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INVASIVE SPECIES FIELD GUIDE





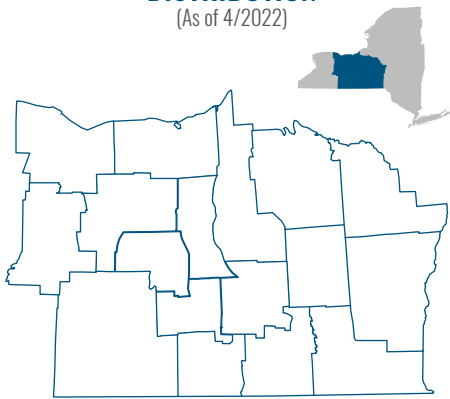
EASTERN MOSQUITOFISH, WESTERN MOSQUITOFISH

Gambusia holbrooki,
Gambusia affinis
Origin: Southern Atlantic & Gulf slope drainages, Mississippi Basin

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION
(As of 4/2022)



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Mosquitofish are small, gray or brown invasive fish. They have short bodies, growing up to about 7 cm, with a flat-topped head and a mouth that is pointed upward for surface feeding. The dorsal and caudal fins are rounded. Small black dots may be present on the body and tail, as well as a small dark-colored bar below the eye. These species are very similar in appearance to each other.

HABITAT

Mosquitofish can live in a variety of freshwater habitats including rivers, springs, and marshes, although they prefer shallow, warmer waters lacking predatory fish. They may also occur in brackish water. These species can withstand higher pollution levels and lower dissolved oxygen levels than other fish. However, they are susceptible to cold temperatures. Some populations have been known to overwinter under ice cover.

THREAT

Due to their aggressive and predatory behavior, mosquitofish can greatly disrupt food webs and negatively impact native fish populations through predation and competition. Despite their name, these fish are not particularly efficient mosquito predators, as they prefer larger prey; they may benefit mosquitos by consuming predators and competitors of the mosquitos. They may also displace native fish species that act as more efficient mosquito control agents. Mosquitofish populations may also result in algal blooms if too many grazing zooplankton are consumed.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - IUCNRedlist. "Gambusia affinis." <http://www.iucnredlist.org/details/166562/0>. (accessed June 6, 2017). U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].

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NORTHERN SNAKEHEAD

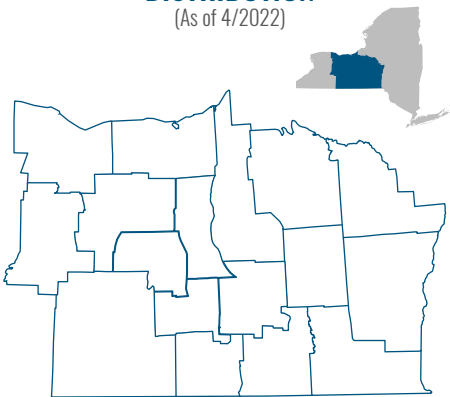
Channa argus
Origin: Asia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION

(As of 4/2022)



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The Northern Snakehead is a long, thin fish with a somewhat flattened head. It is brown with dark blotches, and has a single dorsal fin running along the length of the body. The anal fins are located directly behind the pectoral fins, unlike the native bowfin, whose anal fins are located much farther back on the body. They can grow larger than 80 cm.

HABITAT

Northern Snakehead lives in canals, lakes, and rivers, preferring shallow, stagnant waters with a muddy substrate and aquatic vegetation. It is tolerant of a wide range of temperatures and poorly oxygenated waters.

THREAT

This species may compete for resources with native species, including foods and habitat. Competition for aquatic insects puts native fish populations at risk, and can disrupt recreational and commercial fishing. Juvenile fish are capable of overland movement and can survive up to four days out of water.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - Fuller, P.L., Benson, A.J., Nunez, G., Fusaro, A., and Neilson, M., 2017, *Channa argus* (Cantor, 1842): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, <https://nas.er.usgs.gov/queries/factsheet.aspx?speciesid=2265>, Revision Date: 6/12/2017, Access Date: 9/18/2017 Northern Snakehead Fish. New York State Department of Environmental Conservation. Albany, NY. Accessed [9/18/17] <http://www.dec.ny.gov/animals/45470.html>

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ORIENTAL WEATHERFISH, DOJO, WEATHER LOACH

Misgurnus anguillicaudatus
Origin: Eastern Asia

INVASIVE RANKING, NYS

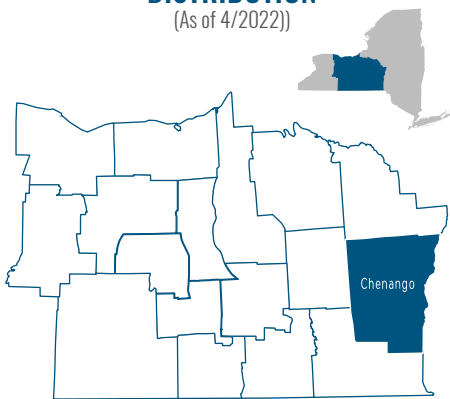
Very High

MANAGEMENT STRATEGY

Physical Prevention

DISTRIBUTION

(As of 4/2022)



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The invasive Oriental Weatherfish is a bottom-feeding, insectivorous fish with an eel-like body. It is colored a marbled brown and greenish gray dorsally and pale silver ventrally. It has a small, underslung mouth with fleshy lips surrounded by six barbells. Individuals average 15 cm in length, but may grow as long as 28 cm.

HABITAT

These fish are often found in shallow, slow-moving waters with muddy or silty substrates. They can survive in oxygen-poor waters by breathing air using a modified intestine and survive long droughts by estivating in soft substrates.

THREAT

This species competes with native fish populations for aquatic insects as a food source. Macroinvertebrate abundance may be drastically reduced. This species has been associated with increased turbidity and nitrogen levels in standing water.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through pet trade, fishing, and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Once established, removing individuals with backpack electrofishing and bait nets can be effective in managing populations.

REFERENCE - Nico, L., P. Fuller, M. Neilson, J. Larson, A. Fusaro, T.H. Makled, and B. Loftus. 2017. *Misgurnus anguillicaudatus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <https://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=498> Revision Date: 1/27/2016
Wells, S. 2014. Monitoring Feral Oriental Weatherfish Infestations In New York State. American Currents. <http://www.nanfa.org/ac/oriental-weatherfish-new-york.pdf>

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ROUND GOBY

Neogobius melanostomus
Origin: Eurasia

INVASIVE RANKING, NYS

High

MANAGEMENT STRATEGY

Prevention

Round Gobies are small, brown and black blotched fish with large, frog-like heads. There is a black spot on their front dorsal fin, which is a characteristic of the species. They grow to just under 30 cm in size. Round Gobies can be distinguished from native sculpins (*Cottidae*) by their fused pelvic fins, or sucktorial disc, which helps them attach to surfaces in flowing water.

HABITAT

Round Gobies are bottom dwellers of fresh or brackish water. They can thrive in a wide variety of habitat types, including open sand, dense macrophytes, and rocky substrates.

THREAT

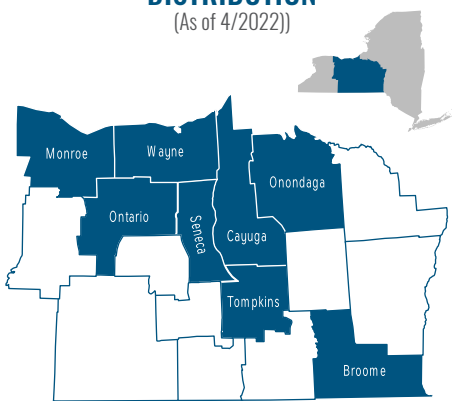
Round Gobies are aggressive fish that can outcompete native species for food, shelter, and nesting sites. They also prey on eggs of many native fish species. Round Gobies bioaccumulate many contaminants, which are then passed on to larger game fish and then potentially to humans.

MANAGEMENT

Prevention and education are the best management strategies. Clean, drain, and dry all equipment prior to moving between waterbodies, and do not release live bait. Little can be done to eradicate populations once they are established.

DISTRIBUTION

(As of 4/2022)



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REFERENCE - Invasives Species Awareness Program. (2011). Round Goby. Retrieved from Ontario Invading Species Awareness Program: <http://www.invadingspecies.com/invaders/fish/roundgoby/>
U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/8/2017].



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Female (middle), male (right) compared to cottonwood borer (left)



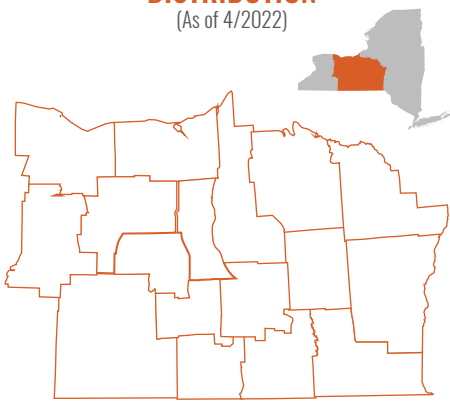
ASIAN LONG-HORNED BEETLE

Anoplophora glabripennis
Origin: Asia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Chemical
Physical
Prevention

DISTRIBUTION
(As of 4/2022)



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Asian longhorned beetles (ALB) are a forest pest with a wide range of host trees. Adult beetles are 2-4 cm in length, with jet black bodies and mottled white spots on the back. Their black-and-white-banded antennae are 1.5-2.5 times longer than the body. Beetle larvae are cream-colored, cylindrical, and up to 6 cm in length. They produce frass that looks like wood-shavings, and leave a circular exit hole about 1 cm in diameter and over 2.5 cm deep.

HABITAT

These beetles live in a wide range of native hardwoods, but prefer maple trees. Larvae first burrow between the inner bark and the wood of the tree, forming a feeding gallery; as they mature, they move deeper, to the dense inner wood of the tree trunk.

THREAT

Asian longhorned beetles can severely damage the physical and vascular structure of trees, interfering with uptake of vital nutrients. Continued infestation leads to tree death in six to eight years. In the US, \$669 billion worth of urban trees are at risk to this pest, and the potential damage to forest ecosystems is currently incalculable.

MANAGEMENT

Quarantines and tree removal are the current methods of prevention and eradication. The Don't Move Firewood campaign helps prevent its spread to new locations. Annual pool surveys help monitor for new infestations. In some areas, an insecticide may be used as a preventative measure as well as a treatment, although it can be costly. Biological control methods are being researched, but are not yet available for use. Development of genetically resistant trees may be part of the long-term solution to ALB if eradication from the US is not successful.

REFERENCE - Meng, P. S., K. Hoover, M. A. Keena. "Asian Longhorned Beetle (Coleoptera: Cerambycidae), an Introduced Pest of Maple and Other Hardwood Trees in North America and Europe." *J. Integ. Pest Mngmt.* (2015) 6(1): 4;DOI: 10.1093/jipm/pmv003

US Forest Service. "Forest Health Protection." www.na.fs.fed.us. https://www.na.fs.fed.us/fhp/alb/ident_reporting/identifying.shtm. (accessed May 25, 2017).

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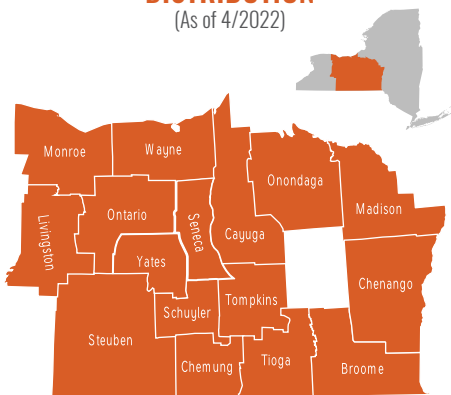
EMERALD ASH BORER

Agrilus planipennis
Origin: Northern China, Korea

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Chemical
Prevention

DISTRIBUTION
(As of 4/2022)



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Emerald ash borer (EAB) is a wood boring beetle that feeds on and eventually kills all species of ash. Adults are about 1 cm long, with an elongated metallic green body and narrow brass colored head. Larvae are creamy white with a brown head and are flattened on top and bottom. The larvae have eight abdominal segments, with the last segment sporting two pincer-like spines. Adults emerging from trees in the spring leave a D-shaped exit hole in the bark.

HABITAT

Emerald ash borers can be found in, on, or around ash trees (*Fraxinus* spp.) in hardwood forests.

THREAT

Adult beetles feed on ash foliage, causing aesthetic damage. The larvae damage ash trees by feeding on the inner bark, which disrupts the transportation of water and nutrients, resulting in mortality. Destruction caused by the emerald ash borer is projected to cost \$10.7 billion by 2020 through urban tree removal, loss of ecosystem services and property value, and wholesale loss of ash plantations.

MANAGEMENT

Ash trees can be treated with an insecticide to prevent infestation; treatments last for three years. Planning for removal of untreated trees in urban areas will prevent costly emergency removals. It is also important to prevent the spread of established populations. When recreating and camping, only local firewood should be used. Biocontrol with the use of parasitic wasps is currently being deployed in a few states. This is a long-term management method rather than immediate control.

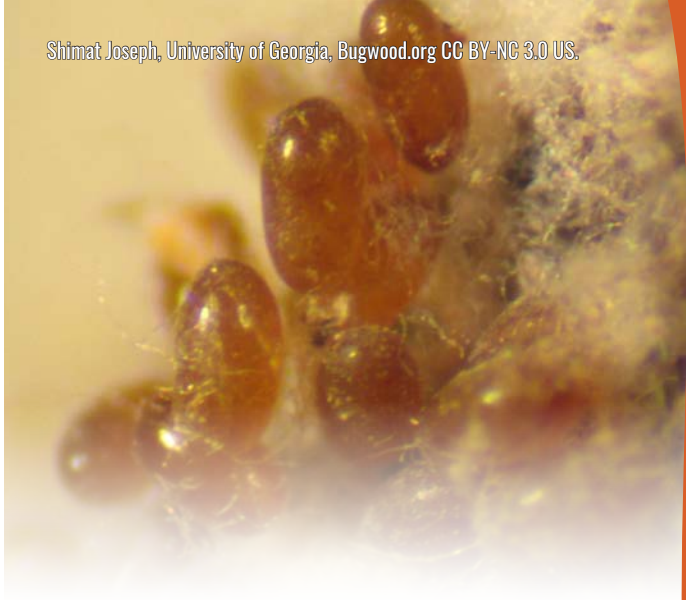
REFERENCE - McCullough, Debra. 2015. Pest Alert: Emerald Ash Borer. United States Department of Agriculture. USDA. June 17, 2017. https://www.na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf

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HEMLOCK WOOLLY ADELGID

Adelges tsugae

Origin: Asia, Southern Japan

INVASIVE RANKING, NYS

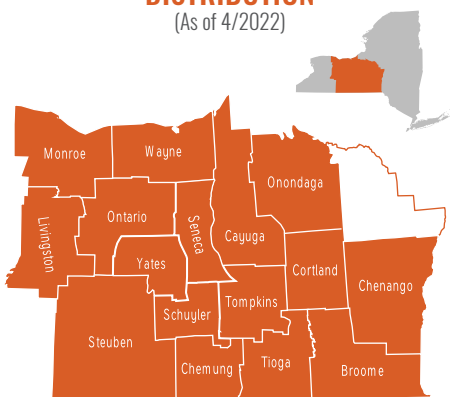
High

MANAGEMENT STRATEGY

- Chemical
- Biocontrol
- Prevention

DISTRIBUTION

(As of 4/2022)



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The hemlock woolly adelgid is a small, aphid-like insect that attacks hemlock trees. They are most easily recognized by the white “woolly” masses of wax they use to protect themselves and their eggs from desiccation and predation. These ovisacs can be readily observed on the undersides of branches, at the base of the needles, from late fall to early summer. Infested trees may have gray-tinted foliage or exhibit needle loss and branch dieback.

