



minnesota's forest

INVADERS

A Guide to Invasive Species





Minnesota

A Bold Approach to Responsible Forest Management

The Sustainable Forestry Initiative® (SFI) program is based on the premise that responsible environmental behavior and sound business decisions can co-exist.

SFI program participants practice responsible forestry on all the lands they manage. They also influence millions of additional acres through the training of loggers and foresters in best management practices and landowner outreach programs.

This unique commitment to responsible forestry recognizes that all forest landowners, not just SFI program participants, play a critical role in ensuring the long-term health and sustainability of our forests.

Look For Our Logo

The SFI Standard requires participants to employ an auditable system to characterize the forest practices on the lands where they procure raw material. This is done by auditing the on-the-ground practices for a portion of the wood that is supplied to their processing facilities. The program emphasizes reforestation, the utilization of best management practices and enhancing the professional capacity of wood production operations.

The SFI labeling program also recognizes landowners certified under the American Tree Farm System® and Canadian Standards Association (CSA) programs, who supply raw materials to SFI program participants as a source equivalent to forests certified under the SFI program for fiber sourcing labels. In addition to the procurement system, the SFI Standard requires participants to support various training and education programs, all of which is designed to assist landowners in improving their capacity to practice responsible forestry on all types of forest lands.

Invaders In Our Forests

Plants and animals that are not native to an ecosystem and are likely to cause economic or environmental harm are considered invasive species. These invaders are significant threats to healthy forests in Minnesota and throughout the nation. Prevention, as well as early detection and rapid response, are the first line of defense against new introductions. Once an invasive species becomes established, controlling it and restoring native vegetation is often a slow and costly process.

Invasive species arrive in Minnesota forests by various means—hitch-hiking on vehicles and equipment, stowed away in firewood and wood packing material, or creeping, crawling, and blowing with the wind. Once established in the forest, the invaders crowd out and prey upon native species, altering habitat and disrupting natural ecosystems.

Some invasive species destroy desirable trees and forest vegetation. Since its discovery in Michigan in 2002, the emerald ash borer has killed over 20 million trees in Michigan, Indiana, and Ohio. Although not yet found in Minnesota, forestry officials say this Asian pest poses a serious threat to the state's ash trees. Other invaders, such as buckthorn, are established in Minnesota forests and are difficult to control and eradicate.

As a private forest landowner, you can help prevent the spread of invasive species. Use this guide to identify invasive plants growing on your property and take immediate steps to control and manage them. Early detection of invasive insects and plants is key to effective control. If you suspect these or other invasive species are present on your land, contact the Minnesota Department of Agriculture, a local state forestry office or your county extension agent. They can identify the pest and recommend control measures. You may also refer to the websites listed on the back page of this publication. Vigilance and a rapid response to the discovery of invasive species are the best ways to protect your forest investment.

The goal of the Sustainable Forestry Initiative (SFI) is to ensure future generations enjoy the same opportunities provided by the abundant forests we enjoy today. Meeting the challenges of invasive species prevention, control, and management are necessary to achieve that goal. This manual gives you an overview of some invasive species threatening Minnesota forests and introduces responsible forest practices you can use to manage invasive species on your land. A healthy, sustainable forest provides the greatest benefits and opportunities to you, the landowner.

AMUR MAPLE

Originating in Asia, the Amur maples was first introduced to the U.S. in the mid 1800s. Planted as an ornamental, it is common in suburban landscapes. Seeds from Amur maples may take hold as invasives, spreading into areas where it displaces trees and shrubs in the forest understory or becomes established in open savannas.

IDENTIFICATION Reaching an average height of 20 feet, the Amur maple is a deciduous tree that grows best in full sun with well-drained soil, but can tolerate shade and poor soils. The four-inch leaves have three lobes (maple-shaped), with deeply toothed edges. The bark and twigs are smooth and light-colored. Clusters of fragrant white flowers appear in May and June, followed by two-winged fruit (seeds) that ripen in late summer. The prolific seeds can scatter widely when they drop from the tree. The foliage becomes bright red in the fall.

