



INVASIVE SPECIES 2019 CALENDAR

Minnesota Invasive Species Advisory Council

Advisory Council

This calendar was produced and distributed by the Minnesota Invasive Species Advisory Council (MISAC). MISAC is a statewide entity that:

- Promotes communication and cooperation among organizations involved in invasive species issues.
- Coordinates outreach on invasive species.
- Supports statewide and multi-state conferences related to invasive species issues.
- Supports trainings and field visits related to invasive species.
- Recognizes outstanding and noteworthy work related to invasive species and encourages such work through the Carol Mortensen Award.
- Advocates for research and management for the species and pathways deemed greatest risk.

The Council includes these members: 1854 Treaty Authority, Fond du Lac Band of Lake Superior Chippewa, Leech Lake Band of Ojibwe, Minneapolis Park and Recreation Board, MN Association of County Agricultural Inspectors, MN Board of Water and Soil Resources, MN Crop Improvement Association, MN Department of Agriculture, MN Department of Natural Resources, MN Department of Transportation, MN Forestry Association, MN Nursery and Landscape Association, MN Shade Tree Advisory Committee, National Park Service, St. Croix River Association, Soil and Water Conservation Society-MN Chapter, The Nature Conservancy, Three Rivers Park District, USDA-Animal and Plant Health Inspection Service, USDA-Natural Resources Conservation Service, U.S. Fish and Wildlife Service, U.S. Forest Service, University of MN, University of MN Sea Grant Program and Wildlife Forever.

MISAC Mission Statement

To provide leadership to prevent the spread and reduce the harmful impacts of aquatic and terrestrial invasive species to MN landscapes, economies, and the citizens of the State of MN by promoting invasive species awareness, prevention, and management through research, education, and regulation in cooperation with local, state, tribal, and federal partners.

Invasive Species Threats

Invasive species are nonnative plants, animals and pathogens that cause environmental damage, economic loss or harm to human health. These pests can displace native species, harm habitats, and degrade natural, managed, and agricultural landscapes.

In addition to harming our natural resources, invasive pests can pose serious economic threats to major Minnesota industries such as agriculture, tourism and forestry. Some estimates peg the economic damage of invasive pests in the U.S. at more than \$130 billion a year.

Public awareness and action are the keys to preventing the spread of invasive species. Please use the information in this calendar to help inform Minnesotans about the invasive species problem and how they can take action in the challenge to reduce invasive species spread and harm.

Authors

Becker Soil and Water Conservation District
Marsha Watland

MN Department of Agriculture
Angie Ambourn
Shane Blair
Emilie Justen
Kathy Kromroy
Stephanie Visser

MN Department of Natural Resources
April Rust

MN Department of Transportation
Dave Hanson

University of MN
Julia Bohnen
Jasmine Eltawely
Michelle Grabowski
Dan Larkin
Ray Newman
Nick Phelps
Megan Weber

University of MN Sea Grant Program
Doug Jensen

Editors

MN Department of Natural Resources
Greg Husak
Laura Van Riper

St. Croix River Association
Angelique Dahlberg

University of MN
Megan Weber

©2018 State of Minnesota
Department of
Natural Resources

500 Lafayette Road
St. Paul, MN 55155-4040
888-646-6367
651-296-6157
www.mndnr.gov

This information can be made available in alternative formats such as large print, braille or audio tape by emailing info.dnr@state.mn.us or by calling 651-296-6157.

Printed on recycled paper containing 10 percent post-consumer waste and vegetable-based ink. Minnesota-made paper.

FSC Logo

Information Sources

The Minnesota Invasive Species Advisory Council (MISAC) website provides additional information about invasive species in Minnesota. This website is a gateway to invasive species information including species profiles, contact information for experts in Minnesota, and links to other related websites.