HABITAT

The hemlock woolly adelgids feed on native eastern hemlock (*Tsuga canadensis*), and on any ornamental species of hemlock. They are found on twigs at the base of needles.

THREAT

Hemlock woolly adelgids use their long, sucking mouthparts to tap into the food storage of plant cells, which causes the tree to wall off the wound with scar tissue. After an intense infestation, the tree is unable to get sap to the end of its branches to produce new growth; once existing needles die, the tree cannot produce food. Dieback can occur in as little as two years, and mortality in 4-20 years depending on site characteristics and climate. Hemlock woolly adelgids reproduce asexually in the eastern US, so one insect can start a new infestation.

MANAGEMENT

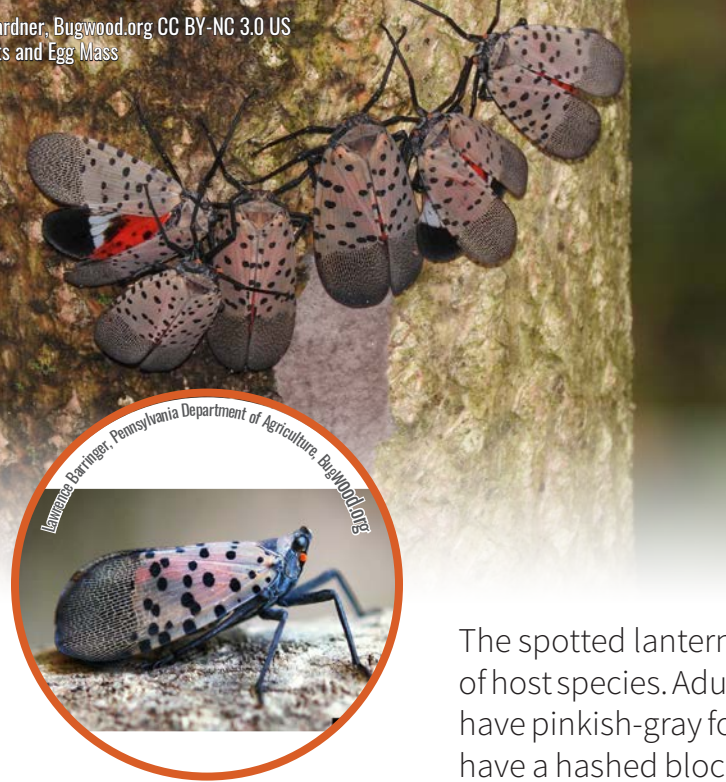
Treatment with systemic insecticides is effective and relatively inexpensive, with treatments remaining effective for up to seven years. Limiting the movement of infested nursery stock will slow its spread. Biological controls are under development and are the best long term management option.

REFERENCE - Childs, Robert. Hemlock Woolly Adelgid Frequently Asked Questions. <https://ag.umass.edu/landscape/fact-sheets/hemlock-woolly-adelgid-frequently-asked-questions>. DEC. Hemlock Woolly Adelgid <http://www.dec.ny.gov/animals/7250.html>. May 31, 2017.

US Forest Service. Pest Alert - Hemlock Woolly Adelgid https://www.na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm. May 25, 2017.

Hemlock Woolly Adelgid, *Adelges tsugae* Factsheet. 2016. New York State Department of Environmental Conservation. https://www.dec.ny.gov/docs/lands_forests_pdf/hwafactsheet.pdf.





Richard Gardner, Bugwood.org CC BY-NC 3.0 US.
SLF Nymphs

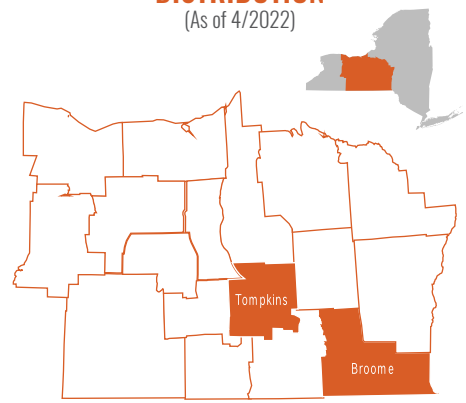
SPOTTED LANTERNFLY

Lycorma delicatula
Origin: Asia

INVASIVE RANKING, NYS
Not Ranked

MANAGEMENT STRATEGY
Prevention
Physical
Chemical

DISTRIBUTION (As of 4/2022)



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The spotted lanternfly (SLF) is an invasive insect with a wide range of host species. Adults are one inch long and about 0.5 in wide. They have pinkish-gray forewings, which are dotted with black spots and have a hashed block pattern near the tips. The upper portion of the hindwings are black with a white band, while the lower part of the hindwings are bright red with black spots. Nymphal development proceeds through four instar stages. The first three instars are black with white spots, while the fourth instar features red patches.

HABITAT

The SLF prefers to feed on tree-of-heaven (*Ailanthus altissima*), which it may need to complete its lifecycle. SLF also feeds on a variety of plants, trees, and agricultural crops, such as grapes, hops, apples, and maples. Females lay gray egg masses on host plants and just about any flat surface, including stone and metal.

THREAT

As SLF feeds, it excretes a sticky sap, called honeydew rain. This honeydew rain attracts black sooty molds, which can impact the health of the host plants and damage their fruits. Resulting fermentation and odor may also attract other insects. This greatly threatens NYS grape and tree-fruit industries, as well as the forestry, nursery, and landscaping industries. The NYS grape industry alone generates an estimated \$4.8 million in economic activity annually.

MANAGEMENT

The SLF travels easily as a hitchhiker, so gear, vehicles, and equipment should be checked for egg masses before leaving areas with SLF populations (currently in DE, NJ, PA, MD, & VA). Egg masses can be scraped off surfaces and destroyed by crushing and submersion in rubbing alcohol or hand sanitizer. Removal of tree-of-heaven may be a proactive approach to help stop the spread of SLF. To ensure effective removal, consult an expert for guidance. The insecticide, dinotefuran, can be used as a bark spray or injection to kill SLF.

REFERENCE - Dara, S.K., L. Barringer, and S.P. Arthurs. "Lycorma delicatula (Hemiptera: Fulgoridae): a new invasive pest in the United States." *J. Integ. Pest Mngmt.* (2015) 6(1). DOI: 10.1093/jipm/pmv021.
PennState Extension. "Spotted Lanternfly." www.extension.psu.edu/
<https://extension.psu.edu/spotted-lanternfly>.
(accessed March 26, 2020).

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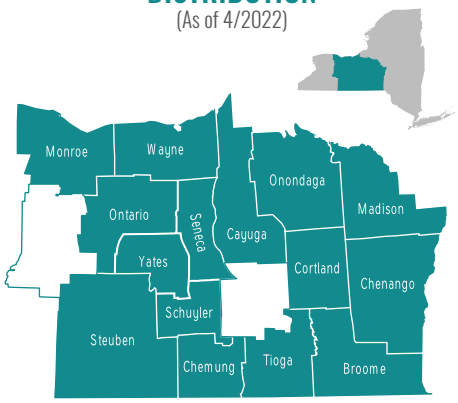
ASIAN CLAM

Corbicula fluminea
Origin: Asia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Chemical
Mechanical
Physical
Prevention

DISTRIBUTION (As of 4/2022)



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The Asian clam is a freshwater bivalve mollusk. The outside shells are yellow-green to brown; where color chips away, white spots can be seen underneath. The inside of the shells are white to light purple. Adults are small, usually less than 4 cm in length.

HABITAT

The Asian clam is a filter feeder that removes particles from the water column. It can be found on or slightly buried in the sediment of freshwater water bodies. The species is cold intolerant and limited to warmer regions of freshwater systems.

THREAT

The Asian clam displaces already threatened native mussels, resulting in biodiversity decline, an unbalanced food chain, and increased possibility of algal blooms. The Asian clam can also cause millions of dollars in damage, clogging commercial and industrial water intake pipes.

MANAGEMENT

In closed environments such as power plants, chemical, physical, and mechanical methods can be used. In natural systems, prevention through education and stewardship is the best management strategy. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - Aquatic Invasive Animals. [November 2017.] Rhode Island Department of Environmental Management. Providence, RI. Accessed [5/8/2018] <http://www.dem.ri.gov/programs/benviron/water/quality/surfwq/pdfs/corflu.pdf>

U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/8/2017].

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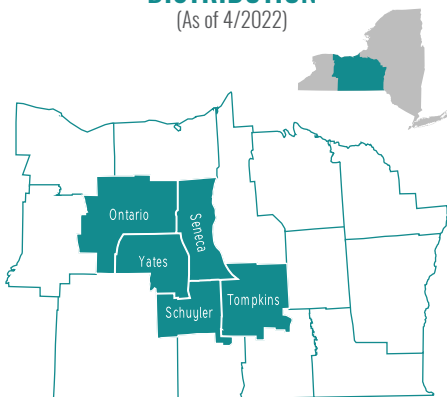
BLOODY RED SHRIMP

Hemimysis anomala
Origin: Eurasia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION (As of 4/2022)



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Bloody red shrimp are small invertebrates that can grow to about 0.5-1.5 cm. Their coloring may range from ivory and translucent to red-orange and is variable in changing temperature and light conditions. This species has eight pairs of legs, which is a distinguishing trait. With magnification, a characteristic flat-ended tail with two prominent spikes can be seen. Bloody red shrimp display a distinctive swarming behavior that is unique in the Great Lakes. Swarms may cover several square meters. Individuals, typically males, will migrate from deeper waters to the upper water column at twilight and return to the profundal zone at dawn.

HABITAT

Bloody red shrimp typically live in quiet areas of brackish or freshwater lakes and reservoirs, but may also establish populations in rivers and streams. This species prefers hard or rocky substrates with water temperatures of about 10-15° C. Specimens have been collected at depths ranging from 0.5-50 m, although it generally inhabits 6-10 m depths.

THREAT

Bloody red shrimp rapidly consume a variety of zooplankton, phytoplankton, detritus, and insect larvae, putting it in direct competition with many native aquatic organisms including young fish. Zooplankton biomass and diversity may also be reduced.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/9/2017]

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CHINESE MITTEN CRAB

Eriocheir sinensis

Origin: Pacific coast of China and Korea

INVASIVE RANKING, NYS

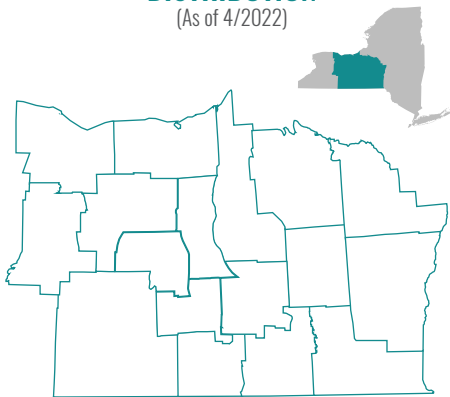
Moderate

MANAGEMENT STRATEGY

Prevention

DISTRIBUTION

(As of 4/2022)



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The Chinese mitten crab has equal-sized claws with white tips and hair. It has eight walking legs that are over twice as long as the width of the carapace. The carapace is smooth and round with four spines along the side, and can be up to 10 cm wide and light brown to olive in color.

HABITAT

The Chinese mitten crab may be found in estuaries, bays, and rivers with ample aquatic vegetation. Although they are born in a marine environment, these crabs migrate to and inhabit freshwater during the majority of their life cycle, between two and five years, before returning to saltwater to reproduce.

THREAT

These crabs are aggressive and may compete with native species. Burrows can destabilize streambanks and lead to erosion and habitat loss.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - Chinese Mitten Crab. New York State Department of Environmental Conservation. Albany, NY. Accessed [9/18/17] <http://www.dec.ny.gov/animals/35888.html>
Benson, A. J., and P. L. Fuller, 2017. *Eriocheir sinensis*: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, <https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=182>, Revision Date: 8/7/2012, Access Date: 9/18/2017

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CHINESE MYSTERY SNAIL

Cipangopaludina chinensis
Origin: Southeast Asia

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Prevention

The shell of the Chinese mystery snail is up to 6 cm tall and smooth, with light to dark olive-green vertical striping and six or seven whorls.

HABITAT

This species may inhabit a slow-moving body of water with a muddy substrate.

THREAT

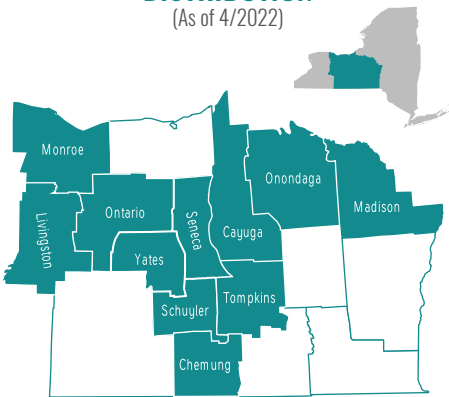
Chinese mystery snails can be hosts for parasites that are harmful to humans. They can also outcompete native snail species for food and space.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. If observed, they can be manually removed using hand or fishing nets. Due to the species' operculum (trap door mechanism), which seals the animal inside its shell, few chemical controls are effective; those that are effective are also likely harmful to native species. Biological controls are being investigated.

DISTRIBUTION

(As of 4/2022)



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REFERENCE - State of Indiana. "Aquatic Invasive Species: Chinese Mystery Snail." http://www.in.gov/dnr/files/CHINESE_MYSTERY_SNAIL.pdf. (accessed June 1, 2017).
TMI. "Chinese Mystery Snail, *Cipangopaludina chinensis malleatus*." <https://sites.google.com/a/rsu5.org/invasive/maine-invasive-species/chinese-mystery-snail-cipangopaludina-chinensis-malleatus>. (accessed June 1, 2017).



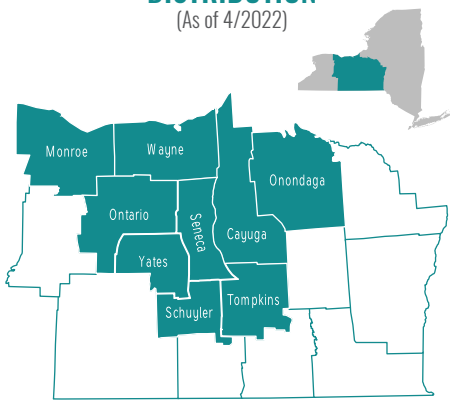
FAUCET SNAIL

Bithynia tentaculata
Origin: Europe

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION (As of 4/2022)



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The faucet snail grows up to 12.5 mm but are generally smaller. Shells have four or five whorls and range from light brown to black. They are difficult to differentiate from other native snails, so photos and the specimen should always be submitted to an expert for identification.

HABITAT

Faucets snails are commonly found in freshwater ponds, shallow lakes, and canals. They typically inhabit the bottom substrate in fall and winter and may be found attached to aquatic macrophytes in warmer months.