WHAT CAN YOU DO? Once established, Amur maple is not easily removed. The tree resprouts from stumps and may survive a prescribed burn. The best removal method is to pull up the root system. You can apply herbicides to cut stumps or the bark at the base of the tree.



BUCKTHORN

Two species of buckthorn were introduced to Minnesota by the nursery trade. Once popular for hedges and as ornamentals, common (European) and glossy (alder) buckthorn invade forests and wetlands, out compete native plants, and degrade wildlife habitat. The buckthorns are listed as noxious plants and are illegal to import, sell, or transport in Minnesota.

IDENTIFICATION Common buckthorn is a tall shrub, often with multiple stems at the base. Dark, glossy leaves are egg-shaped with fine-toothed edges and pointed tips. The leaves stay green late into the fall. Clusters of black, berrylike fruit ripen in August and September. The twigs have stout thorns.

Glossy buckthorn also is a tall understory shrub. Dark, glossy leaves are oval-shaped with smooth edges. Berry-like fruit clusters ripen from red-brown to dark purple in the fall.

WHAT CAN YOU DO? Remove buckthorn by cutting stems at ground level or pulling them up. Cut stems must be treated with an herbicide or covered with black plastic to prevent resprouting. Removing established buckthorn requires ongoing treatments to destroy new sprouts.



GARLIC MUSTARD

Garlic mustard is a European plant that spreads from gardens to the woods, where it may quickly take over the forest floor. Overwhelming native plant species, garlic mustard alters habitat for insects utilized as food by birds and small mammals. The tiny seeds are easily spread by birds or through human vectors such as logging equipment or recreational vehicles. Garlic mustard is classified as a prohibited noxious weed in Minnesota.

IDENTIFICATION Thriving in areas of forest disturbance, garlic mustard prefers moist, shaded deciduous woods or floodplain forests. It is a biennial plant that blooms with white, four-petal flowers in May of its second year. In the first year, dark green, leaves form rosettes. In the second year, the leaves are on alternate stems. When crushed, stems and leaves smell like garlic.

WHAT CAN YOU DO? If you find just a few garlic mustard plants, you can pull them up, remove them from the site, and dispose of them. A larger patch may be treated with prescribed burning. Spring or fall herbicide treatments can be used, too. The seeds remain viable for several years, so your boots and mechanical equipment must be washed thoroughly after being used where garlic mustard is found.



HONEYSUCKLE

Three species of exotic honeysuckle, Tartarian, Morrow's and Bell's, are considered invasives in Minnesota. Honeysuckles are popular ornamental shrubs readily available from nurseries. Birds feed upon honeysuckle berries and may transfer the shrub into the wild. Honeysuckles may become established in disturbed areas, abandoned fields, open woodlands, or other forest habitat, preferring drier soils.

IDENTIFICATION Honeysuckle shrubs are five to 15 feet high. They have multiple stems and may form dense thickets. Older stems have shaggy bark and a pithy interior. The simple leaves may be smooth or downy, depending upon the species. The shrubs are easily identified during the summer by their distinctive paired berries, which are red or yellow in color. Small, paired flowers bloom in May or June and are usually pink, but may be white or red.

WHAT CAN YOU DO? Honeysuckle can be pulled up, but pulling will expose the seedbed so it may resprout. Prescribed burning will kill seedlings and the living tops of mature plants, but repeated burns are necessary. You can apply herbicide to the foliage in the spring or treat cut stumps.



LEAFY SPURGE

Native to Europe and Asia, leafy spurge is distributed across the northern U.S., especially in grasslands and savannas. This perennial plant has a deep and extensive root system and may quickly displace native vegetation. Leafy spurge is often found in disturbed sites such as roadsides, though it may invade grasslands and forest openings. It prospers in dry soils, where it has less competition from native plants, but will grow in a range of soil and shade conditions. It is classified as a prohibited noxious weed in Minnesota.

IDENTIFICATION Leafy spurge is a perennial with smooth stems branching from a deep root. The stems, leaves, and flowers ooze milky white sap when broken. The plant is two to three feet in height and has clusters of yellow flowers that bloom from May to September. The seeds are expelled from a seed capsule and may travel up to 15 feet. They remain viable for years.