MISAC
www.mninvases.org

The following websites of MISAC members also have information about invasive species:

Minnesota Department of Agriculture
www.mda.state.mn.us

Minnesota Department of Natural Resources
www.mndnr.gov/invasives

University of Minnesota Sea Grant Program
www.seagrants.umn.edu/ais

U.S. Department of Agriculture
 APHIS
www.aphis.usda.gov

U.S. Department of Agriculture
 Forest Service
www.fs.fed.us/invasivespecies

U.S. Department of Agriculture
 National Invasive Species Information Center
www.invasivespeciesinfo.gov

U.S. Fish and Wildlife Service
www.fws.gov/invasives

Find contact information for four agencies with invasive species responsibilities in Minnesota on the back of this calendar. These agencies, as well as other MISAC members, can provide informational products such as brochures, species identification cards, and videos about invasive species.

Report Invasive Species

One of the keys for a rapid response to invasive species is the early identification of new occurrences. Please report occurrences of invasive species in MN to the following:

- “Arrest the Pest” at: 888-545-6684. Please call to report suspicious pest species arriving on plants or articles from foreign countries or other states. Get the latest updates on invasive species such as gypsy moth, soybean rust, sudden oak death, Asian longhorned beetle, emerald ash borer, bark beetles, and other destructive insect, plant and disease pest species at: www.mda.state.mn.us/plants-insects/arrest-pest
- DNR Invasive Species Program at: 651-259-5100 or 888-646-6367 to report invasive aquatic plants or wild animals such as Eurasian watermilfoil, zebra mussels, invasive carp, round goby, nonnative deer and mute swans.
- EDDMapS Midwest website or Great Lakes Early Detection Network app at: www.eddmaps.org/midwest
- Or, as specified for individual species in this calendar.

Front Cover Photos

Drone: Monika Chandler, MN Department of Agriculture;
Purple coneflower: Michelle Grabowski, University of MN Extension;
Red-eared slider turtle: Jeff LeClerc, MN Department of Natural Resources;
Japanese beetle: MN Department of Agriculture.

Back Cover Photos

Drone: Monika Chandler, Minnesota Department of Agriculture;
Hybrid watermilfoil: Michael Verhoeven, Minnesota Department of Natural Resources;
Japanese beetles: Stephanie Visker, Minnesota Department of Agriculture;
Starry Trek: Megan Weber, University of Minnesota;
Phragmites: University of Minnesota.

MISAC Members





DRONES



Top: Image captured by a drone searching a forest for Oriental bittersweet vines. *Photo: Curt Olson, U of M*

Photo: Monika Chandler, Minnesota Department of Agriculture

What Is It?

A drone is an uninhabited aerial vehicle (UAV) that can fly by remote control or programmed flight plans guided by GPS and sensors. Drones come in many shapes and sizes, typically with a camera mounted on the bottom, which may be used to detect invasive species.

How Will This Help?

- It is much faster to survey prairies, bluffs, hills, timber stands and waterways by air than by foot.
- Drones provide access to areas that may be difficult to reach on foot to conduct invasive species surveys.
- Images from air surveys can be stitched together to create a full landscape view. Software can then search the landscape to find specific light wavelength ranges associated with target pests.
- Drones are likely to detect invasive species in less time and at lower cost than traditional methods.

Is It Ready To Use?

Many researchers are conducting aerial surveys. One example is a project by University of Minnesota, Minnesota Department of Agriculture, City of Red Wing and private landowners testing drones to detect Oriental bittersweet and Palmer amaranth. They are determining which cameras, sensors, aircraft, altitudes, flight plans and data processing procedures work best.

This work is supported by the Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizens Commission on Minnesota Resources.

Further Information

University of Minnesota UAV Laboratories:
www.aem.umn.edu/facilities/Unmanned_Aerial_Vehicle_lab.shtml

JANUARY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1 New Year's Day	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21 Martin Luther King Jr. Day	22	23	24	25	26
27	28	29	30	31		



HABITATTITUDE SURRENDER COLLABORATIVES



Top: Red-eared slider turtles. Bottom: Koi.