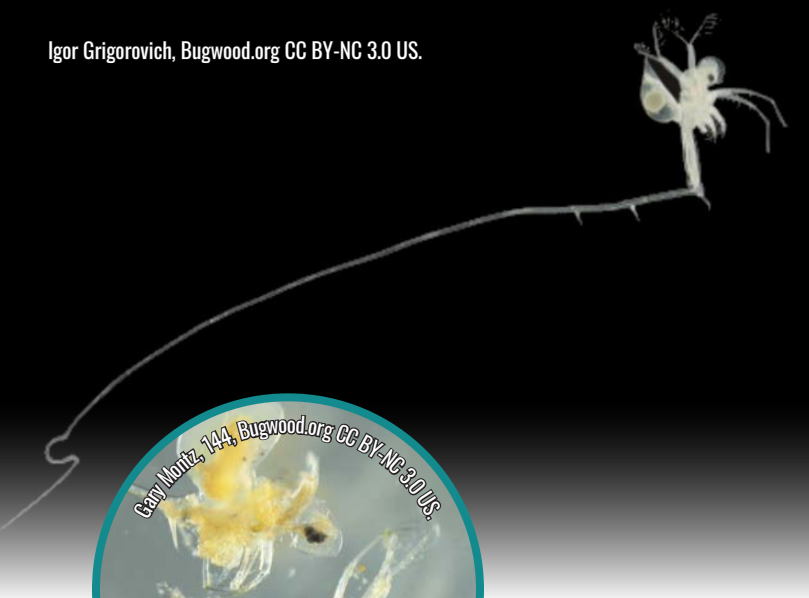
THREAT

The faucet snail can outcompete native species. The species is a host for parasites that can kill waterfowl when the snail is ingested. They may also be a source of biofouling as they can clog water intake pipes and accumulate in swimming areas.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].



FISHHOOK WATERFLEA, SPINY WATERFLEA

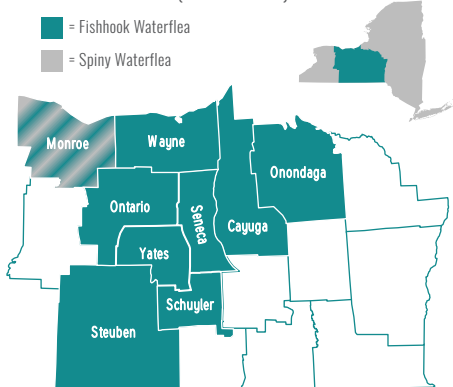
Cercopagis pengoi & *Bythotrephes longimanus*
Origin: Eurasia

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION

(As of 4/2022)



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Fishhook and spiny waterfleas are tiny crustaceans less than 1.25 cm in length, with long, sharp, barbed tails. The tail of spiny waterflea is straight, while the fishhook waterflea has an angled tail-spine with a distinguishing “fishhook” like loop at the end of the tail.

HABITAT

These species inhabit freshwater and brackish lakes. The fishhook and spiny water fleas prefer cooler temperatures over warmer areas of a lake.

THREAT

Fishhook and spiny waterfleas are predators of small zooplankton, such as *Daphnia*. This results in direct competition between the waterfleas and small planktivorous fishes. Few predators can eat them due to the long, spiny tails, which can result in exponential waterflea population growth. The waterfleas also contribute to biofouling issues, as their tails collect on fishing equipment and lines.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].



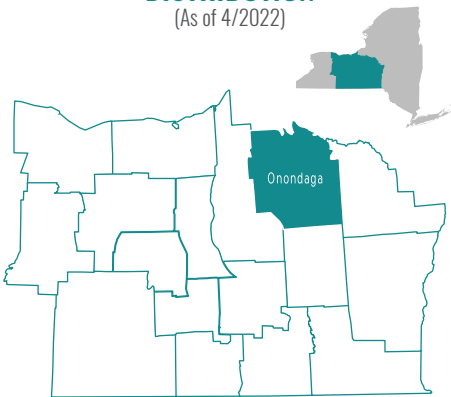
NEW ZEALAND MUD SNAIL

Potamopyrgus antipodarum
Origin: New Zealand & nearby islands.

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION (As of 4/2022)



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The New Zealand mud snail has an elongated shell with seven or eight whorls that coil to the right. Shell colors range from dark gray or brown to light brown. Some variants within the species in the Great Lakes region exhibit a keel or ridge in the middle of each whorl. The snail is usually 4-6 mm in length within the Great Lakes region.

HABITAT

This species can live in fresh and brackish water; where it may be found on and around macrophytes, often in littoral zones of lakes or slow streams with muddy substrates. It can also live in high flow environments, where it burrows into the sediment.

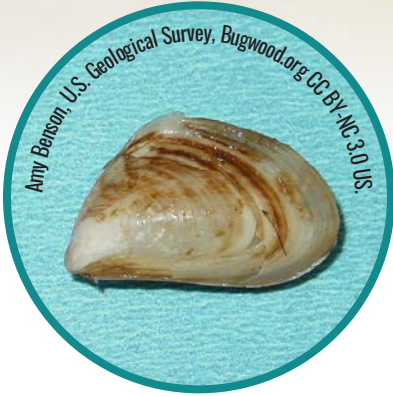
THREAT

Abundant populations of introduced New Zealand mud snail may outcompete other grazing invertebrates and inhibit colonization by other macroinvertebrates. It has yet to colonize streams in the Great Lakes basin, but these are areas where the snail is expected to have significant impact. These snails alter nutrient (nitrogen and carbon) flows, and consume large amounts of the food available to filter feeders.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].



QUAGGA MUSSEL

Dreissena rostriformis bugensis
Origin: Eurasia

INVASIVE RANKING, NYS

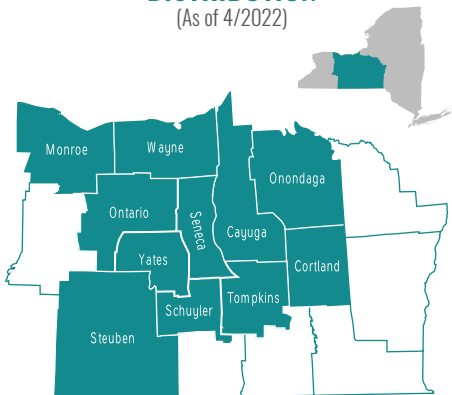
Very High

MANAGEMENT STRATEGY

- Chemical
- Mechanical
- Physical
- Biocontrol
- Prevention

DISTRIBUTION

(As of 4/2022)



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Quagga mussels are filter-feeding, freshwater, bivalve mollusks. Their appearance is variable, but shells usually have dark concentric rings that fade toward the hinge. Shells can grow to about 4 cm and are rounded, with a slightly bowed bottom that causes the mussel to tip over if set on its flattest surface.

HABITAT

Quagga mussels inhabit freshwater at varying depths depending on temperature, where they are sheltered from wave attack. They can live on a wide variety of soft and hard surfaces.

THREAT

Quagga mussels can outcompete and crowd out native species. As filter feeders, they remove particles from the water, which affects water quality and the food chain of aquatic ecosystems. They also cover many surfaces and can be a nuisance to humans due to their sharp shells.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Not much can be done once established. Manual removal may be performed on small, accessible populations. In closed systems, such as water treatment plants, other control methods can be used, including chemical, thermal, electrical, and biological controls.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].



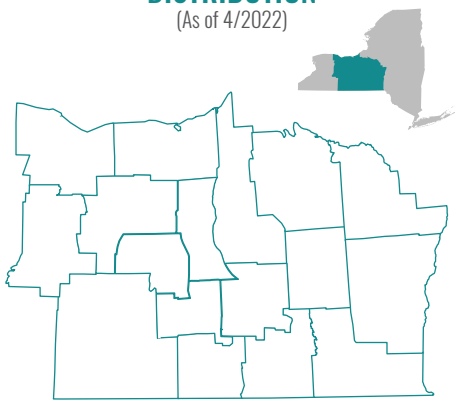
RED SWAMP CRAYFISH

Procambarus clarkii
Origin: Southern Mississippi River drainage to Illinois and Gulf Coast plain from Florida panhandle to Mexico

INVASIVE RANKING, NYS
Not Applicable

MANAGEMENT STRATEGY
Prevention

DISTRIBUTION (As of 4/2022)



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Red swamp crayfish have a dark red body with bright red raised spots. Head and claws are elongated. The body ranges from 5.5-12 cm in length.

HABITAT

This species may inhabit a variety of permanent freshwater habitats including lakes, ponds, streams, canals, seasonally flooded swamps and marshes, and ditches with mud or sand bottoms and organic debris for shelter.

Red swamp crayfish are tolerant of a range of salinity, pH, oxygen, temperature, and pollution levels.

THREAT

The red swamp crayfish can dramatically alter habitats through burrowing activity, and is a strong competitor to native crayfish species. Juveniles feed upon and can significantly reduce local macroinvertebrate populations. Abandoned burrows can result in collapsed banks along the water's edge.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. The red swamp crayfish is also spread through dumping of bait buckets and releases due to pet trade.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [9/14/2017].





RUSTY CRAYFISH

Faxonius rusticus

Origin: Ohio River Basin

INVASIVE RANKING, NYS

High

MANAGEMENT STRATEGY

Prevention

Rusty crayfish grow to about 10 cm in length and are dark brown with rust-colored spots on both sides of the carapace. It has relatively large, robust claws that are gray-green to red-brown with black bands on the tips. The moveable claw is smooth and S-shaped, forming an oval gap when the claws are closed.

HABITAT

Rusty crayfish live in waterbodies and waterways with clear, well-oxygenated water and rocks, logs, and debris for shelter. This species prefers cobbly bottom sediment but will tolerate a variety of substrates, including silt, clay, sand, and gravel substrates.

THREAT

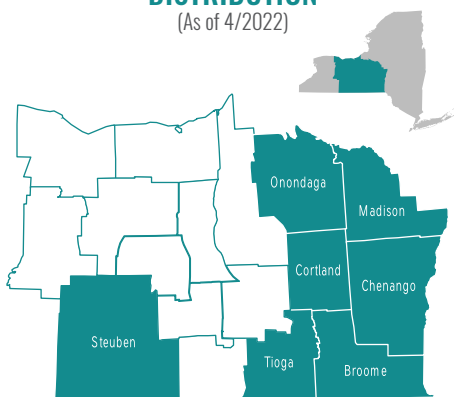
Rusty crayfish are aggressive and reproduce quickly, which allows them to out-compete and displace native crayfish species. This can also negatively impact the structure and biodiversity of the aquatic community.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

DISTRIBUTION

(As of 4/2022)



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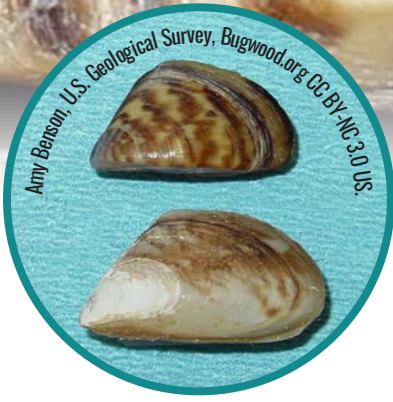
REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].

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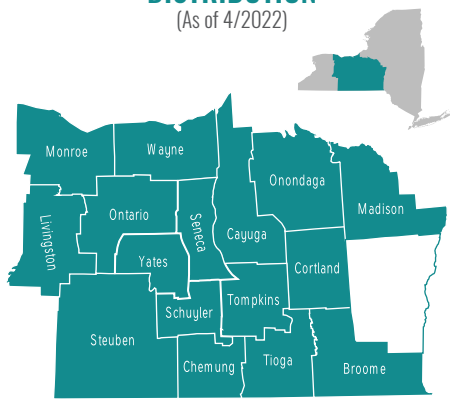
ZEBRA MUSSEL

Dreissena polymorpha
Origin: Eurasia

INVASIVE RANKING, NYS
Very High

- MANAGEMENT STRATEGY**
- Chemical
 - Mechanical
 - Physical
 - Biocontrol
 - Prevention

DISTRIBUTION
(As of 4/2022)



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Zebra mussels are filter-feeding, freshwater, bivalve mollusks that attach to most surfaces in aquatic environments. Zebra mussels are small, up to 3 cm long, and D-shaped with light and dark yellow to brown alternating stripes. This species is similar in appearance to the quagga mussel (*Dreissena rostriformis bugensis*), but they can be distinguished by the presence of a flattened underside. When placed on a flat surface, zebra mussels will remain upright.

HABITAT

Zebra mussels inhabit freshwater lakes, rivers, reservoirs, streams, and ponds up to depths of widely varying depths. They attach to any stable substrate including sand, silt, cobbles, macrophytes, concrete, and metal. They do not tolerate salinity or low dissolved oxygen.

THREAT

Zebra mussels can outcompete and displace native species. Although they have some predators, they breed faster than they can be consumed. As filter feeders, they remove particles from the water, affecting the clarity, content, and ultimately the food chain of aquatic ecosystems. They can also attach to and cover many surfaces, which can cause slippery and sharp conditions, and clog intakes or other pipes.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Zebra mussels are very difficult to control once established. In closed systems such as water treatment plants, chemical, thermal, electrical, and biological controls may be used.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].





BLACK SWALLOWWORT, PALE/EUROPEAN SWALLOWWORT

Cynanchum louiseae,
Cynanchum rossicum
Origin: Europe

INVASIVE RANKING, NYS

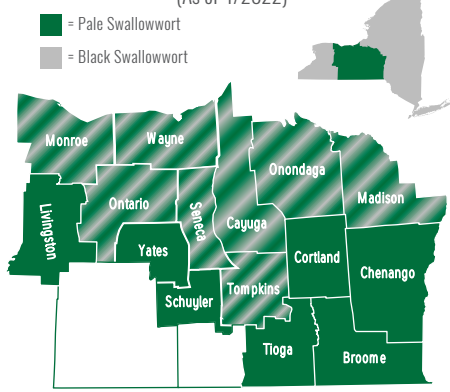
Very High

MANAGEMENT STRATEGY

- Chemical
- Physical
- Prevention

DISTRIBUTION

(As of 4/2022)



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Black and pale swallowwort (*Vincetoxicum nigrum* and *V. rossicum*) are invasive, herbaceous, perennial vines. Leaves are shiny, dark green, and narrowly oval or heart-shaped, with smooth edges and sharply pointed tips. The leaves are oppositely arranged. Swallowwort stems grow in a spiral pattern and are covered in tiny hairs. Swallowworts closely resemble the related common milkweed (*Asclepias syriaca*).

Swallowwort flowers are five petaled and clustered at the base of leaf stems. Pale swallowwort blooms from May through mid-July; its small flowers have petals twice as long as they are wide, ranging from pink to dark burgundy in color. Black swallowwort blooms in June and July; its flowers are small and dark purple in color, with petals covered in fine hairs and about as wide as they are long.

HABITAT

Both swallowwort species are shade tolerant, but grow more aggressively when exposed to open areas of sunlight. They occur along roadsides, in gardens, old fields and pastures, forests, limestone rich environments with thin soil, and along the edges of low lying marshy areas. They can tolerate only brief periods of flooding.

THREAT

Swallowworts can form dense populations that outcompete native species, and are a serious threat to monarch butterflies (*Danaus plexippus*). They crowd out milkweed patches where monarchs lay their eggs and their larvae feed and monarchs mistakenly lay eggs on swallowworts. As monarch caterpillars cannot survive on swallowwort, this further reduces monarch populations.

MANAGEMENT

These plants can be physically removed by thoroughly digging up root masses prior to seed dispersal. They may also be treated with herbicides once flowering has begun. Spread of swallowworts can be reduced if mowed consistently every year before seed pods are mature, although this will not affect rhizome growth.