WHAT CAN YOU DO? It takes aggressive, repeated treatments to remove leafy spurge. The most effective control methods are herbicide applications and biological control using root mining flea beetles. Prescribed burns can be useful when done in conjunction with herbicides or biological controls.



MULTIFLORA ROSE

A native of Asia, multiflora rose is well established in the eastern U.S. and is beginning to spread into Minnesota. Once planted as an ornamental shrub or for wildlife cover, multiflora rose became a prolific and tenacious invasive that overwhelms other vegetation, especially in hilly terrain. If multiflora rose takes hold in Minnesota, it may damage pastures, prevent tree regeneration at forest harvest sites, or impede recreational activities.

IDENTIFICATION Multiflora rose forms dense thickets comprised of prickly stems that may reach heights of 15 feet. It commonly grows in disturbed or edge areas, such as roadsides, forest edges, and stream banks. Clusters of fragrant, white flowers bloom in May and June. The stems are covered with curved and flattened thorns. You can distinguish multiflora rose from other wild roses, because it has a feather-like fringed bract at the base of each leaf.

WHAT CAN YOU DO? Once established, multiflora rose is difficult to eradicate. Repeated cutting or mowing will slowly set it back, but it may take two to four years. Herbicide treatments kill the plants, but must be repeated over a period of years as seedlings continue to sprout.



PURPLE LOOSESTRIFE

In summer, colorful purple loosestrife is easily detected when it is growing in wetlands and ditches. Unfortunately, this Eurasian native forms dense stands that have little or no value as wildlife habitat. The plant is widespread in Minnesota. Infestations are monitored and controlled through an ongoing state management program.

IDENTIFICATION Purple loosestrife has a wand of pink-purple flowers with yellow centers. You'll find it growing in marshes or along the water's edge. Opposing leaves are downy with smooth edges. The stalks may reach heights of six feet. Stands of purple loosestrife form dense root mats in the soil. The plants begin producing seeds in late July or August.

WHAT CAN YOU DO? If you have a small infestation of purple loosestrife, you can pull up the plants by hand, preferably before the seeds ripen. Report infestations to the nearest DNR office or the county extension agent. They may provide you with control assistance. For large infestations, insects that eat purple loosestrife have proven effective. Although the insects don't eliminate purple loosestrife, they greatly reduce its abundance. Herbicide treatments must be repeated, because new plants sprout from remaining seeds.



JAPANESE KNOTWEED

Japanese knotweed is an ornamental plant also used for erosion control. In the wild, Japanese knotweed may colonize and take over stream banks and lake shores, choking out native vegetation. It primarily spreads through its root system forming new plants or by seeds. The plant is capable of tolerating a range of growing conditions.

IDENTIFICATION Forming dense thickets, this shrub-like plant may grow 10 feet high. Large, oval leaves are six inches long and three to four inches wide. Greenish-white flowers bloom in late summer. Stems are reddish-brown, hollow, and swollen where the leaf meets the stem. Tiny seeds are triangular shaped. In the soil, the plant sends out horizontal stems called rhizomes, which form roots and produce new plants.

WHAT CAN YOU DO? You can dig up or pull out small patches of Japanese knotweed. Use appropriate herbicides if the infestation is along the bank of a lake or stream. You can apply herbicide to cut stems or spray the foliage of large stands.



REED CANARY GRASS

Common in Minnesota wetlands and low lying areas, reed canary grass forms a mat of vegetation that eliminates other plants and has minimal wildlife value. It has been widely planted for forage and erosion control. Reed canary grass may become established following wetland disturbances such as ditching, stream channeling or sedimentation.



IDENTIFICATION Reed canary grass is among the first to green up in the spring. Growing two to six feet high on erect, hairless stems, reed canary grass has long, tapering leaves up to 10 inches in length and up to a half-inch in width. Blooming in May and June, the densely clustered florets go from green to purple and become beige as summer progresses. Horizontal stems, called rhizomes, grow beneath the soil and sprout to form new plants.