Above: Habitattitude Surrender and Minnesota Aquarium Society Auction. All photos: Doug Jensen, Minnesota Sea Grant

What's the Problem?

Release or escape of aquarium or water garden fish, turtles, crayfish, snails or other animals and plants into Minnesota waters is potentially harmful to our environment and economy. Released non-native species can become invasive, outcompete native species, carry diseases and destroy habitat.

Pet owners, teachers, students and water gardeners need to be aware that allowing plants or animals to escape into the environment can have serious negative impacts. Surrender Events provide a potential solution!

What is a Habitattitude Surrender Collaborative?

Minnesota Sea Grant-led Habitattitude Surrender Collaboratives provide pet owners a safe, legal way to rehome unwanted aquarium animals. At Surrender Events, pet owners bring in animals they can no longer care for, and partner organizations find new homes for those animals. Surrender Events benefit pets, owners, event partners and the environment. Habitattitude is a successful national education campaign that empowers pet owners to be part of the solution. Surrender Events provide people with a humane and ecologically friendly option for unwanted aquarium pets.

Regulatory Classification

It is illegal to release most aquarium or watergarden animals and plants into a free-living state (DNR).

How Can People Help?

- Establish a Habitattitude Surrender Collaborative in your community.
- Do not release non-native animals or plants into natural environments.
- Re-home your unwanted pets or plants at a Habitattitude Surrender Event near you.

Further Information:

- Surrender events: www.seagrants.umn.edu
- Habitattitude: www.habitattitude.net
- Regulations: www.dnr.state.mn.us/invasives/laws.html

Habitattitude Surrender Collaboratives funded through the Great Lakes Restoration Initiative.

FEBRUARY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	1	2 Groundhog Day
3	4	5	6	7	8	9
10	11	12	13	14 Valentine's Day	15	16
17	18 Presidents' Day	19	20	21	22	23
24	25	26	27	28	 Habitattitude TM PROTECT OUR ENVIRONMENT DO NOT RELEASE FISH AND AQUATIC PLANTS    www.Habitattitude.net	



TREE OF HEAVEN

Ailanthus altissima

Keys to ID

- Alternate, compound leaves are generally one to three feet long.
- A typical leaf can have 11–25 leaflets but may have as many as 41.
- Leaflets are smooth-edged, except for one to three notched teeth near the base, where a gland can be found on the underside of the leaflet.
- Fruits are flat and hold one seed.



Species: A tree that reaches heights up to 70 feet tall.

Origin: Native to Taiwan and central China.

Impacts

Tree of heaven is an aggressive invader that displaces native species as it forms thick stands that produce dense shade. Its tolerance of poor growing conditions, in particular, allows tree of heaven to be a troublesome invader in cityscapes, where it can damage pavement, sidewalks and foundations.

Status

Tree of heaven was extensively planted in eastern North American cities beginning in the 1700s and then into California as the gold rush began. While these regions of early introduction remain strongholds for tree of heaven, all but five states have recorded its presence in the Early Detection and Distribution Mapping System (EDDMapS.org). As of summer 2018, tree of heaven has been confirmed in only two Minnesota counties: Ramsey County, which includes St. Paul, and Houston County in southeast Minnesota.

Where to Look

Tree of heaven thrives in almost any habitat in full sun, but its ability to tolerate poor soils allows it to establish and thrive in abandoned urban settings.

Regulatory Classification (agency)

Listed as a Restricted Noxious Weed (MDA). This listing prohibits the importation, sale and transportation of propagating parts in the state.

Means of Spread

Tree of heaven spreads vigorously by root sprouting. Prolific seed production from female trees aids its spread to new areas.

How Can People Help?

- Do not plant tree of heaven.
- Report tree of heaven locations using EDDMapS.org.

Further Information

Visit www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/treeofheaven

MARCH

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
24	25	26	27	28	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
Daylight Savings Time Begins						
17	18	19	20	21	22	23
St. Patrick's Day			Spring Equinox			
24	25	26	27	28	29	30
	31					



DOCKS AND LIFTS

What's the Problem?