REFERENCE - April 2014. Black And Pale Swallow-worts. Invasive Species Control. Michigan Natural Features Inventory. <https://mnfi.anr.msu.edu/invasive-species/Swallow-wortBCP.pdf>

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BRAZILIAN WATERWEED

Egeria densa

Origin: South America

INVASIVE RANKING, NYS

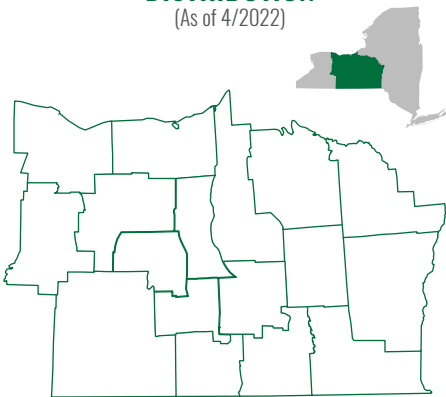
High

MANAGEMENT STRATEGY

Chemical
Physical
Biocontrol
Prevention

DISTRIBUTION

(As of 4/2022)



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Brazilian waterweed is a submerged aquatic plant with bright green stems and leaves and a very leafy appearance. Leaves are linear, up to 2.5 cm long and ½ cm wide with finely toothed margins, and grow in whorls of four to eight leaves. Stems are cylindrical and grow until they reach the water surface, where they can form dense mats. White, three-petaled flowers grow just above the water surface to 2 cm in diameter. Only male plants are found in the U.S.; these reproduce via stolons and fragmentation.

HABITAT

Brazilian waterweed inhabits slow-flowing freshwaters. This species is tolerant of a wide range of temperatures and light levels, and can occur as deep as 7 m.

THREAT

Dense populations of Brazilian waterweed can disrupt water flow, trap sediment, and alter water quality, as well as reduce the abundance and diversity of native vegetation. Severe infestations may impair recreational uses of a water body including boating, fishing, and swimming.

MANAGEMENT

Prevention is the best management practice to ensure that this species remains unintroduced. Education of the public about practices such as clean, drain, and dry, as well as timely reporting of sightings, can keep this invasive at bay. Brazilian waterweed may be physically removed only if extreme care is taken to remove fragments from the water. Chemical control can reduce infestations, although it is not species-specific and may damage other beneficial aquatic plants in the area. Triploid Grass Carp (*Cteonpharyngodon idella*) may also be used to control Brazilian waterweed infestations. However, the stocking of Grass Carp requires a permit.

REFERENCE - *Egeria densa* USGS Nonindigenous Aquatic Species Database, Gainesville, FL, and NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI.
<https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=10&Potential=Y&Type=2&HUCNumber>
Revision Date: 1/28/2015

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BRITTLE WATERNYMPH, BRITTLE NAIAD

Najas minor
Origin: Eurasia & Northern Africa.

INVASIVE RANKING, NYS

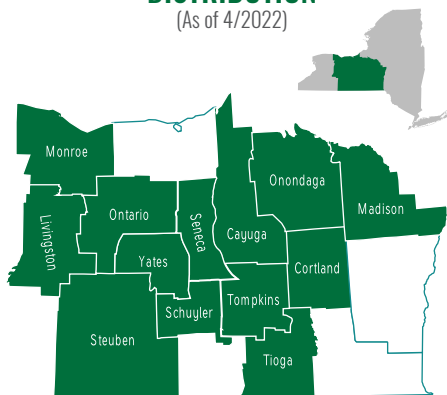
Moderate

MANAGEMENT STRATEGY

- Chemical
- Mechanical
- Physical
- Prevention

DISTRIBUTION

(As of 4/2022)



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Brittle water nymph is an annual submersed aquatic plant, that is compact but bushy in appearance with thin, branching stems that can grow up to 1.5 m in length. Stems and roots can fragment easily. The leaves are oppositely arranged, stiff, curled, and pointed, with visible spines along the margins. The seeds, which grow along the stem, are slightly recurved, purplish in color, and have tiny, rectangular pits arranged in longitudinal rows. Care must be taken when identifying this species, as it is similar in appearance to native water nymph species.

HABITAT

Brittle water nymph inhabits still or slow-moving waterbodies. This species is capable of growing in depths up to 4 m, and is more tolerant of turbidity and high-nutrient conditions than native species of the same genus.

THREAT

Brittle water nymph can form dense stands in shallow water that inhibit the growth of native aquatic macrophytes. This can also result in unfavorable habitat for fish and waterfowl. Dense infestations will also hinder swimming, fishing, boating, and other forms of recreation.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Small infestations may be removed manually or mechanically to reduce biomass. However, since this plant spreads very easily, it is crucial to avoid fragmentation during removal. Herbicides can be effective in controlling larger infestations.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].

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COMMON REED

Phragmites australis ssp. *australis*

Origin: Europe & Middle East

INVASIVE RANKING, NYS

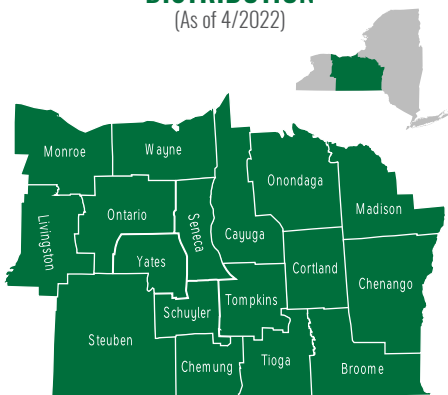
Very High

MANAGEMENT STRATEGY

Chemical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



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Common reed is a tall, herbaceous, perennial plant that grows 1-6 m tall from rhizomes or stolons (horizontal stems). The stems are hollow and ribbed. Leaves are linear, flat, drooping, smooth, and blue-green in color. The flowers grow in an oblong panicle inflorescence and progress from purple to straw-colored when mature. The non-native subspecies can be distinguished from the native using leaf color (blue-green vs yellow-green), persistent leaf sheaths, and rougher texture on the stem. Common reed mostly reproduces clonally through rhizomes but will also grow from viable seeds.

HABITAT

Common reed grows on shorelines, wetlands, ditches, and disturbed sites. It can tolerate saline habitats and a wide range of environmental conditions.

THREAT

Common reed forms dense monocultures, displaces native species, and degrades wetland habitat. It also alters habitat structure and hydrology. The leaves and stems are of poor nutritional value to wildlife. Dense stands impede shoreline access and can block important signage, as well as pose a fire hazard during its dormant season.

MANAGEMENT

Prescribed burning following herbicide treatment can help manage common reed populations. Mechanical control can slow the spread but will not eradicate established stands. Soil disruption should be kept to a minimum since it encourages re-sprouting. Cut material should be raked, bagged, and disposed of to prevent seed dispersal. Large stands are best managed using herbicides.

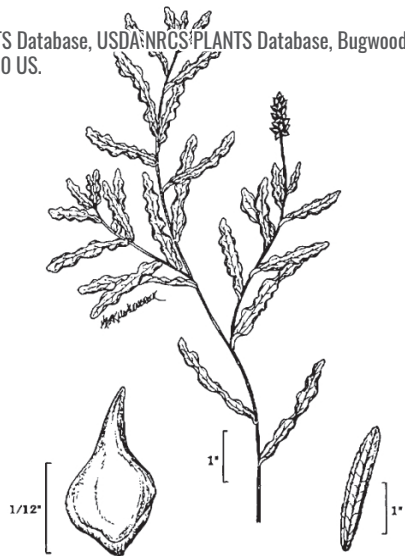
REFERENCE - Sturtevant, R., A. Fusaro, W. Conard, and S. Iott, 2017, *Phragmites australis australis* (Cav.) Trin. ex Steud.: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL
NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI, <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=2937>, Revision Date: 6/3/2016, Access Date: 9/15/2017

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CURLY-LEAVED PONDWEED

Potamogeton crispus
Origin: Europe, Africa, and Australia

INVASIVE RANKING, NYS

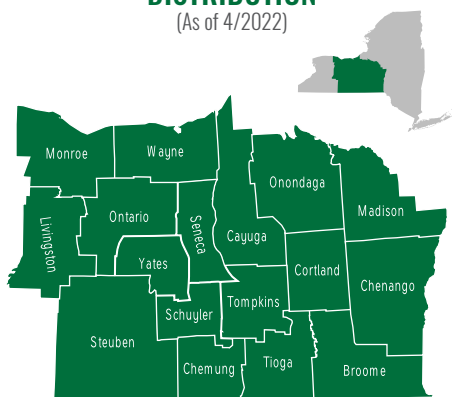
High

MANAGEMENT STRATEGY

Chemical
Mechanical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



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Curly-leaved pondweed is a submerged perennial aquatic plant that can grow to about 5 m long. It has rigid, reddish-green, oblong leaves with finely toothed, wavy margins and blunt tips, which grow in an alternate arrangement. This species produces very small greenish-red flowers on a spike above the water surface. It also reproduces using overwintering buds, called turions.

HABITAT

Curly-leaved pondweed grows in a wide variety of environments, including shallow, deep, still, flowing, slightly brackish, or freshwater water up to a depth of about 6 m.

THREAT

This species is one of the first to grow in the spring and can grow quickly, allowing curly-leaved pondweed to outcompete native plants for light and space thereby reducing the biodiversity and value of aquatic habitat. Curly-leaved pondweed's senescence during midsummer can cause a critical loss of dissolved oxygen. The decomposition process can result in increased levels of phosphorous, which can lead to algal blooms. Dense infestations will also inhibit boating, fishing, swimming, and other recreational activities.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. This plant may be removed manually, provided all fragments and stem parts are also removed. Herbicides have been effective in controlling infestations.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].

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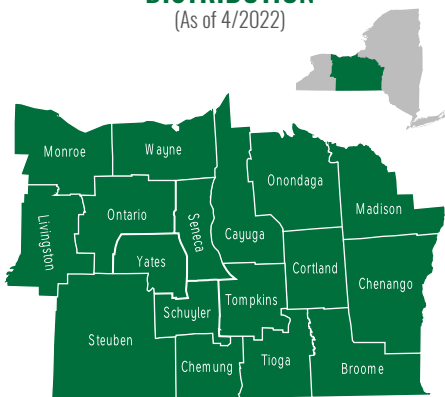
EURASIAN WATERMILFOIL

Myriophyllum spicatum
Origin: Eurasia

INVASIVE RANKING, NYS
Very High

- MANAGEMENT STRATEGY**
- Chemical
 - Mechanical
 - Physical
 - Biocontrol
 - Prevention

DISTRIBUTION
(As of 4/2022)



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Eurasian watermilfoil is an invasive submerged aquatic plant that can be easily mistaken for several native plants. Each leaf is blunt-tipped and finely divided into at least 12 pairs of leaflets, arranged in whorls of four on brown or green stems. The plant can grow up to 6 m in length. Tiny pink flowers may occur on emergent spikes in mid-June and again in late July. Although each plant can produce 100 seeds in a season, it reproduces more successfully via fragmentation.

HABITAT

This invasive can be found to depths of 10 m in lakes, ponds, and quieter sections of rivers and streams. It can grow in fresh or brackish water, across a wide range of temperatures, and thrives in disturbed areas with nutrient loading, intense plant management, and/or abundant motorboat use.

THREAT

Eurasian watermilfoil can spread very easily through fragmentation. This species forms dense mats that outcompete and displace native species, degrade habitat, and inhibit recreational activities.

MANAGEMENT

Education about practices such as clean, drain, and dry, as well as timely reporting of sightings is an important management practice to reduce the spread of this species and prevent new infestations. Once Eurasian watermilfoil is established, it is very hard to control. Mechanical control can enhance the spread of an infestation by creating and transporting plant fragments. If extreme care is taken to prevent or remove fragments, small infestations may be mechanically or manually removed. Many herbicides can control milfoil populations. Biocontrol insects or the triploid Grass Carp (*Ctenpharyngodon idella*) may also be options for control.

REFERENCE - <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=237>
U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].

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EUROPEAN DEWBERRY

Rubus caesius
Origin: Europe

INVASIVE RANKING, NYS

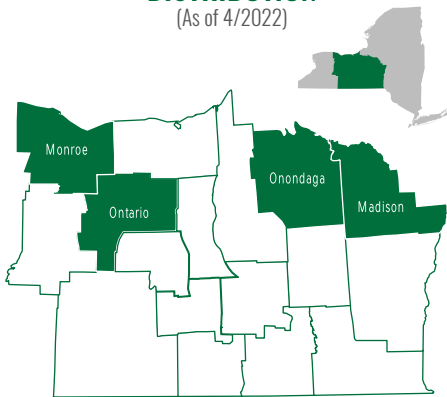
Unranked

MANAGEMENT STRATEGY

Prevention
Physical
Mechanical
Chemical

DISTRIBUTION

(As of 4/2022)



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European dewberry is a non-native low-growing shrub that is similar to raspberries and blackberries. This species is biennial, meaning it takes two years to grow, fruit, and senesce. Thin, deciduous leaves are green above and below and composed of three toothed leaflets. Stems are blue-gray-green and waxy, with small hooked, flexible prickles. First-year stems may be tinged red if exposed to the sun. Flowers have five white, oval-shaped petals. European dewberry primarily reproduces vegetatively, though it may produce aggregate fruits composed of few large black drupelets. This species flowers throughout the growing season and may grow into the fall.

HABITAT

European dewberry may grow in a wide range of habitats, including woodlands, floodplains, riparian areas, meadows, roadsides, and disturbed areas. In other states, this species has been used to stabilize streambanks.

THREAT

Although populations of European dewberry may be considered to be naturalized in New York State, this species can exhibit aggressive growth, form monocultures, and crowd out native species. This species' formation of monocultures likely affects wildlife habitat and biological diversity. Because there are few infestations in the Finger Lakes region, any specific effects dewberry can have on native communities are not yet well known.

MANAGEMENT

The best management strategy is prevention through education and stewardship. Best management practices such as cleaning outdoor gear, as well as timely reporting of sightings, can help keep this invasive at bay. Little is known about effective control strategies. However, research on control strategies, including mechanical and chemical methods, is in progress.



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REFERENCE - Widrlechner, M.P., Wagner Jr., W.H. (1998). Occurrence of European Dewberry, *Rubus caesius* (Rosaceae), Naturalized in Iowa and Michigan. 37, 107-11. https://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1081&context=nrcpris_pubs



EUROPEAN FROGBIT

Hydrocharis morsus-ranae
Origin: Europe

INVASIVE RANKING, NYS

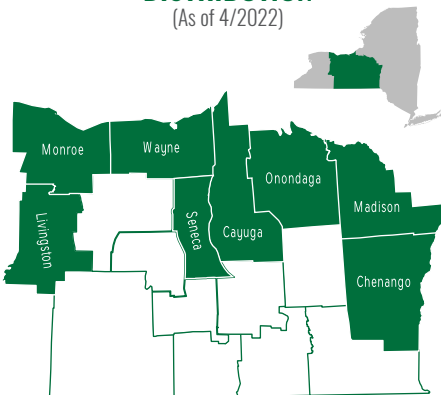
Very High

MANAGEMENT STRATEGY

Mechanical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

European frogbit is a free-floating annual aquatic plant. The leaves are small, kidney or heart shaped (1.5-6.5 cm long), and leathery, with undersides that may be dark purple. The plant is not anchored to bottom sediments. Three-petaled white flowers with yellow centers bloom in summer. The leaf stem of European frogbit lacks a midline groove, which distinguishes it from American frogbit (*Limnobium spongia*). European frogbit leaves, although smaller in size, may resemble those of white and yellow water lilies.