WHAT CAN YOU DO? Reed canary grass is difficult to control. Prescribed burns may give native species a better advantage. Mowing in mid June and October reduces seed production. In some situations, reed canary grass can be plowed up and reseeded with favorable species. Herbicide applications are most effective in the fall.

SPOTTED KNAPWEED

This Eurasian immigrant is thought to have invaded North America via contaminated alfalfa in the 1890s. It is a serious problem for rangeland in western states and is spreading in Minnesota. The seeds may hitch a ride in loads of hay or in the undercarriage of vehicles or mechanical equipment. It prefers dry sandy soils and may take hold in disturbed or undisturbed areas. Spotted knapweed is phytotoxic, which means it is poisonous to neighboring plants. In Minnesota, it is classified as a secondary noxious weed.



IDENTIFICATION Look for thistle-like pink to purple flowers at the tips of wiry stems two to three feet in height. Blooms appear from July through September. The plant is a biennial or short-lived perennial that reproduces with brown seeds topped with a tuft of bristles.



WHAT CAN YOU DO? Be sure to wear long sleeves and gloves when working with spotted knapweed, because it is a skin irritant for some people. You may pull up individual plants or mow them often to prevent seed production. Very hot, prescribed burns are necessary to kill spotted knapweed. Early summer herbicide treatment may be effective. Biological controls are used in Minnesota with some effectiveness.

SIBERIAN PEA SHRUB

Commonly used in hedges and as an ornamental, the Siberian pea shrub may become established along woodland edges, in savannahs, or in disturbed areas. This native of Siberia and Manchuria out competes native shrubs and stubbornly resists removal. It is sold in nurseries for landscaping, as well as for shelterbelts and wildlife cover.



IDENTIFICATION The bean-like seed pods, up to 2 inches long, are a distinctive identifying trait. Compound leaves contain eight to 12 pairs of elliptic leaflets. Yellow flowers bloom in May and June. The plant has narrow branches with gray bark or yellowish green bark on new shoots. Siberian pea shrub may grow to about 20 feet in height.



WHAT CAN YOU DO? Repeated prescribed burns will set back Siberian pea shrub, though it may continue to resprout. You may pull up individual shrubs. Treat cut stumps or spray around the stem with herbicide.

COMMON TANSY

Common tansy was once cultivated for medicinal purposes and is still planted by gardeners. In the wild, it primarily grows along roadsides or in similar disturbed areas where it crowds out other vegetation. Widely established across northern Minnesota, common tansy is classified as a secondary noxious weed in the state. Most grazing animals avoid common tansy.



IDENTIFICATION Common tansy is a perennial typically growing in dense patches. From July through September, you can identify common tansy by the clusters of bright yellow, button-like flowers topping stiff, three foot high stalks. Compound leaves projecting from the stalk are fern-like in appearance. When crushed, the leaves are strongly aromatic. After the foliage dies back for the season, stiff, brittle stalks remain. Numerous, tufted seeds are dispersed from the flower heads by wind and water. The plant also spreads from the roots and may grow from small root pieces



WHAT CAN YOU DO? Common tansy can be spot-sprayed with herbicide. Repeated treatments may be needed to eliminate infestations. You can pull up individual plants, but they may resprout from remaining roots.

THISTLE

Several non native thistles are found in Minnesota, including Canada, musk, bull, sow, and plumeless. They may be difficult to tell apart unless they are in bloom. Thistles generally become established in disturbed areas. Prickly leaves and stems make them unsuitable for grazing and uncomfortable for human contact. Some thistles are classified as prohibited noxious weeds in Minnesota.



IDENTIFICATION Thistles are easy to identify. A rosette-shaped plant with a deep tap root forms, then tall, flowering stems grow two to five feet. Small, purplish flowers bloom throughout the summer, creating clusters of tufted seeds distributed by winds and birds. Thistle seeds remain viable for many years. The plants can spread from shoots on the root system.



WHAT CAN YOU DO? Thistles are persistent and difficult to remove. You can try to pull them up, but they will resprout from pieces of roots remaining in the ground. Spring prescribed burning will set thistles back, but may trigger the plants to produce more seeds. You can follow up with spot-spraying with herbicides, preferably during the bud stage. Thistle-eating weevils are available, but have been known to eat native thistles, too.