Docks and lifts have multiple parts with lots of nooks and crannies where aquatic invasive species (AIS) can attach. Carefully check brackets, foot bases, tires and the insides of long dock posts. Since docks and lifts are typically in the water all season, zebra mussels and faucet snails can attach to hard-to-reach interior parts of the equipment. Seeds, plant fragments and small or larval invertebrate invasive species can spread in mud stuck to docks and lifts. This provides a path of transport to another waterbody.

What is Being Done?

Minnesota passed laws to lower the risk of spreading AIS:

- Boat lifts, docks, swim rafts and other water-related equipment removed from any Minnesota waterbody must **sit out of water for 21 days** before being placed in **a different** waterbody in the state.
- In order to legally provide services, dock and lift companies and other businesses that install, remove, decontaminate or rent water-related equipment must be trained every three years on how to prevent AIS. These "lake service provider" businesses are often moving water-related equipment and are a key partner in slowing the spread of AIS.

How Can People Help?

- Inspect docks and lifts for invasive species and remove all plants and animals. Allow docks and lifts to sit out of water for at least 21 days before moving them to a new waterbody, as required by law. Leaving them out over winter is an even better option.
- Check the DNR website to make sure your dock installer company has the required permit.
- If you work for a lake service provider business, complete AIS training and get the required permit.

Further Information

www.mndnr.gov/lsp

APRIL

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
Easter	Earth Day				Arbor Day	
28	29	30	1	2	3	4



POISON HEMLOCK

Conium maculatum

Keys to ID

- Low-growing rosette in its first year.
- In second year, develops a tall flowering stalk that grows up to 8 feet tall.
- Stems are hollow, hairless and have ridges and purple spots or mottles.
- Fernlike leaves. Leaf stalks clasp to the stem.
- Small white flowers in three- to six-inch diameter clusters. Plants bloom May–August.



Species: Poison hemlock is a biennial herbaceous plant in the carrot family (Apiaceae). It may be mistaken for similar white-flowered carrot family plants.

Origin: Native to Europe

Impacts

Highly poisonous to humans and livestock. Do not ingest any part of the plant. Symptoms of toxicity include nervous trembling, salivation, pupil dilation, a rapid and weak pulse and, eventually, coma or death. If you suspect toxicity from poison hemlock, call the Minnesota Poison Control System immediately at 800-222-1222. For suspected toxicity to animals, call your local veterinarian. Use gloves, long sleeves, long pants, and closed-toe boots if working in an infestation. Poison hemlock can grow in dense patches and displace native vegetation.

Status

Reported in more than 15 counties in Minnesota, including central and southern Minnesota.

Where to Look

Roadsides, ditches, pastures, along streambanks.

Regulatory Classification (agency)

Poison hemlock is a Prohibited Noxious Weed on the Eradicate List (MDA). Landowners are required to eradicate any plants they find by killing both the above- and below-ground parts of the plant.

Means of Spread

Produces abundant seed that can be easily spread by mowers or other equipment.

How Can People Help?

- Learn to identify poison hemlock.
- Report finds by contacting MDA Arrest the Pest: 888-545-6684 or arrest.the.pest@state.mn.us.

Further Information

www.mda.state.mn.us/plants/pestmanagement/weedcontrol/targetplants/elimtargetplants/poisonhemlock

MAY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	1 Arbor Month in MN Begins	2	3	4
5	6	7	8	9	10	11
12 Mother's Day	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27 Memorial Day	28	29	30	31	1



HYBRID WATER- MILFOIL

Myriophyllum spicatum x
Myriophyllum sibiricum

Keys to ID

- Looks intermediate to Eurasian and northern watermilfoil.
- Compare the typical number of pairs of leaflets on a leaf:
 - Eurasian watermilfoil: 12–21
 - Northern watermilfoil: 5–9
 - Hybrid watermilfoil leaf: 8–12



Species

A rooted, submersed aquatic plant, which is a hybrid of the native northern watermilfoil and non-native Eurasian watermilfoil.