HABITAT

European frogbit grows well in quiet, open waters including marshes, ditches, swamps, and sheltered coves. This species grows well in calcium rich waters.

THREAT

European frogbit has rapid vegetative spread and forms dense mats, which can crowd out other macrophytes and limit light penetration into the water column. With limited light below the vegetative mats, native plants may not be able to survive, limiting native biodiversity. It can also inhibit recreational use such as swimming, fishing, or boating.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Hand-pulling or harvesting may be an effective management strategy for small infestations or infestations in closed systems such as ponds. High density shade treatments can reduce biomass. European frogbit is also susceptible to some herbicides.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database Gainesville, Florida. Accessed [6/8/2017].



FANWORT

Cabomba caroliniana
Origin: South America

INVASIVE RANKING, NYS

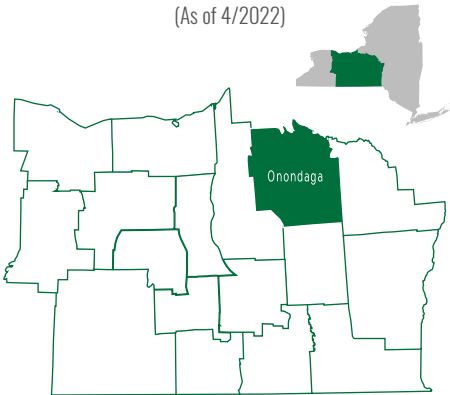
High

MANAGEMENT STRATEGY

Chemical
Mechanical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Fanwort is a submerged invasive aquatic plant with green, delicate, fan-like underwater leaves that are usually about 5 cm across and arranged opposite each other in pairs along the stem. Small oval floating leaves are occasionally present. Small (2 cm or smaller) white flowers form and bloom throughout late spring and summer. It can also reproduce vegetatively via fragmentation.

HABITAT

Fanwort grows up to depths of 10 m rooted in the muddy substrate of slow moving waters of lakes, ponds, and occasionally rivers. It can grow under a wide range of of nutrient levels, light levels, temperatures, and pH levels.

THREAT

Fanwort can be an aggressive weed. Once established, fanwort forms dense mats that can out-compete and displace native vegetation, which leads to a decline in biodiversity. Dissolved oxygen can be depleted when the mats of fanwort decompose. Infestations also inhibit recreational activities, including boating, fishing, and swimming.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Harvesting can greatly reduce fanwort biomass in a water body. However, mechanical and manual removal are likely to create and spread fragments, which are capable of producing new plants. Several herbicides are effective in controlling fanwort populations. Benthic barriers can also be effective in small areas, although they are not species specific.

REFERENCE - Robinson, M. 2002. Fanwort: An Invasive Aquatic Plant. D.C.R. Office of Water Resources, Lakes and Ponds Program. <http://www.mass.gov/eea/docs/dcr/watersupply/lakepond/fact-sheet/fanwort.pdf>. June 12, 2017.

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FLOATING PRIMROSE-WILLOW, CREEPING WATER PRIMROSE

Ludwigia peploides
Origin: Southeastern United States

INVASIVE RANKING, NYS

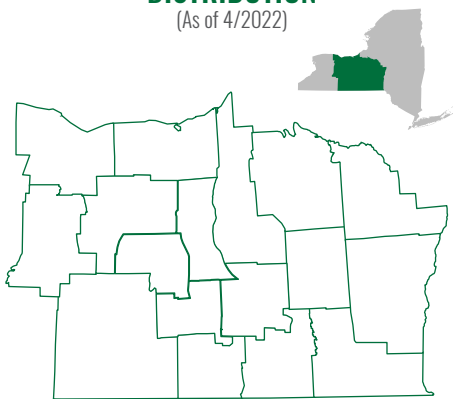
Very High

MANAGEMENT STRATEGY

- Chemical
- Physical
- Biocontrol
- Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Floating primrose-willow is a perennial aquatic plant with stems and leaves that float on the water's surface. The leaves have smooth margins and are alternately arranged in clusters. Flowers of the floating primrose-willow have five bright yellow petals with ten stamens. The fruit of the plant is an elongate capsule 1-4 cm long.

HABITAT

Floating primrose-willow can be found rooted in the silty substrate of slow moving bodies of water. It often forms a dense, thick mat of vegetation in shallow waters and grows best in areas with high nutrients, warm water temperatures, and abundant sunlight.

THREAT

Floating primrose-willow can form thick mats on the water's surface, which crowds native vegetation and blocks sunlight from penetrating into the water column. This can cause submerged aquatic plants to die from lack of sunlight and negatively affect water chemistry and aquatic communities.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Physical removal is a preferred control method for floating primrose-willow. The fruit, rhizomes, and seeds should be targeted for removal in their entirety as fragmentation can result in spread and unsuccessful control. Floating primrose-willow is also susceptible to herbicides. Water primrose beetles and triploid Grass Carp (*Ctenopharyngodon idella*) are potential biocontrol agents.

REFERENCE - Pennsylvania Department of Conservation and Natural Resources. Invasive Plants in Pennsylvania, Floating Primrose Willow. PADCNR. http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_012344.pdf

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FLOWERING RUSH

Butomus umbellatus
Origin: Eurasia and Africa

INVASIVE RANKING, NYS

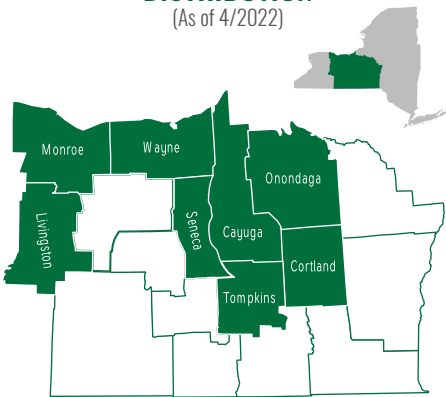
Medium

MANAGEMENT STRATEGY

Chemical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Flowering rush is an emergent perennial plant that can grow on shore or in shallow water. Leaves grow up to 1 m long and are triangular in cross section. The plant can grow to 1.5 m, with umbrella-shaped clusters of three-petaled flowers from white to dark pink. Plants bloom from June to August, but do not flower in deep water. Flowering rush reproduces through seeds, branching and fragmentation of rhizomes, and production of bulbils on rhizomes and inflorescences.

HABITAT

Flowering rush lives where cattails are typically found, growing in freshwater lakes, riparian areas, and wetlands. It can grow in water depths to about 2 m.

THREAT

Flowering rush can form dense stands that displace native species, which can reduce biodiversity. Dense stands of flowering rush can also alter water temperatures, water and nutrient flow, and sedimentation rates.

MANAGEMENT

Plants may be removed physically, but care should be taken to account for all parts, as it can spread via floating seeds, rhizomes, and root fragments. Removed material should be dried to prevent any new shoot growth. Cutting the plants below the water surface can reduce abundance, but will not kill them. Chemical control is usually not effective due to the herbicide washing off the plant. Several treatments would be required.

REFERENCE - Cao, L., L. Berent, and A. Fusaro, 2017, *Butomus umbellatus* L.: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, and NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI, <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=1100&Potential=N&Type=0>, Revision Date: 12/5/2012, Access Date: 9/15/2017



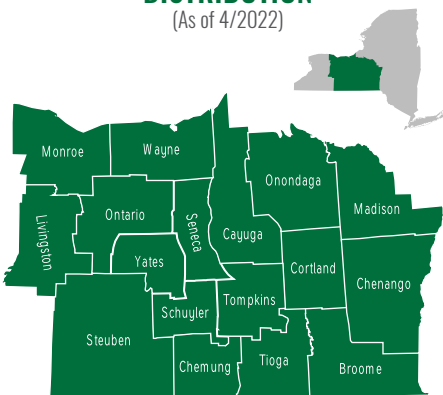
GIANT HOGWEED

Heracleum mantegazzianum
Origin: Eurasia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Chemical
Physical
Prevention

DISTRIBUTION
(As of 4/2022)



www.fingerlakesinvasives.org

Giant hogweed is a monocarpic (blooms only once) perennial herb that typically grows to 3-4 m in height. The stems are hollow, covered in bristles, and have dark reddish-purple blotches when flowering. The leaves are deeply lobed and serrated, with one to three leaflets, and may grow to 1.5 m in width. The flower can grow to about 80 cm in diameter and is composed of a broad, umbrella-shaped cluster of small white florets.

HABITAT

The species is common along railroads, roadsides, rights-of-ways, vacant lots, streams, rivers, uncultivated or waste lands and agricultural areas.

THREAT

Giant hogweed sap contains a substance that, when touched, causes skin to become sensitive to ultraviolet light. This can result in severe burns when the affected areas become exposed to sunlight, producing swelling and severe, painful blistering. Giant hogweed is also an aggressive competitor; because of its size and rapid growth, it out-competes native plant species and reduces the amount of suitable habitat available for wildlife. It dies back during the winter months, leaving bare ground that can lead to increases in soil erosion on riverbanks and steep slopes.

MANAGEMENT

If seen, report this plant to the giant hogweed information line at 845-256-3111 or ghogweed@dec.ny.gov. Be sure to provide photos, location, and an estimated number of plants. Follow proper safety precautions when working around giant hogweed. Care should be taken to not allow skin to come into contact with any part of the plant. Wash skin and equipment after control. Cut the taproot 15 cm below ground level using a spade with a sharp blade, remove the cut part of the plant from the soil, and leave it to decompose. Apply systemic herbicides, such as glyphosate and triclopyr, through mid-October as long as giant hogweed plants are still green and not dying back. To prevent spread, flower/seed heads should be removed and placed in clear plastic bags and left to sit in the sun for at least one week prior to disposal. Start control early, it is easier to work safely around giant hogweed plants when they are small.

REFERENCE - USDA Forest Service. 2005. Giant Hogweed. Weed Of The Week. https://www.na.fs.fed.us/fhp/invasive_plants/weeds/giant-hogweed.pdf. June 12, 2017

Giant Hogweed Identification. New York State Department of Conservation. <https://www.dec.ny.gov/animals/72766.html>.

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HYDRILLA

Hydrilla verticillata
Origin: Asia

INVASIVE RANKING, NYS

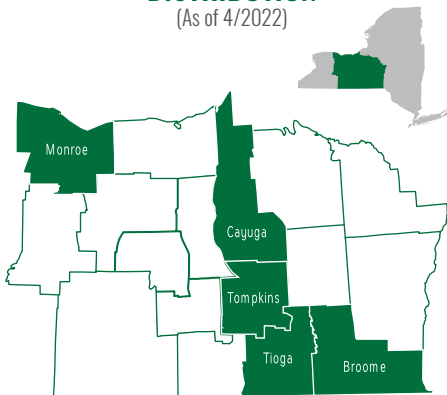
Very High

MANAGEMENT STRATEGY

Chemical
Mechanical
Physical
Biocontrol
Prevention

DISTRIBUTION

(As of 4/2022)



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Hydrilla is a submerged herbaceous perennial plant with visibly serrated leaves that grow in whorls of three to eight, often five. The undersides of Hydrilla leaves can be spiny and the midrib of each leaf is often reddish. Hydrilla can spread by seeds, tubers (which resemble tiny bulbs in the sediment), plant fragments, and turions (overwintering buds located on the stems). This invasive plant looks similar to American or Canadian waterweed (*Elodea canadensis*), a common native and aquarium aquatic plant, which has smooth leaves usually arranged in whorls of three and no tubers or turions.

HABITAT

Hydrilla inhabits freshwater lakes, ponds, rivers, impoundments, and canals. Hydrilla is shade-tolerant and can thrive in a wide range of nutrient conditions and depths.

THREAT

Hydrilla spreads quickly, and once established, forms dense stands that crowd out native species and disrupt aquatic habitats. Hydrilla can also clog waterways and restrict water flow, which may damage water control structures and inhibit recreational activities such as swimming, boating, and fishing.

MANAGEMENT

Several techniques have been used to manage Hydrilla. Mechanical removal can be effective only if all parts of the plant are removed including the long-lasting tubers. Herbicides and physical barriers, such as benthic mats, are also effective. Biological agents can also be a successful management strategy, although they are not widely used in NY. The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].



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JAPANESE KNOTWEED

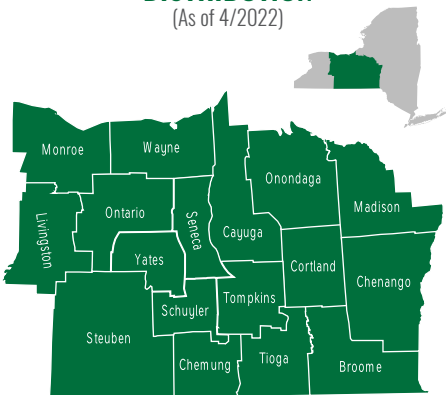
Reynoutria japonica
var. *japonica*
Origin: Eastern Asia
(Japan, China, Korea)

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Chemical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Japanese knotweed is a tall, shrubby, herbaceous perennial that forms dense patches up to 3 m tall. Stems are hollow and ‘bamboo-like’, with purple speckles. Leaves are broadly triangular in shape, about 15 cm long and 7-12 cm wide, coming to a sharply pointed tip. They emerge alternately from the swollen internodes, producing a ‘zig-zag’ appearance. In late summer, Japanese knotweed produces small, creamy white flowers in spikes up to 10 cm in length.

HABITAT

This species can tolerate a wide range of light conditions, temperatures, nutrients, and other environmental conditions. It is commonly found along streams and rivers, in low-lying areas, and in disturbed areas.

THREAT

This species spreads rapidly, forming dense populations that crowd and shade out native vegetation resulting in reduced species diversity, altered ecosystems, and negatively impacted wildlife habitat. Japanese knotweed grows aggressively in riparian and previously disturbed areas and can have detrimental effects on infrastructure.

MANAGEMENT

Rhizomes must be controlled in order to manage Japanese knotweed populations. Manual removal of established plants is usually ineffective due to the easily fragmented rhizomes. A range of chemical control methods, used alone or in conjunction with cutting, have been proven effective on smaller infestations, including foliar spray, cut-and-wipe, and stem injection. If plant materials are to be removed from the site, they should be bagged and disposed of; any root fragment or stem fragment containing an internode can start a new plant. Treatment of large infestations rarely results in the eradication of knotweed from the site, but can suppress the population and prevent spread.

REFERENCE - Japanese Knotweed. Michigan Department of Natural Resources. http://www.michigan.gov/documents/dnr/knotweed_BCP_372280_7.pdf November 10, 2017





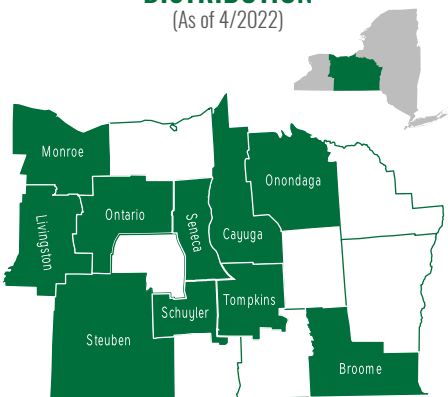
JAPANESE STILTGRASS

Microstegium vimineum
Origin: Asia

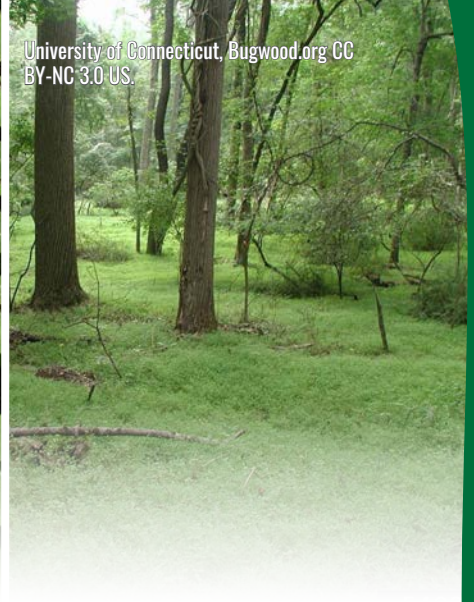
INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Chemical
Mechanical
Physical
Prevention

DISTRIBUTION
(As of 4/2022)



www.fingerlakesinvasives.org



Japanese stiltgrass is an annual grass that is adapted to low light levels. It grows in a sprawling habit up to 1 m in height. The leaves are 3-13 cm long, asymmetrical with an off-center mid-rib, and are alternately arranged on the stalk. The leaves feel smooth, although each leaf has a line of silvery hairs on the upper surface. Japanese stiltgrass blooms in the late summer and early fall. Flowers are arranged in one or two delicate spikes at the top of each stem. Roots are weak, but can form at stem nodes.