WILD PARSNIP

Primarily found in southeastern Minnesota, wild parsnip becomes established in disturbed prairies and oak openings. A native of Europe and Asia, this is the same parsnip gardeners plant as a root crop. The sap from wild parsnip may cause skin rashes, irritation, and blistering.



IDENTIFICATION A perennial, wild parsnip may spend more than one year in the rosette stage. Blooming under favorable conditions from June to late summer, the plants produce flowerings up to four feet in height. Clusters of yellow flowers two to six inches wide appear at the top of the stem. After blooming, the plant dies. Small, straw-colored seeds remain viable up to four years. Although it slowly moves into new habitat, wild parsnip may spread rapidly once it becomes established.



WHAT CAN YOU DO? Whenever you are handling wild parsnip, wear long-sleeved shirts and pants, as well as gloves to avoid skin contact. You can pull up plants or cut them off below the root crown. Prescribed fire can be followed up with spot applications of herbicide, because wild parsnip is one of the first plants to green up after a burn. In undisturbed habitat, try leaving wild parsnip alone, because it may not out compete native vegetation.

ASIAN LONGHORNED BEETLE

The Asian longhorned beetle hasn't been found in Minnesota, but has infested trees in New York City and Chicago. The beetle, native to China and Korea, was transported to the U.S. in wood shipping crates. Aggressively attacking living trees, the beetle prefers maples but may infest other deciduous trees. Federal regulations requiring solid wood packing material from China to be treated to kill insects hopefully will prevent more introductions of this pest.



IDENTIFICATION The Asian longhorned beetles are $\frac{3}{4}$ to $1\frac{1}{4}$ inch in length. The adults are black with white markings and have long antennae. They chew holes into tree bark, especially maples, to lay eggs. Look for round and oval holes $\frac{3}{8}$ inch in diameter. You may find coarse sawdust around infested trees.



WHAT CAN YOU DO? Early detection of this pest is essential to the eradication of a beetle infestation. Trees attacked by the beetle must be removed. Any discovery of Asian longhorned beetle should be immediately reported to the Minnesota Department of Agriculture, a local state forestry office or your county extension agent.

COMMON PINE SHOOT BEETLE

The common pine shoot beetle is a Eurasian immigrant first discovered in Ohio in 1992. It has since been found in other states, including Minnesota in the Twin Cities metropolitan area. The beetle prefers Scotch pine, but may infest eastern white pine, red pine, and jack pine. Feeding on new shoots, the beetles may inhibit tree growth.



IDENTIFICATION Adult beetles are $\frac{1}{4}$ inch long, cylinder-shaped, and range in coloration from reddish brown to black. Larvae are the same length with legless, white bodies and a brown head. Eggs are laid in pine stumps and logs, with larvae emerging as adults in June. The beetles fly to living pine trees to feed on new and one-year old shoots, which are destroyed. In fall, the beetles burrow into thick bark at the base of the host tree to over winter.



WHAT CAN YOU DO? Minnesota is under a USDA quarantine for pine trees (including Christmas trees) and pine products with the bark attached. Pines and pine products being moved to a no quarantine area must be inspected and certified free from pine shoot beetles. Look for the beetles in dead or dying pine shoots. Chip or burn pine slash and downed logs. When harvesting pine, cut the stumps as close as possible to the ground.

EMERALD ASH BORER

The emerald ash borer was discovered near Detroit, Michigan in 2002. Since then, this Asian insect has killed millions of ash trees in Michigan, Ohio, and Indiana. It has not been found in Minnesota, but nevertheless poses a great risk to the state. Where it presently occurs in other states, the emerald ash borer has been found in nurseries, shade trees, and forests. It infests and kills all species of ash. Government agencies have quarantined areas where the insect is known to occur and restricted the transport of firewood by campers and others.



IDENTIFICATION The emerald ash borer is a small green beetle. As an adult, it feeds on ash foliage, but doesn't cause lasting damage. In the larval stage, it burrows into the inner bark of ash trees and disrupts the transport of water and nutrients. Since the insect hasn't been discovered in Minnesota, be on the watch for dead or dying ash trees.