Origin

Eurasian watermilfoil is native to Europe, Asia and Africa. It was most likely introduced to North America from Asia in the 1940s. The hybrid has arisen in North America by sexual reproduction between the native and non-native species and was first documented in the early 2000s.

Impacts

Like Eurasian watermilfoil, hybrid watermilfoil can form dense monocultures with surface matting that can shade out native plants, inhibit navigation and disrupt recreation. Some genotypes of hybrid watermilfoil are more tolerant of some herbicides and, thus, more difficult to control.

Status

Widespread throughout North America, but distribution among lakes is less well-documented because genetic analysis is required for certain identification. As of 2017, hybrid watermilfoil had been confirmed in 23 lakes in Minnesota, but likely occurs in many more.

Where to Look

Look in waterbodies that have Eurasian or northern watermilfoil, in water depths 2–15 feet. It can be found in lakes by itself or in lakes with either or both parent species.

Regulatory Classification (agency)

It is a prohibited invasive species (DNR), treated as Eurasian watermilfoil in Minnesota.

Means of Spread

Boats, boat trailers and water recreation equipment. If a waterbody has both Eurasian and northern milfoil present, they may produce hybrid watermilfoil offspring.

How Can People Help?

- Remove all aquatic vegetation before transporting aquatic equipment.
- Notify the DNR Invasive Species Program with the exact location, if you spot suspected hybrids.

JUNE

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
Father's Day					Flag Day	
23	24	25	26	27	28	29
	30				Summer Solstice	



JAPANESE BEETLE

Popilla japonica

Keys to ID

- Adult beetles are up to about ½ inch in length.
- The adult's head is a dark metallic green color and the wing covers are a copper color.
- Adults have two white rear tufts of hair and five white lateral tufts of hair on their abdomen. Look-alike insects lack white tufts of hair.
- Grubs are creamy white, C-shaped and about one inch long when fully grown. Grub identification requires expert examination.



Species: Japanese beetles are metallic-looking leaf chafer beetles in the family Scarabaeidae.

Origin: They are native to Japan and northern China.

Impacts

Adults feed on the foliage and fruits of more than 300 species of trees, shrubs, vines, and field and vegetable crops. Feeding causes leaves to be skeletonized, with large, irregular holes. Grubs develop in the soil and feed on the roots of plants. They are a significant pest of turf in lawns, parks, golf courses and pastures.

Status

They are found in most states east of the Rocky Mountains. In Minnesota, Japanese beetles first reached noticeable levels in the Twin Cities area in 2011. Japanese beetles are most abundant in the seven county metro area, but they have been confirmed in about half of Minnesota counties.

Where to Look

Adults are commonly found feeding on the upper surface of leaves on sunny days in late June.

Regulatory Classification

Japanese beetles are not regulated in Minnesota. States west and south of Minnesota typically have regulations to prevent the introduction into their state. Those states require Japanese beetle-free certification from the Minnesota Department of Agriculture to accompany incoming shipments of plants and grass sod.

Means of Spread

Japanese beetles are primarily spread through the transport of nursery stock and grass sod. Grubs are found in soil, while adults hitchhike on plants, trucks or containers. Adults can also disperse by flying.

How Can People Help?

If you think you have found Japanese beetles in a county where they have not been confirmed, please report it at arrest.the.pest@state.mn.us or 888-545-6684.

Further Information

www.mda.state.mn.us/plants-insects/japanese-beetle

JULY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1	2	3	4 Independence Day	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3



STARRY TREK

*Searching for
Aquatic Invasive Species*

What Is It?