HABITAT

Japanese stiltgrass grows in a wide range of habitats, from roadsides to undisturbed forest understory. It is most often associated with moist, acidic to neutral soils that are high in nitrogen. Japanese stiltgrass readily takes advantage of disturbed areas.

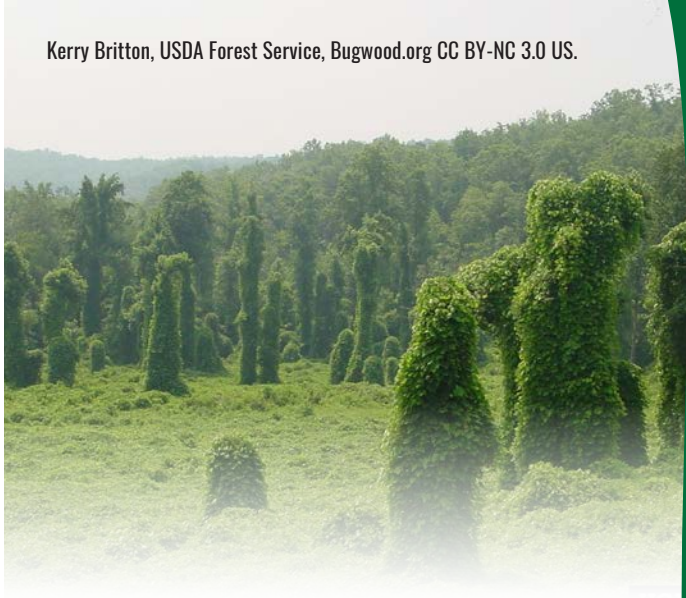
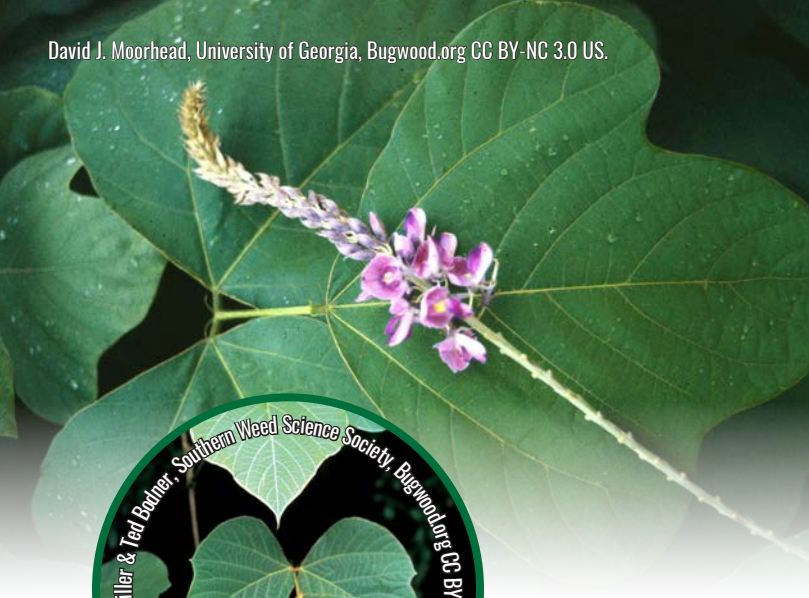
THREAT

Japanese stiltgrass grows densely, crowding out native vegetation. This results in decreased biodiversity and wildlife value, as well as disrupted ecosystem functioning.

MANAGEMENT

Prevent infestations by limiting disturbance and quickly remediating disturbed areas. Hand pulling, mowing, and soil tilling of small infestations can be effective before the seeds set in late summer. Herbicides can be used to control larger Japanese stiltgrass infestations.

REFERENCE - Japanese Stiltgrass. New York Invasive Species Information. Cornell University Cooperative Extension. http://www.nyis.info/index.php?action=invasive_detail&id=32



KUDZU

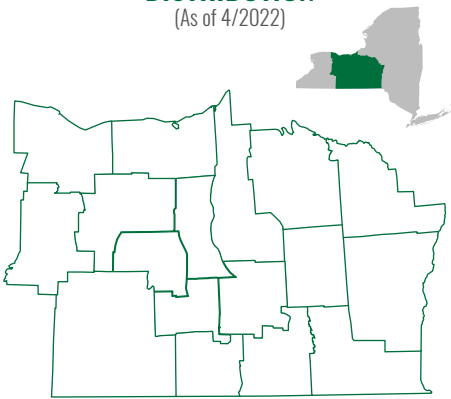
Pueraria montana var. lobata
Origin: Eastern Asia

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Physical
Chemical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Kudzu is a perennial climbing vine that can grow to lengths over 30 m. It has deciduous, hairy, alternate leaves that are comprised of three-lobed leaflets. Fragrant purple flowers grow in clusters during the summer and produce green or brown, flat, hairy seed pods that are about 6 cm long. Kudzu can also spread via roots and rhizomes.

HABITAT

Kudzu tends to live in open, disturbed habitats including forest edges, roadsides, and old fields.

THREAT

The vine grows rapidly and kills other plants by smothering, girdling, or uprooting them due to its weight.

MANAGEMENT

Prevention is the best management practice to ensure that this species remains unintroduced. Education of the public about practices such as cleaning outdoor gear, as well as timely reporting of sightings, can keep this invasive at bay. The extensive root system must be destroyed for control to be successful. Vines can be cut and fed to livestock or bagged and sent to a landfill. Herbicides can also be effective in controlling infestations.

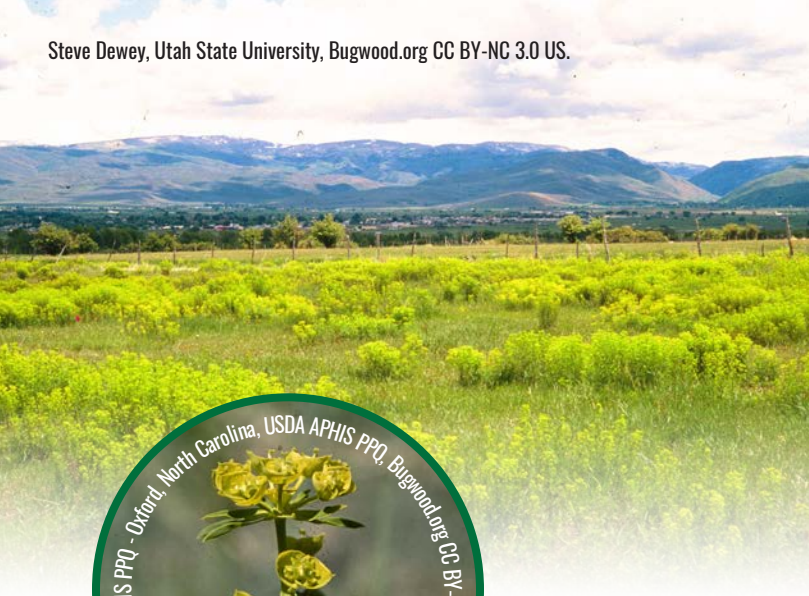
REFERENCE - Pennsylvania Department of Conservation and Natural Resources. Invasive Plants in Pennsylvania, Kudzu. PADCNr. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_010253.pdf

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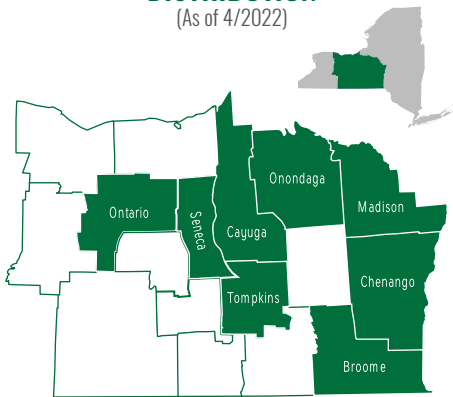
LEAFY SPURGE

Euphorbia virgata
Origin: Eurasia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Chemical
Mechanical
Biocontrol
Prevention

DISTRIBUTION
(As of 4/2022)



www.fingerlakesinvasives.org

Leafy spurge is a deep-rooted perennial. It propagates by seed and extensive roots, which can grow as deep as 9 m. Smooth, pale green stems grow up to 1 m tall in thick clusters. Narrow, linear leaves are alternately arranged and 2-10 cm long. Small, yellow-green flowers are enclosed by visible yellowish-green, heart-shaped bracts. The entire plant contains white, milky sap that can damage eyes and sensitive skin.

HABITAT

Leafy spurge is found in a wide variety of habitats, ranging from streambanks to dry, upland sites. It can invade disturbed and undisturbed areas, including roadsides, woodlands, riparian zones, grasslands, mountain ridges, and land used for agriculture.

THREAT

Leafy spurge can displace native vegetation, is toxic to cattle and horses, and can damage skin. It can be difficult to control once it has established in an area.

MANAGEMENT

Hand pulling this plant is not a viable option due to its extensive root system. Mowing will reduce seed production if repeated every two to four weeks during the growing season. Herbicides alone have limited effectiveness because of a waxy layer on the leaves and stems. They are most effective during the fall, after flowering. Some biological controls are available in areas where this species has invaded and can be effective, especially when combined with herbicide treatment and/or grazing by sheep or goats.

REFERENCE - Leafy spurge Identification and Management. 2015. Colorado State University. <https://www.colorado.gov/agconservation/Factsheets/LeafySpurgeFactSheet.pdf>
USDA, NRCS. 2010. The PLANTS Database. National Plant Data Center, Baton Rouge, LA, USA. <https://www.invasive.org/browse/subinfo.cfm?sub=3405>. June 12, 2017.

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LESSER CELANDINE, FIG BUTTERCUP

Ranunculus ficaria
Origin: Eurasia

INVASIVE RANKING, NYS

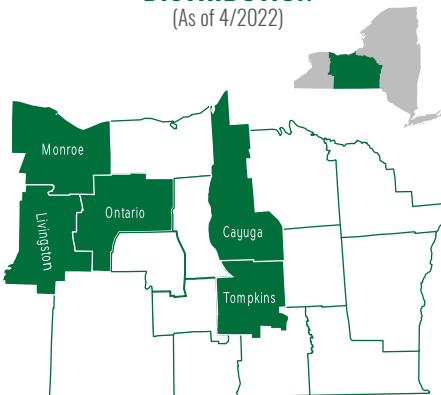
Very High

MANAGEMENT STRATEGY

Chemical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Lesser celandine is an invasive spring ephemeral that grows in a dense rosette. The shiny, dark green leaves are 4-9 cm wide, kidney or heart-shaped, and smooth with wavy edges. Leaf stalks are U-shaped in cross section. Flowers are eight petaled and bright yellow in color. Plants emerge early in the growing season, bloom late-April to mid-May, and die back by summer. They can reproduce vegetatively by bulbils, which are cream colored and hang from leaf stalks, making them easily dislodged if disturbed. Lesser celandine also has small, gray, fingerlike tuberous roots that overwinter and can create new plants.

HABITAT

Lesser celandine typically grows along stream banks, forested floodplains, and other wetlands.

THREAT

Lesser celandine can outcompete and displace native spring-flowering or short-lived plants. It emerges earlier in the spring than most native species, giving it a competitive advantage. Once established, it spreads rapidly, forming a solid green blanket across the ground making it difficult for important pollen and nectar providing native plants to grow.

MANAGEMENT

Prevention through education and awareness is an important management strategy to impede the spread of this invasive species. Hiking boots and other outdoor gear should be cleaned between uses at different sites. Small infestations may be pulled by hand or dug up using a shovel. However, entire plants and as many tubers as possible must be removed in order to prevent the spread of this invasive species. Chemical control using herbicides is also an option but should be done as early as possible to avoid impact to native plant species.

REFERENCE - Swearingen, J., C. Barger. 2016 Invasive Plant Atlas of the United States. University of Georgia Center for Invasive Species and Ecosystem Health. <http://www.invasiveplantatlas.org/> http://www.nyis.info/index.php?action=invasive_detail&id=71

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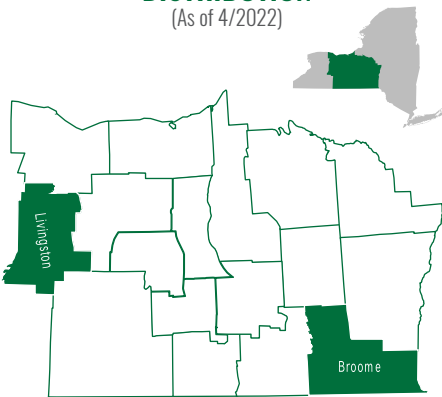
MILE-A-MINUTE VINE

Persicaria perfoliata
Origin: India & Eastern Asia

INVASIVE RANKING, NYS
Very High

MANAGEMENT STRATEGY
Chemical
Mechanical
Physical
Biocontrol
Prevention

DISTRIBUTION
(As of 4/2022)



www.fingerlakesinvasives.org

Mile-a-minute vine is an annual herbaceous vine with distinct triangular leaves and prickly stems. Leaves are 5-7 cm wide and 7-9 cm long, alternate in arrangement, and light green with barbs on the underside. Vines are narrow and covered in small, curved spines; older vines are reddish and woody. The flowering structure of mile-a-minute vine has a distinctive leafy, cup-shaped ocrea at its base. Small white flowers bloom in early summer. Berries are pale green when immature and ripen to a deep purple-blue from mid July until the first frost.

HABITAT

Mile-a-minute vine is generally found colonizing disturbed and open areas, including along the edges of woods, streams, wetlands, and roads. While it will grow in drier soils, mile-a-minute vine prefers wet environments with poor soil structure. The plant is most aggressive in full sun, but minimal shade can be tolerated. Using its specially adapted recurved barbs, mile-a-minute weed can reach maximum sunlight by growing over shrubs and trees.

THREAT

Extremely rapid growth of up to 15 cm per day allows mile-a-minute vine to form dense populations that smother tree seedlings and native plants. New outbreaks can occur great distances from the original source due to seed distribution by birds, small rodents, and water.

MANAGEMENT

Biological, mechanical, physical and chemical control are options for the removal and management of mile-a-minute vine. The vines can be mowed, cut, or removed by hand and disposed of in plastic bags before seeds are produced. Vines should be allowed to dry prior to disposal. Low-growing infestations may be repeatedly cut or mowed to reduce flowering and seed production. Biological control is available through the use of mile-a-minute weevils (*Rhinoncomimus latipes*). Herbicides have also proven effective against this species.

