.us/treecare/forest_health.

PlayCleanGo

The PlayCleanGo program is built around partnering and using consistent messaging to prevent the introduction and spread of invasive species. As of September 2018, PlayCleanGo had more than 543 partners in the United States, Canada and Mexico. Visit playcleango.org/partners.

Minnesota Invasive Species Advisory Council

The Minnesota Invasive Species Advisory Council (MISAC) continues to provide a mechanism for interagency and inter-organization communication and collaboration on invasive species issues. MISAC produced a 2019 wall calendar highlighting 12 invasive species and issues of concern to Minnesotans. Visit mninvasives.org.

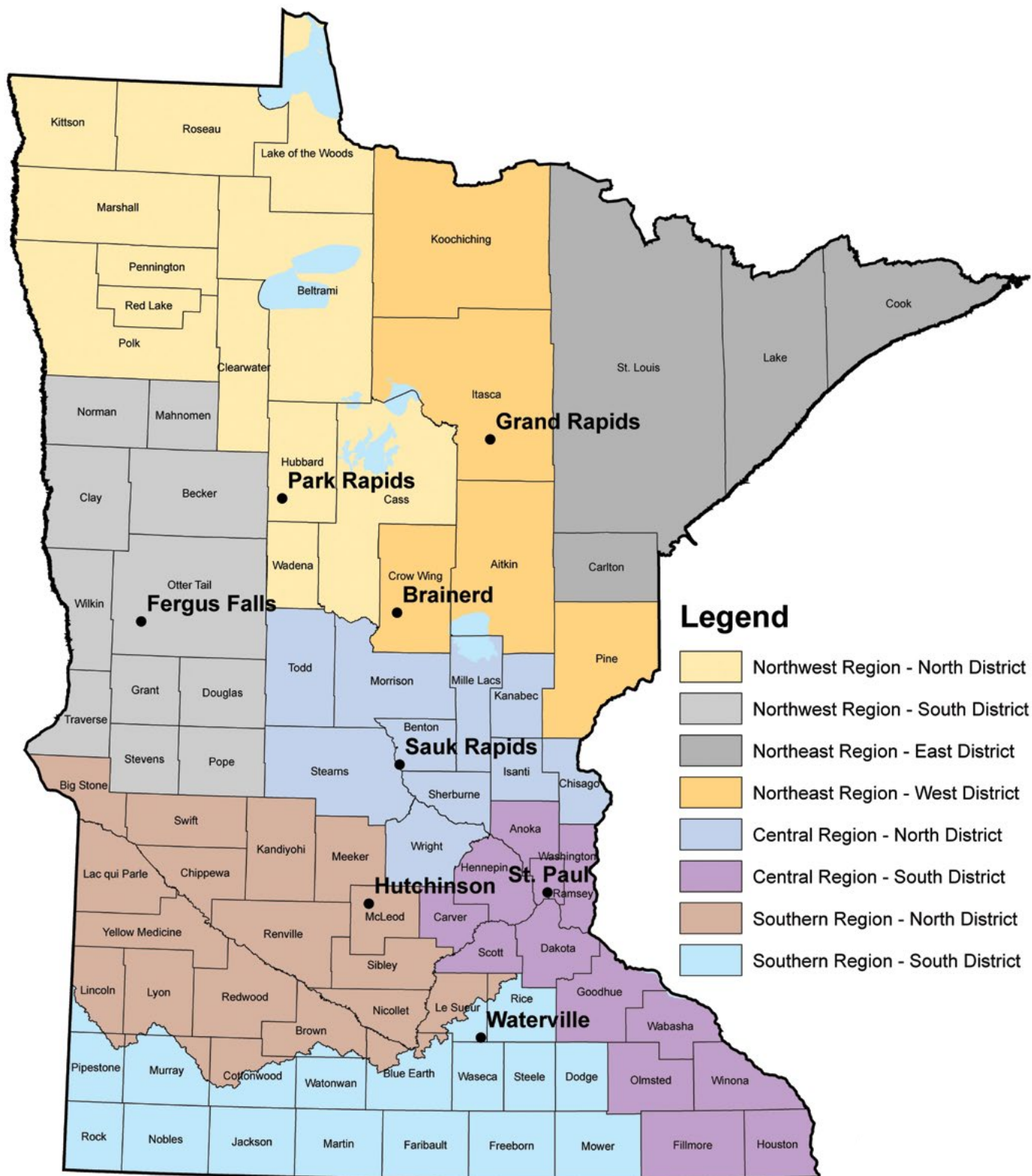
Minnesota Invasive Terrestrial Plants and Pests Center

The Minnesota Invasive Terrestrial Plants and Pests Center at the University of Minnesota funds applied scientific research to prevent and minimize the threats posed by terrestrial invasive plants, other weeds, pathogens, and pests. The DNR invasive species program's section manager serves on the advisory board for the center. Visit mitppc.umn.edu.