Starry Trek is organized by the Minnesota Aquatic Invasive Species Research Center and University of Minnesota Extension in partnership with the Minnesota Department of Natural Resources and local stakeholders. The event harnesses the power of motivated volunteers to search for and report new occurrences of starry stonewort and other aquatic invasive species. Starry Trek is also held in cooperation with University of Wisconsin Extension and River Alliance of Wisconsin's AIS Snapshot Day, making it a two-state day of action. Starry Trek was first held in 2017 and is planned as an annual event.

Where Is It?

Starry Trek searches take place throughout Minnesota, thanks to local host coordinators affiliated with soil and water conservation districts, county governments, lake associations and other groups. In 2017, local coordinators hosted Starry Trek rendezvous locations in 20 Minnesota counties.

How Does It Make a Difference?

During Starry Trek's inaugural event, 200 volunteers participated in Minnesota. They searched 211 public water accesses on 178 water bodies, with many additional participants in Wisconsin. Volunteers found a previously unknown population of starry stonewort in Grand Lake (Stearns County). This discovery was made when the population was small and appeared to be at an early stage of invasion, enabling the Grand Lake Association and Minnesota DNR to partner on the response, with DNR staff removing all visible starry stonewort by hand.

Further Information

Starry Trek will be held every August. Visit www.starrytrek.org to learn more and find a participating location near you!

AUGUST

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31



PHYTOPLASMAS

Candidatus

Phytoplasma species

Keys to ID

- Leaves are smaller than normal and pale yellow or purplish-red, depending on the plant.
- Witches brooms: a cluster of weak spindly branches growing from a spot where only one strong branch or no branches should arise.
- Irregularly distorted and discolored flowers.



Top: Spirea infected with spirea stunt phytoplasma.

Above: Echinacea (or purple coneflower) infected with aster yellows phytoplasma.
Photos: Michelle Grabowski, University of Minnesota Extension

SEPTEMBER

Species: Phytoplasmas are wall-less bacteria that inhabit the vascular system of plants. They are transmitted by sap feeding insects, such as leafhoppers and psyllids. Phytoplasmas cannot survive outside of a plant or insect vector and can only be observed with a high-powered microscope. Little is known about these tiny pathogens.

Origin: Information is lacking for most species.

Impacts

Phytoplasmas cause incurable diseases that result in discoloration and distortion of plant parts, stunting, overall reduced vigor, dieback and death. Some phytoplasmas can infect hundreds of species, while others are more specific.

Status

Several phytoplasmas already occur in Minnesota, such as aster yellows, ash yellows and spirea stunt phytoplasma. Others have not been found in the U.S. but are targets of Minnesota Department of Agriculture (MDA) early detection surveys, because of the serious impact they would have if they arrived here.

Where to Look: Any landscape where plants grow.

Regulatory Classification

USDA regulates imports of certain plants from countries where specific phytoplasmas are known to occur. Nursery stock suspected of phytoplasma infection will be placed off-sale by MDA nursery inspectors until laboratory analysis confirms whether the stock is infested.

Means of Spread: Spread occurs through movement of infected plants and insects.

How Can People Help?

- Only use, buy or sell healthy plant material from a reputable source.
- If concerned that a plant may be infected with a phytoplasma, submit a sample to the U of M Plant Disease Clinic for testing (pdc.umn.edu).

Further Information

extension.umn.edu/plant-diseases/aster-yellows

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 Labor Day	3	4	5	6	7
8	9	10	11 Patriot Day	12	13	14
15	16	17	18	19	20	21
22	23 Fall Equinox	24	25	26	27	28
29 Rosh Hashanah begins at sundown	30 Rosh Hashanah	1	2	3	4	5



U of M INVASIVE PHRAGMITES RESEARCH

Keys to ID

It can be difficult to distinguish invasive *Phragmites* from native *Phragmites*. A positive ID should be made before attempting to control *Phragmites*.

- Grows as tall as 15 feet.
- Stems are ribbed, rough textured, and typically green, but may be reddish on the lower stem.
- Leaf sheaths adhere closely to the stem and persist after the leaf blades drop in winter.
- Flowering begins from mid-Aug. to early Sept. Mature flowering heads may be up to 12 inches long, fluffy, and purplish-green, becoming tan in winter.