REFERENCE - Abbey, Tim. Mile-A-Minute or Devil's Tearthumb. May 2000. Connecticut Invasive Plant Working Group. http://www.hort.uconn.edu/cipwg/pdfs/mile_a_minute.pdf. June 6, 2017.
Mile-A-Minute (*Persicaria perfoliate*). New York Invasive Species Information: Cornell University Corporate Extension. http://nyis.info/index.php?action=invasive_detail&id=31. June 6, 2017.





PARROT FEATHER

Myriophyllum aquaticum
Origin: South America

INVASIVE RANKING, NYS

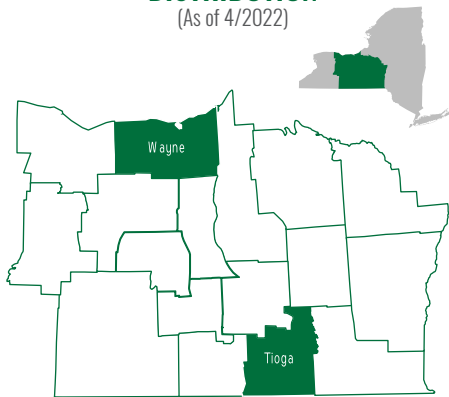
High

MANAGEMENT STRATEGY

- Chemical
- Mechanical
- Physical
- Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

Parrot feather is an invasive aquatic plant with both submerged and emergent leaves. Submerged leaves are feathery, reddish-orange, and grow in whorls of four to six leaves. Where the plant reaches the water surface, it creates dense mats of short spikelets up to 30 cm above the water surface. Leaves are still whorled and feathery, but are stiffer and gray-green or bright blue-green. Small, white flowers may be present along the emergent part of the stem.

HABITAT

Parrot feather grows well in high nutrient, shallow, slow moving water to depths of 9 m, and can survive a wider range of environmental conditions.

THREAT

Parrot feather can form dense mats, which may compete with native vegetation, constrict water flow, and reduce dissolved oxygen concentrations leading to stress of aquatic organisms. These can all negatively impact human activities in the water.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Management of parrot feather is difficult once it is established. Mechanical control methods may be utilized. However, this can spread fragments that re-establish the plant. Chemical control has had mixed results due to a waxy layer on the leaves. There are no biological controls permitted for use on this species in the US.

REFERENCE - Myriophyllum aquaticum USGS Nonindigenous Aquatic Species Database, Gainesville, FL, and NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI. <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=14&Potential=Y- Type=2&HUCNumber> Revision Date: 2/3/2015

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PURPLE LOOSESTRIFE

Lythrum salicaria
Origin: Eurasia

INVASIVE RANKING, NYS

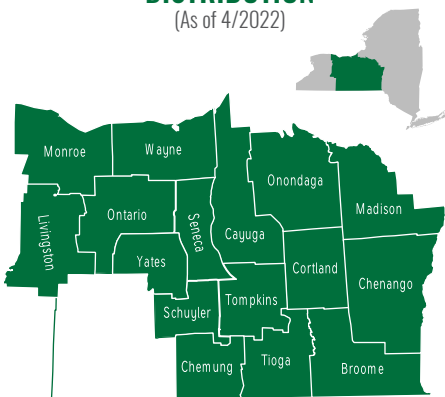
Very High

MANAGEMENT STRATEGY

- Chemical
- Physical
- Biocontrol
- Prevention

DISTRIBUTION

(As of 4/2022)



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Purple loosestrife is a showy wetland plant that grows up to 2.5 m tall. Leaves are 5-14 cm long, sword-shaped, and oppositely arranged. Stems are square and hairy, with an upright growth habit. Purple flowers have five to seven petals and grow in pairs or clusters on tall spikes; flowering starts in June and lasts into early fall. Older plants can have many woody stems growing from a single root crown.

HABITAT

Purple loosestrife will grow in wet meadows, tidal and non-tidal marshes, the edges of waterways and ponds, and in ditches. It can tolerate a wide range of conditions, including shading and flooding, but prefers moist, organic soils.

THREAT

Once established, purple loosestrife outcompetes and replaces native wetland species, which decreases biodiversity. This reduces the quality of habitat and food sources important to wetland wildlife, such as marsh birds and waterfowl. Dense stands of purple loosestrife also alter biogeochemical and hydrological processes in wetlands.

MANAGEMENT

Small infestations can be pulled by hand, though this must be completed before seeds are produced. Care must be taken to completely remove the root crown. The soil should not be overly disturbed when removing plants in case it releases seeds from the seedbank. All plant parts should be bagged and removed, and may be burned. Herbicides approved for aquatic use, preferably broadleaf-specific, can also effectively control small stands. Biocontrol options include: *Galerucella* spp. beetles, which eat the leaves and target the area of the plant that produces seeds; *Hylobius transversovittatus*, a root-mining weevil; and seed-eating beetles *Nanophyes marmoratus* and *N. brevis*. These insects can suppress populations to non-significant levels, although they do not eradicate them.

REFERENCE - New York Invasive Species Information. Purple Loosestrife. Cornell University Corporate Extension. http://www.nyis.info/index.php?action=invasive_detail&id=64

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SLENDER FALSE BROME

Brachypodium sylvaticum
Origin: Europe, Asia,
North Africa

INVASIVE RANKING, NYS

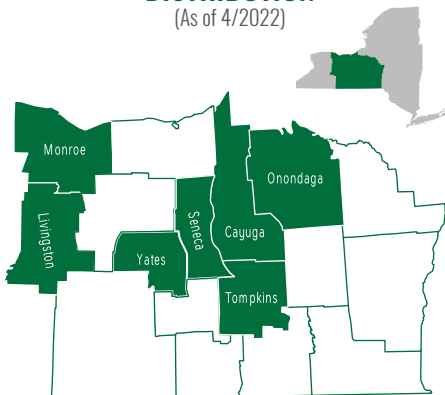
Very High

MANAGEMENT STRATEGY

Chemical
Mechanical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



www.fingerlakesinvasives.org

This invasive, perennial grass forms distinctive bunches of broad, arching leaves up to 12 mm wide and 1 m tall. Foliage emerges early in the spring and remains bright yellow-green into the late fall. Slender false brome can be distinguished from most other grasses by its drooping flower spikes, which bloom June-September, and hair on lower stems and leaf veins.

HABITAT

Slender false brome can tolerate a wide range of habitats, from shaded upland hardwood and conifer forests to full sun grasslands, but it is especially competitive in shaded or drought conditions.

THREAT

Slender false brome emerges earlier than many native species in the spring and can outcompete and replace native vegetation, which decreases biodiversity and habitat quality. It can prevent tree seedling establishment and has little nutritional value for wildlife. This plant is self-fertilizing and can produce hundreds of seeds per plant.

MANAGEMENT

Prevention is the best management option for uninfested sites. Cleaning hiking clothes, boots, management equipment, and recreational equipment between sites is critical to prevent spread. Hand removal in the spring before seed set can be effective for small populations. Mowing can prevent seed set if timed appropriately, but will not kill existing plants. Herbicides have been effective at controlling larger populations of slender false brome. Because seeds may remain viable in the seedbank for up to two years, any management should include site visits for several years to ensure eradication.

REFERENCE - Oregon State University. 2008. Slender False Brome. Slender False Brome. New York Department of Conservation. http://www.dec.ny.gov/docs/lands_forests_pdf/sfbfactsheet.pdf. November 15, 2017.

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STARRY STONEWORT

Nitellopsis obtusa
Origin: Eurasia

INVASIVE RANKING, NYS

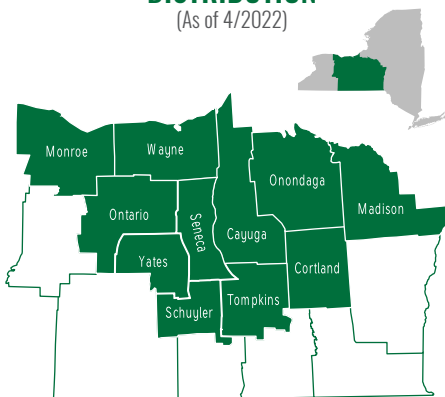
Not Applicable

MANAGEMENT STRATEGY

Chemical
Physical
Mechanical
Prevention

DISTRIBUTION

(As of 4/2022)



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Starry stonewort is a macroalgae that is easily spread by fragmentation. It is anchored to the sediment by clear root-like structures (*rhizoids*), and can grow more than 2 m long with whorls of four to six long, blunt-tipped branchlets. While it is similar to native stoneworts, it can be identified by production of white, star-shaped bulbils, asymmetrical branching structure, and orange structures (antheridium) at the branchlet and rhizoid nodes in low oxygen conditions.

HABITAT

Starry stonewort grows at depths up to 9 m in a broad range of slow-moving aquatic habitats, including low light and low nutrient conditions. It is adapted to both fresh and brackish habitats.

THREAT

Starry stonewort forms dense 'pillows' of vegetation, which outcompete aquatic plants and interfere with human and fish movement. Dense infestations are correlated with low abundance and diversity of plant species, and can completely block fish spawning.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Once established, the algae spreads readily through its easily dislodged bulbils and fragments, making manual or mechanical control challenging. Manual or mechanical control is more likely to succeed if the infestation is small and detected early. Starry stonewort's response to copper-based algaecides and herbicides is mixed and requires further research, although this may be a feasible management option.

REFERENCE - P. Douglas Pullman and Crawford, Gary. 2010. A Decade of Starry Stonewort in Michigan. *Lakeline*. Accessed [12/16/2017].
Sleith, R.S., Havens, A.J., Stewart, R.A. et al. 2015. Distribution of *Nitellopsis obtusa* (Characeae) in New York, U.S.A. *Brittonia* 67: 166
State of Michigan's Status and Strategy for Starry Stonewort (*Nitellopsis obtusa* (Desv. in Loisel.) J. Groves) Management. Updated August 2017; accessed [12/16/17]. http://www.michigan.gov/documents/deq/wrd-ais-nitellopsis-obtusa-strategy_499687_7.pdf



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VARIABLE-LEAF WATERMILFOIL

Myriophyllum heterophyllum
Origin: Eastern Asia

INVASIVE RANKING, NYS

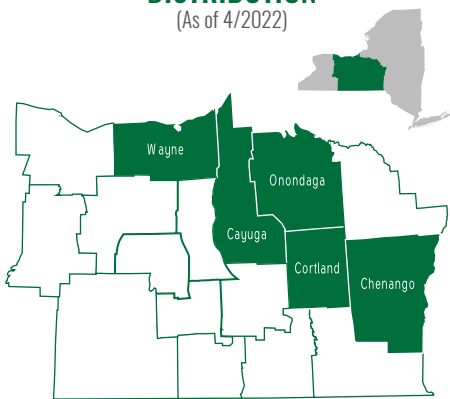
Very High

MANAGEMENT STRATEGY

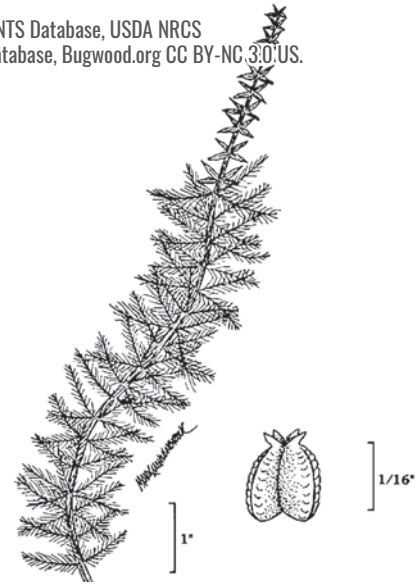
- Chemical
- Mechanical
- Physical
- Prevention

DISTRIBUTION

(As of 4/2022)



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Variable-leaf watermilfoil is an invasive, rooted aquatic plant with both submerged and emergent leaves. Submerged leaves are feather-like, with 5-14 pairs of green to reddish leaflets, and are arranged in whorls of 4-6 around red-brown stems. Emergent parts can grow to 15-20 cm above the water; leaves are highly variable bracts that are stiff, usually toothed, and may reach 2.5 cm in length. Flowers grow in spikes 7-15 cm tall in late June to August.

HABITAT

Variable-leaf watermilfoil grows in lakes, ponds, and pools in streams up to depths of about 1.8 m, occasionally deeper. This species prefers clear and neutral to slightly acidic water.

THREAT

Variable-leaf watermilfoil is an aggressive plant competitor that can outcompete and displace native vegetation, which can alter habitats for fish, waterfowl, and aquatic organisms. Dense growth inhibits recreational activities including boating, fishing, and swimming.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Small infestations can be managed using a variety of manual or mechanical control options, but fragments may spread the infestation so care must be taken to remove all parts of the plant. Plants should be disposed of away from the water. Some herbicides have also been effective.

REFERENCE - Rook, Earl. 2002. Two Leaf Milfoil. <http://www.rook.org/earl/bwca/nature/aquatics/myriophyllumhet.html>. June 12, 2017.
New Hampshire Department of Environmental Services. 2010. Variable Milfoil. Environmental Fact Sheet. <https://www.des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-23.pdf>. June 12, 2017.
Washington Invasive Species Council. 2016. Variable-Leaf Watermilfoil. Stop The Invasion. <http://www.invasivespecies.wa.gov/documents/priorities/VariableLeafMilfoilFactsheet.pdf>. June 12, 2017.
King County Noxious Weed Control Program BEST MANAGEMENT PRACTICES: Eurasian and variable-leaf milfoil. Published January 2010; accessed Dec 17, 2017. https://www.nwcb.wa.gov/images/weeds/Milfoil_Myriophyllum_control_King.p.

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WATER CHESTNUT

Trapa natans
Origin: Eurasia

INVASIVE RANKING, NYS

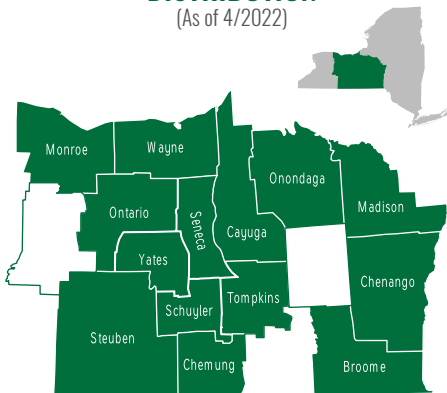
Very High

MANAGEMENT STRATEGY

Chemical
Mechanical
Physical
Prevention

DISTRIBUTION

(As of 4/2022)



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Water chestnut is a floating-leaved, annual, aquatic plant. Linear, oppositely arranged submersed leaves are replaced by feathery adventitious roots early in the growing season. On the water surface, the plant forms a rosette of green, glossy, triangular floating leaves with toothed edges and inflated petioles. Plant stems are cord-like and can grow up to 5 m. Small, white, four-petaled flowers bloom from the center of the rosette during the summer, eventually producing large, four-spined seeds.

HABITAT

Water chestnut grows best in quiet, shallow, high nutrient water bodies with a soft bottom substrate. They prefer waters with an alkaline or neutral pH.

THREAT

Populations of this species can form very dense mats of interlocking and stacking rosettes. These thick mats completely shade the water column and suppress most other aquatic plant growth in the area. Dense mats also inhibit boating, swimming, and fishing. The seeds are painful when stepped upon.

MANAGEMENT

Small populations can be controlled by hand pulling the plants prior to seed maturation. Large infestations have been controlled by the use of mechanical harvesters or the application of aquatic herbicides. Biocontrol options are in development. As always, the best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

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REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/8/2017].