FUTURE NEEDS AND PLANS

Within the DNR, there is an ongoing need to expand awareness, data, tools and resources to reduce impacts of terrestrial invasive species on state-managed lands. Funding for terrestrial invasive species work has decreased since 2010. The terrestrial invasive species program plans to continue to work to meet the growing needs for outreach materials, data, tools and resources.

MINNESOTA DEPARTMENT OF NATURAL RESOURCES ECOLOGICAL AND WATER RESOURCES DISTRICTS



APPENDIX A

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APPENDIX B

Water Bodies Listed as Infested in 2018

This table includes all water bodies added to the infested waters list in 2018. Explanations of the last two columns are below:

Year species was first confirmed, or connected water body: Either (1) the year in which we 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 DOW number of the connected, confirmed water body.

DOW number: an identifying number for lakes. DOW stands for the former DNR Division of Waters. 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 in the number column; some river pools are identified with a DOW number.

WATER BODY NAME	COUNTY OR COUNTIES	LISTED FOR AQUATIC INVASIVE SPECIES	YEAR SPECIES WAS FIRST CONFIRMED, OR CONNECTED WATER BODY	DOW NUMBER
Amelia	Pope	zebra mussel	2018	61-0064
Andrew	Kandiyohi	zebra mussel	connected to Norway (34-0251)	34-0206
Annie Battle	Otter Tail	zebra mussel	2018	56-0241
Bald Eagle	Ramsey	zebra mussel	2018	62-0002
Barrett	Grant	zebra mussel	2018	26-0095
Bass	Otter Tail	flowering rush	2018	56-0770
Baxter	Isanti	Eurasian watermilfoil	2016	30-0114
Bay	Crow Wing	zebra mussel	2017 (dead); 2018 (live)	18-0034
Bde Maka Ska	Hennepin	zebra mussel	2018	27-0031
Becker	Stearns	zebra mussel	connected by the Sauk River between Sauk (77-0150) and Becker (73-0156)	73-0156
Belle	McLeod	Eurasian watermilfoil	2018	47-0049
Bemidji (includes Stump)	Beltrami	zebra mussel	2018	04-0130
Big Fish	Stearns	zebra mussel	2018	73-0106
Big Pine	Aitkin	zebra mussel	2018	01-0157
Blackduck	Beltrami	faucet snail	2018	04-0069

WATER BODY NAME	COUNTY OR COUNTIES	LISTED FOR AQUATIC INVASIVE SPECIES	YEAR SPECIES WAS FIRST CONFIRMED, OR CONNECTED WATER BODY	DOW NUMBER
Blanche	Otter Tail	zebra mussel	connected to Molly Stark and Annie Battle	56-0240
Blandin Reservoir	Itasca	zebra mussel	2018	31-0533
Blueberry	Wadena	faucet snail	2018	80-0034
Carr	Beltrami	zebra mussel	connected to Bemidji (04-0130)	04-0141
Carver Creek from Waconia to the Minnesota River	Carver	zebra mussel	connected to Waconia (10-0059), Burandt (10-0084) and Miller (10-0029)	
Cedar Island (Koetter)	Stearns	zebra mussel	2018	73-0133
Chippewa River from Emily (61-0180) to confluence with the Minnesota River	Multiple (Pope, Swift, Chippewa)	zebra mussel	2017	
Crooked	Crow Wing	Eurasian watermilfoil	2018	18-0041
Crookneck	Morrison	Eurasian watermilfoil	2018	49-0133
Crookneck	Morrison	zebra mussel	2018	49-0133
Cullen Brook and Roy Lake outlet stream between Roy (18-0398), Nisswa (18-0399) and Lower Cullen (18-0403)	Crow Wing	zebra mussel	connected to Roy and Lower Cullen	
Diamond	Kandiyohi	zebra mussel	2018	34-0044
Eagle	Kandiyohi	zebra mussel	2018	34-0171
East Loon	Otter Tail	zebra mussel	2018	56-0523
East Silent	Otter Tail	zebra mussel	2018	56-0517
Elkhorn	Kandiyohi	zebra mussel	2018	34-0119
Floyd (includes Mud)	Becker	zebra mussel	2018	03-0387
Fredrickson Slough	Sherburne	Eurasian watermilfoil	2018	71-0110
Games	Kandiyohi	zebra mussel	connected to Norway (34-0251)	34-0224