Species: A wetland grass that forms dense colonies.

Origin: Minnesota has a native *Phragmites* (*Phragmites australis* subsp. *americanus*) and an invasive *Phragmites* native to Europe (*Phragmites australis* subsp. *australis*).

Impacts: Invasive *Phragmites* degrades habitat, reduces plant and wildlife diversity and impairs recreational use of aquatic resources. It has impaired thousands of acres on the eastern seaboard. In Minnesota, it is at a relatively early stage of invasion.

What Are Current Research Efforts?

- Determining the current distribution of native and invasive *Phragmites* populations in Minnesota.
 - The University of Minnesota's MNPhrag program enlists professionals and members of the community to document populations, to provide baseline data and facilitate coordinated response efforts.
- Determining where *Phragmites* may spread.
- Developing management protocols for responding to different invasion scenarios.
- Identifying the extent to which Minnesota populations of invasive *Phragmites* are producing viable seed.

Status

Invasive *Phragmites* is not yet widely distributed in Minnesota, but is established in Duluth, the Twin Cities, along interstate highways and in some outstate counties.

Where to Look: Wetlands, shorelines and roadsides.

Regulatory Classification

Listed as a Restricted Noxious Weed (MDA).

Means of Spread

Invasive *Phragmites* spreads by rhizomes, stolons and seeds. Rhizomes may be transported via contaminated soil or by erosion. Seeds and stolons (horizontal above-ground stems) may be deposited in new areas by mowers.

How Can People Help?

- Report suspected populations in www.EDDMapS.org so an expert can verify the species.
- Do not harvest or transport the showy seed heads.

OCTOBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	1	2	3	4	5
6	7	8 Yom Kippur begins at sundown	9	10	11	12
13	14 Indigenous People's Day	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31 Halloween	1	2



WEED-FREE GRAVEL PIT CERTIFICATION

“A review of cost benefit analysis of controlling various non-native invasive species suggests that it’s 17 times cheaper to implement prevention practices than to apply management once they are established.”

— Corey Ransom, Associate Professor
of Weed Science, Utah State University



Top: New pit area needs to be clean where equipment drives or parks.

Above: Places to manage plants include fence line and roadways. *Photos: Marsha J. Watland*

What Is It?

When gravel is brought to a new site, it may bring plant seeds along with it. The goal of a Gravel Pit Certification Program is to provide consumers an opportunity to purchase gravel with fewer weed seeds. This helps prevent the spread of invasive plants and reduces maintenance costs. Gravel pit certification gives counties a standard for consistent weed management protocols. Certification is voluntary for gravel producers. Becker and Clearwater Counties are the first and only counties to implement programs in Minnesota.

How Does It Work?

County Agricultural Inspectors (CAI) are the designated authority for gravel pit certification, under the Minnesota Noxious Weed Law. Each CAI must be trained and certified in accordance with Minnesota Statutes.

A certification program begins with a local government resolution to purchase gravel, aggregates and fill from certified pits. Inspection uses protocols for conducting gravel pit inspections. Following an inspection, a certificate provides assurance to all participants that the gravel meets a minimum acceptable standard.

Gravel pits that contain prohibited noxious weed species can still be certified, if they treat their materials properly. Proper treatment would prevent seed formation and ripening, reducing the risk of seed dissemination. Treatment must also address non-seed parts of the plants that may propagate vegetatively.