WATER HYACINTH

Eichhornia crassipes
Origin: Amazon basin, Brazil

INVASIVE RANKING, NYS

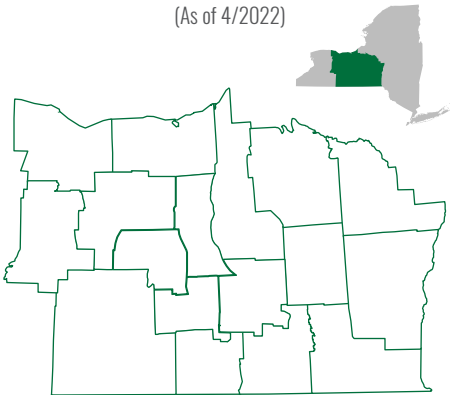
Not Applicable

MANAGEMENT STRATEGY

- Physical
- Chemical
- Prevention

DISTRIBUTION

(As of 4/2022)



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Water hyacinth is a free-floating aquatic perennial. Rosettes are made of round or elliptical glossy green leaves that are usually about 15 cm wide. Spongy, inflated petioles are about 30 cm long. Six-petaled flowers are lavender-blue with a yellow spot and bloom in a showy spike. The fruit has three chambers filled with many seeds. Water hyacinth also reproduces vegetatively from brittle stolons (horizontal stems).

HABITAT

Water hyacinth inhabits slow-moving freshwaters including ponds, lakes, swamps, and canals. It can tolerate short-term exposure to freezing temperatures.

THREAT

Thick mats of water hyacinth can obstruct waterways, alter water temperatures and chemistry, and displace native species. Mats reduce light and oxygen availability in aquatic ecosystems. Water hyacinth can also provide habitat for disease-carrying mosquitoes. Obstructed waterways can negatively affect transportation, irrigation, and recreation.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Plants may be cut and removed from the waterbody. Herbicide treatment can be effective. Bioherbicides have been developed for control of this plant.

REFERENCE - Jacono, C.C., M.M. Richerson, V. Howard, E. Baker, C. Stottlemeyer, and J. Li, 2017, *Eichhornia crassipes* (Mart.) Solms: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL, NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI, <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=11&Potential=Y&Type=2&HUCNumber=>, Revision Date: 1/30/2015, Access Date: 9/15/2017

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WATER LETTUCE

Pistia stratiotes

Origin: Not clear, occurs on all continents except Antarctica, pantropical

INVASIVE RANKING, NYS

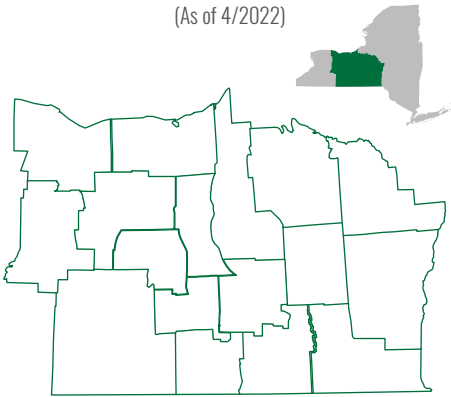
Not Applicable

MANAGEMENT STRATEGY

- Physical
- Chemical
- Prevention

DISTRIBUTION

(As of 4/2022)



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Water lettuce is a free-floating aquatic perennial plant. Rosettes are made of thick, hairy, light green leaves that are usually 2-15 cm long. Inconspicuous flowers occur in the center of the rosette, producing green berries. Water lettuce also reproduces vegetatively from brittle stolons (horizontal stems).

HABITAT

Water lettuce is native to tropical and subtropical lakes and will inhabit slow-moving waters including ponds, lakes, swamps, and canals. It is restricted by cold sensitivity, although the seeds have the potential to overwinter.

THREAT

Thick mats of water lettuce can obstruct waterways, reduce water flow, reduce dissolved oxygen concentrations, degrade aquatic habitats, displace native species, and impact recreation and infrastructure. Water lettuce also provides habitat for disease-carrying mosquitoes.

MANAGEMENT

Prevention is the best management practice to ensure that this species remains unintroduced. Education of the public about practices such as clean, drain, and dry, as well as timely reporting of sightings, can keep this invasive at bay. Plants may be physically removed and transported to shore for disposal. Manipulation of water levels in conjunction with physical removal of plants prior to flowering can reduce seed germination. Chemical treatment is also an effective treatment, although herbicides may not affect the seeds.

REFERENCE - Pennsylvania Department of Conservation and Natural Resources. Invasive Plants in Pennsylvania, Water Lettuce. PADCNr. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_010308.pdf
 Howard, V., E. Baker, J. Li, and P. Alsip, 2017, *Pistia stratiotes* Linnaeus: U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL.
 NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI, <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=15&Potential=Y&Type=2&HUCNumber>, Revision Date: 4/13/2017, Access Date: 9/14/2017

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WATER SOLDIERS

Stratiotes aloides
Origin: Eurasia

INVASIVE RANKING, NYS

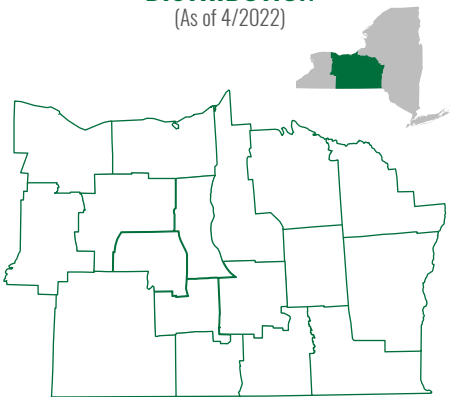
Not Applicable

MANAGEMENT STRATEGY

Physical
Chemical
Prevention

DISTRIBUTION

(As of 4/2022)



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Water soldiers is a loosely-rooted aquatic plant with submerged and emergent growth forms that resemble the household spider plant. Submerged leaves can grow to about 60 cm and are thin and brittle with weak spines. The emergent growth form produces rosettes of thick, rigid, brittle leaves with strongly developed spines on the margins. These leaves are generally about 40 cm in length. Water soldiers can reproduce vegetatively via buds that are released when the rosette decays.

HABITAT

Water soldiers inhabits shallow, stagnant freshwaters with muddy substrate. It can grow in depths up to about 6 m.

THREAT

This plant can form dense monocultures that outcompetes native vegetation. It also has the potential to alter the surrounding water chemistry. Dense mats can hinder recreational activities and sharp leaves can cut skin.

MANAGEMENT

Prevention is the best management practice to ensure that this species remains unintroduced. Education of the public about practices such as clean, drain, and dry, as well as efficient reporting of sightings, can keep this invasive at bay. These plants may be removed by hand, covered using shade-cloth, or chemically treated.

REFERENCE - Fusaro, A., A. Davidson, K. Alame, M. Gappy, E. Baker, G. Nunez, J. Larson, W. Conard, and P. Alsip, 2017, *Stratiotes aloides* (Linnaeus, 1758): U.S. Geological Survey, Nonindigenous Aquatic Species Database, Gainesville, FL
NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI, <https://nas.er.usgs.gov/queries/greatlakes/FactSheet.aspx?SpeciesID=70&Potential=Y&Type=2&HUCNumber=>, Revision Date: 5/11/2017, Access Date: 9/15/2017



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WATERWHEEL

Aldrovanda vesiculosa
Origin: Europe, Asia, Africa,
& Australia

INVASIVE RANKING, NYS

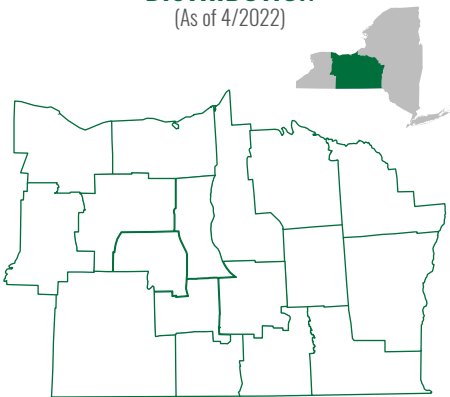
Not Applicable

MANAGEMENT STRATEGY

Prevention

DISTRIBUTION

(As of 4/2022)



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Waterwheel is a rootless, free-floating, submerged, carnivorous aquatic plant. Approximately 1 cm-long leaves grow in whorls of six to eight leaves on a stem that can reach 20 cm in length. A cross-section of one whorl resembles the spokes of a wheel. The leaves have kidney-shaped, hinged trap structures with fringed hairs. Waterwheel plants can have up to 20 whorls of leaves. Small, emergent, pinkish flowers bloom in late summer. This species also produces turions, which overwinter in temperate climates, and can reproduce by fragmentation.

HABITAT

Waterwheel grows in slightly acidic, nutrient poor waters with high organic matter content.

THREAT

This species may compete with other submersed, carnivorous species, including native bladderworts. It could also affect invertebrate populations and food webs in the aquatic community.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body.

REFERENCE - U.S. Geological Survey. [2017]. Nonindigenous Aquatic Species Database. Gainesville, Florida. Accessed [6/7/2017].



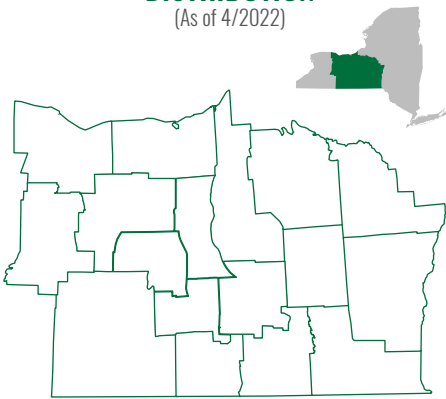
YELLOW FLOATING HEART

Nymphoides peltata
Origin: Eurasia

INVASIVE RANKING, NYS
High

MANAGEMENT STRATEGY
Chemical
Mechanical
Physical
Prevention

DISTRIBUTION
(As of 4/2022)



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Yellow floating heart is a perennial, rooted, aquatic invasive plant that resembles water lilies. The stems can grow up to 2 m long and lie just below the water surface, where they may branch into smaller plantlets. Round or heart-shaped floating leaves grow to 3-12 cm in diameter and are green or yellow-green with slightly wavy margins. The undersides of the leaves can be purple in color. Yellow floating heart can produce two to five bright yellow, five-petaled flowers, between May and October, depending on the temperature. These produce a capsule of flat, shiny seeds that have margins of stiff hairs. They can also reproduce vegetatively from fragments and rhizomes.

HABITAT

Yellow floating heart grows in slow-moving waters to 4 m depths, including lakes, ponds, swamps, and channels. It can tolerate anaerobic environments and survive on mudflats. This species overwinters as rhizomes.

THREAT

Yellow floating heart can form dense patches of vegetation that can outcompete and displace native plants and create stagnant, low-oxygen conditions in the water below. If a population of yellow floating heart is large enough, fish and other wildlife may be forced to relocate. The patches can also impede recreational activities, including boating, fishing, and swimming.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As this species is most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water body. Hand-pulling and mechanical removal may be used to control populations, although care should be taken to remove all plant pieces from the water. Chemical treatment can also be effective in managing infestations.

REFERENCE - *Nymphoides peltata* USGS Nonindigenous Aquatic Species Database, Gainesville, FL, and NOAA Great Lakes Aquatic Nonindigenous Species Information System, Ann Arbor, MI. <https://nas.er.usgs.gov/queries/GreatLakes/FactSheet.aspx?NoCache=12%2F10%2F2013+7%3A53%3A28+PM&SpeciesID=243&State=&HUCNumber> Revision Date: 3/23/2016





YELLOW IRIS

Iris pseudacorus
Origin: Eurasia

INVASIVE RANKING, NYS

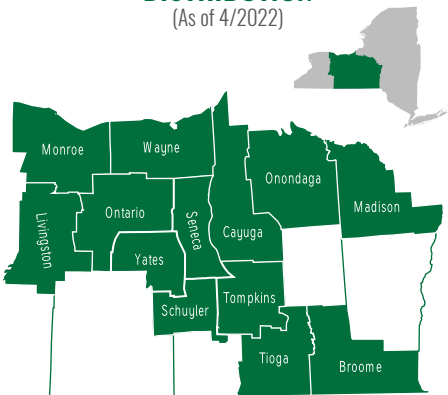
High

MANAGEMENT STRATEGY

Physical
Chemical
Prevention

DISTRIBUTION

(As of 4/2022)



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Yellow iris is an herbaceous perennial plant that grows in clusters to 1.5 m tall, connected by rhizomes. The leaves are elongated and dark green with a gray-blue tint. Showy yellow flowers bloom between May and July. This species may be mistaken for the native blue flag (*Iris versicolor*). Flowers and fruits are important for identification. Blue flag does not grow in large, dense stands and has blue-purple flowers and three-angled fruit capsules that remain closed upon maturity. Yellow iris has yellow flowers and a six-angled fruit capsule that spreads into three wide segments upon maturity.

HABITAT

Yellow iris commonly grows in wetlands and on stream banks, ponds, and ditches. It is tolerant of a wide range of conditions.

THREAT

Yellow iris has escaped gardens and can form dense colonies. Such monocultures alter habitat and displace native species. This plant is also poisonous to livestock and other animals.

MANAGEMENT

New infestations may be prevented through education and awareness of invasive species and native garden species that may be more suitable to cultivate. Small-scale infestations may be removed by hand via digging, although resin can cause skin irritation. The entire root system must be removed to eliminate the plant. Removing the flowers and seed pods will help slow its dispersal. Large-scale infestations likely require multiple herbicide applications.

REFERENCE - Pennsylvania Department of Conservation and Natural Resources. Invasive Plants in Pennsylvania, Yellow Flag Iris. PADCNr. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_010300.pdf
Sarver, M.J., A. Treher, L. Wilson, R. Naczi, and F.B. Kuehn, 2008. Mistaken Identity? Invasive Plants and their Native Look-alikes: an Identification Guide for the Mid-Atlantic. Dover, DE: Delaware Department of Agriculture and USDA Natural Resources Conservation Service.



HOBART AND WILLIAM SMITH COLLEGES





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The Finger Lakes Partnership for Regional Invasive Species Management (Finger Lakes PRISM) is a collaborative program designed to address the threat of invasive species. Housed within the Hobart and William Smith Colleges Finger Lakes Institute (FLI), the program is one of eight across New York that focuses on managing invasive species, developing detection programs, employing response efforts, providing education programs and outreach, and working with communities. PRISM is supported through the Environmental Protection Fund as administered by the New York State Department of Environmental Conservation.

Hobart and William Smith are nationally recognized liberal arts colleges defined by a longstanding focus on educating across academic disciplines and an intellectual environment that cultivates

faculty and student connections. With a strong commitment to inclusive excellence, the Colleges have a distinguished history of interdisciplinary teaching and scholarship, curricular innovation and exceptional outcomes. Hobart and William Smith provide robust programs in career development, study abroad, service, leadership and athletics. There are 45 majors and 67 minors. With an enrollment of 2,237, more than 60 percent of students study abroad through the No. 1 global education program in the country and all participate in community service. Located in the heart of the Finger Lakes region, Hobart and William Smith enjoy a lakeside campus on the shore of Seneca Lake. Originally founded as two separate colleges (Hobart for men in 1822 and William Smith for women in 1908), Hobart and William Smith students share the same campus, faculty, administration and curriculum.



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Partnership for Regional
Invasive Species Management

Reducing the introduction, spread and impact of invasive species within the Finger Lakes PRISM region through coordinated education, detection, prevention, and control measures.

FINGER LAKES PRISM

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