WATER BODY NAME	COUNTY OR COUNTIES	LISTED FOR AQUATIC INVASIVE SPECIES	YEAR SPECIES WAS FIRST CONFIRMED, OR CONNECTED WATER BODY	DOW NUMBER
George	Hubbard	faucet snail	2017	29-0216
Goodview	Winona	zebra mussel	2017	85-0012
Goose	Washington	Eurasian watermilfoil	2018	82-0059
Granite	Wright	flowering rush	2018	86-0217
Great Northern	Stearns	zebra mussel	connected by the Sauk River between Sauk (77-0150) and Becker (73-0156)	73-0083
Henchien	Kandiyohi	zebra mussel	connected to Norway (34-0251)	34-0207
Henderson	Kandiyohi	Eurasian watermilfoil	2018	34-0116
Horseshoe	Stearns	zebra mussel	connected by the Sauk River between Sauk (77-0150) and Becker (73-0156)	73-0157
Indian	Douglas	Eurasian watermilfoil	2018	21-0136
Irving	Beltrami	zebra mussel	connected to Bemidji (04-0130)	04-0140
Isabelle	Dakota	zebra mussel	2018	19-0004
Jewett	Otter Tail	zebra mussel	2018	56-0877
Johanna	Ramsey	zebra mussel	2018	62-0078
Little Floyd	Becker	zebra mussel	connected to Floyd (03-0387)	03-0386
Long	Otter Tail	zebra mussel	2018 - veligers	56-0784
Long	Otter Tail	zebra mussel	connected to East Loon (56-0523)	56-0388
Long Branch Creek from Long (56-0784) to Pelican River and streams from Jewett (56-0877) to Long	Otter Tail	zebra mussel	connected to Jewett (56-0877)	
Marquette	Beltrami	zebra mussel	connected to Bemidji (04-0130)	04-0142
Mary	Todd	Eurasian watermilfoil	2018	77-0019
Medicine	Hennepin	starry stonewort	2018	27-0104

WATER BODY NAME	COUNTY OR COUNTIES	LISTED FOR AQUATIC INVASIVE SPECIES	YEAR SPECIES WAS FIRST CONFIRMED, OR CONNECTED WATER BODY	DOW NUMBER
Melrose	Stearns	zebra mussel	connected by the Sauk River between Sauk (77-0150) and Becker (73-0156)	73-0251
Middle Cullen	Crow Wing	zebra mussel	connected to Lower Cullen (18-0403)	18-0377
Middle Pomme de Terre	Stevens	zebra mussel	connected - zebra mussels confirmed in Pomme de Terre River between Middle and North Pomme de Terre in 2018	75-0074
Miller	Carver	zebra mussel	2018	10-0029
Mississippi River from Carr (04-0141) to Wolf (04-0079)	Beltrami	zebra mussel	connected to Bemidji (04-0130)	
Mississippi River from Little Winnibigoshish (31-0850) to the confluence with the Leech Lake River	Itasca	zebra mussel	2017	
Molly Stark	Otter Tail	zebra mussel	2018	56-0303
Mound	Todd	zebra mussel	2018	77-0007
North Pomme de Terre	Stevens	zebra mussel	connected - zebra mussels confirmed in Pomme de Terre River between Middle and North Pomme de Terre in 2018	75-0061
Norway	Kandiyohi	zebra mussel	2018	34-0251
Perkins (Lower Pomme de Terre)	Stevens	zebra mussel	2018	75-0075
Pleasant	Wright	starry stonewort	2018	86-0251
Pomme de Terre	Grant	zebra mussel	2018	26-0097
Pomme de Terre River from Ten Mile (56-0613) to 500 feet downstream of Perkins (75-0075)	Multiple (Otter Tail, Grant and Stevens)	zebra mussel	connected - zebra mussels confirmed in Pomme de Terre River between Middle and North Pomme de Terre in 2018	
Reed	Otter Tail	zebra mussel	connected to Long (56-0784)	56-0876
Riley	Carver	zebra mussel	2018	10-0002
Round	Otter Tail	zebra mussel	2018	56-0214

WATER BODY NAME	COUNTY OR COUNTIES	LISTED FOR AQUATIC INVASIVE SPECIES	YEAR SPECIES WAS FIRST CONFIRMED, OR CONNECTED WATER BODY	DOW NUMBER
Sarah	Murray	zebra mussel	2018	51-0063
Sauk	Todd	zebra mussel	2018	77-0150
Sauk River from Sauk (77-0150) to Becker (73-0156)	Todd	zebra mussel	2018	
Schneider	Stearns	zebra mussel	connected by the Sauk River between Sauk (77-0150) and Becker (73-0156)	73-0082
School Section	Stearns	Eurasian watermilfoil	2018	73-0035
Shakopee Creek from Norway (34-0251) to Andrew (34-0206)	Kandiyohi	zebra mussel	connected to Norway (34-0251)	
Stalker	Otter Tail	flowering rush	2018	56-0437
Streams from West Battle to Otter Tail	Otter Tail	zebra mussel	connected to West Battle, Molly Stark and Annie Battle	
Sugar	Wright	zebra mussel	2018	86-0233
Swan	Kandiyohi	zebra mussel	connected to Norway (34-0251)	34-0223
Third Crow Wing	Hubbard	faucet snail	2016	29-0077
Unnamed lake	Otter Tail	zebra mussel	connected to Molly Stark and Annie Battle	56-1126
Unnamed lake (Hay)	Dakota	flowering rush	2018	19-0062
Walker	Otter Tail	zebra mussel	2018	56-0310
Wolf (Big Wolf)	Beltrami	starry stonewort	2018	04-0079
Zumwalde	Stearns	zebra mussel	connected by the Sauk River between Sauk (77-0150) and Becker (73-0156)	73-0089



ECOLOGICAL AND WATER RESOURCES

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www.mndnr.gov/invasives