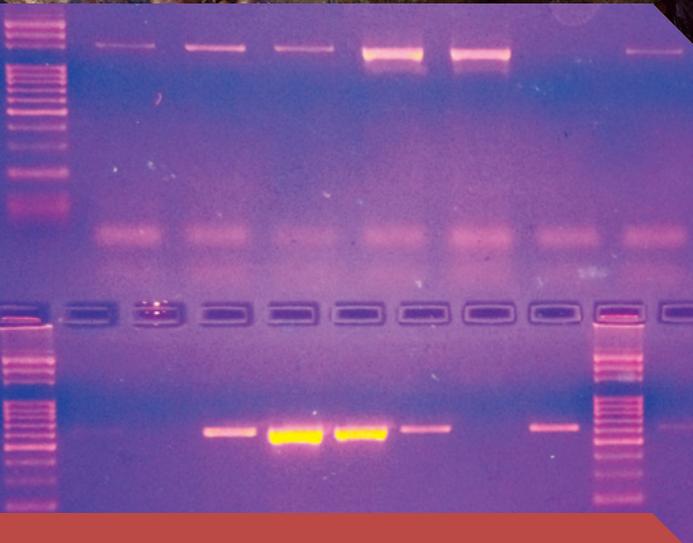
Further Information

North American Invasive Species Management Association Weed Free Gravel certification program:
www.naisma.org/weed-free-forage

Becker county gravel pit certification:
www.co.becker.mn.us/dept/soil_water/ag_inspector_program.aspx

NOVEMBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	1	2
3	4	5	6	7	8	9
Daylight Savings Time Ends		Election Day				
10	11	12	13	14	15	16
	Veterans Day					
17	18	19	20	21	22	23
24	25	26	27	28	29	30
				Thanksgiving		



FISH PATHOGEN RESEARCH

Top: Bluegill and other sunfish are the most common species reported in fish kills. **Above:** Viral DNA in samples from a common carp mortality event. *Photos: Isaiah Tolo, University of Minnesota*



Above: Researchers at the Minnesota Aquatic Invasive Species Research Center perform a necropsy of common carp to diagnose the cause of the mortality event. *Photo: Carter Blochwitz, University of Minnesota*

What Is It?

Fish kills are defined as sudden, localized mortality events involving five or more fish with similar symptoms. While some fish kills happen as a result of changing environmental conditions, dead fish can be a sign of pollution, toxic spills, harmful algae blooms or disease outbreaks.

Why Do We Care?

Researchers at the Minnesota Aquatic Invasive Species Research Center (MAISRC) are investigating these fish kills to discover and track potential invasive pathogens. Minnesota's first confirmed case of koi herpes virus caused a fish kill in southern Minnesota in 2017. Viral hemorrhagic septicemia virus has been confirmed in Lake Superior but not in any inland Minnesota lakes. As with any other invasive species, early detection is critical to informing response.

How Does It Work?

When a fish kill is reported, researchers travel to the lake as quickly as possible to begin the detective work. They collect information about the water, the environmental conditions and any sick fish that they may observe. Researchers then transport dead fish samples to the laboratory to examine the fish and conduct a number of tests to determine the cause of the fish kill. It's a stinky job, but it needs to be done!

How Can People Help?

Report fish kills and become a part of the research!

- See a group of five or more dead fish? Take note of the weather, water conditions and the number of fish you see.
- Call the state duty officer at 800-422-0798.
- Then use the MAISRC fish kill webpage to report online to UMN Researchers and to see where other fish kills have occurred.

Further Information

- MAISRC's fish kill webpage:
www.maisrc.umn.edu/report-fishkills
- Minnesota fish kill database: z.umn.edu/fishkill

DECEMBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
Hanukkah Begins Winter Solstice		Christmas Eve	Christmas	Kwanzaa Begins		
29	30	31	1	2	3	4
		New Year's Eve				

January



February



April



May



March



June



August



For more information about invasive species in Minnesota

Aquatic Plants and Animals
Minnesota Department of Natural Resources
Invasive Species Program
651-259-5100

U.S. Fish and Wildlife Service
612-713-5114

University of Minnesota
Sea Grant Program
218-726-8712

Terrestrial Plants and Insects
Minnesota Department of Agriculture
Invasive Species Program
651-201-6328

September



July

October

December



November