WHAT CAN YOU DO? Examine any dead or declining ash trees for evidence of the emerald ash borer. Report suspicious damage to the Minnesota Department of Agriculture, a local state forestry office or your county extension agent. Do not transport firewood or wood with the bark on from one location to another, especially from out of state.

GYPSY MOTH

The gypsy moth originated in Europe and appeared in the eastern U.S. in 1869. Gypsy moth caterpillars feed on newly developed leaves and can defoliate deciduous trees across broad areas. In Minnesota, aspen, oak, and sugar maples are the preferred food trees. If a gypsy moth infestation lasts for more than one year, many trees may die. Gypsy moths have few natural predators.



IDENTIFICATION Caterpillars hatch from egg masses found on trees, firewood, other objects in spring and early summer. After feeding on the foliage of host trees, the caterpillars pupate in midsummer, forming a reddish brown hard shell. Moths emerge in late summer and early fall. Male moths are smaller than females and brownish-colored. Female moths yellowish-white with a series of dark dots across the bottoms of their wings. They cannot fly. Males, which do fly, have up to a 1 1/2-inch wingspan. The females have a 2 1/2-inch wingspan.



WHAT CAN YOU DO? Report suspected gypsy moth egg masses to the Minnesota Department of Agriculture, a local state forestry office or your county extension agent. When camping or going to your cabin, use local firewood.

JAPANESE BEETLE

The Japanese beetle was first found in New Jersey in 1916 and has since become widespread in the eastern United States, including Minnesota. They feed on an array of leafy and flowering vegetation, including shrubs and shade trees. The larvae burrow in the soil and feed on the roots of grasses, vegetables, and herbaceous fruits.



IDENTIFICATION Adult Japanese beetles are green with copper wing casings and about 1/2 inch long. They have tufts of white hair along both sides of the abdomen. The larvae have grayish white bodies and brown heads. They may be up to one inch in length. Beetle activity peaks on warm summer days. The beetles eat green tissue, leaving a skeletal web of leaf veins. They also consume flowers and fruit.



WHAT CAN YOU DO? The Minnesota Department of Agriculture monitors Japanese beetles. If you suspect you've found beetles or have extensive damage to vegetation that may be caused by them, report it to the agency. You can also cooperate with the monitoring program by allowing technicians to place insect traps on your property. Do not import soil, plants rooted in soil, or sod from eastern states unless it is certified by state officials or treated to eliminate Japanese beetles.

SIREX WOOD WASP

The sirex wood wasp has not been found in Minnesota. A native of Europe, Asia, and north Africa, this insect has been discovered in solid wood packing material entering the United States. In other countries where it has been accidentally introduced, it has done extensive damage to several species of pines, including North American varieties.



IDENTIFICATION The sirex wood wasp is difficult to distinguish from native wood wasps. They are one to 1 1/2 inches long. Adult wood wasps have blue-black bodies with middle segments of orange. They have reddish-yellow legs with black feet. Wood wasps have a spear-shaped plate at the tail end and also are known as horntails. The larvae are creamy white and have a distinctive dark spine at the tail end.



WHAT CAN YOU DO? Sirex wood wasps attack living pines. The females lay eggs in the outer sapwood in combination with a mucous and symbiotic fungus that kills the tree to create a suitable environment for the larvae. The larvae tunnel through the sapwood and eventually emerge through holes in the bark as adults. If you have dead or dying pine trees exhibiting this damage, contact the Minnesota Department of Agriculture, a local state forestry office or your county extension agent.



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Back Cover

Common pine shoot beetle, Stanislaw Kinselski, Bugwood.org



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For More Information

If you suspect these or other invasive species are present on your land contact the Minnesota Department of Agriculture, a local state forestry office or your county extension agent.

**Minnesota SFI
Implementation Committee**
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On the Web

www.dnr.state.mn.us/invasives/index.html
www.dnr.state.mn.us/treecare/forest_health/index.html
www.mda.state.mn.us/plants/pestmanagement/invasives.htm

Burrows in a log made by common pineshoot beetle larvae.