HOBART AND WILLIAM SMITH COLLEGES

FINGER LAKES INSTITUTE

FINGER LAKES PRISM
Partnership for Regional Invasive Species Management

INVASIVE SPECIES FIELD GUIDE

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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 programs are administered through 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.

According to Executive Order 13112, an "**invasive species**" is defined as a species that is:

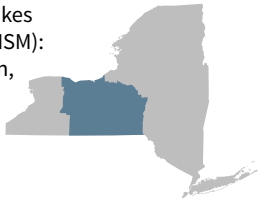
1) non-native (or alien) to the ecosystem under consideration and

2) whose introduction causes or is likely to **cause economic or environmental harm or harm to human health**.

Invasive species can be plants, animals, or other organisms. They aggressively out-compete native species for resources such as light, nutrients, and habitat, eventually displacing native plant and animal communities. This results in habitat degradation and loss of biodiversity. Once invasive species become dense and widespread, eradication becomes costly, energy-intensive, and nearly impossible to achieve. In the 21st century, global trade, climate change, and human activities are increasing the number of invasive species and exacerbating the magnitude of their impacts.

This guide was created in response to the growing threat of invasive species in the Finger Lakes region, with the intention of helping members of the public identify local flora and fauna and learn to distinguish between invasive species and native species.

This guide is applicable to the counties within the Finger Lakes Partnership for Regional Invasive Species Management (PRISM): Broome, Cayuga, Chemung, Chenango, Cortland, Livingston, Madison, Monroe, Onondaga, Ontario, Schuyler, Seneca, Tompkins, Tioga, Steuben, Wayne, and Yates.



USING THIS FIELD GUIDE

Species are grouped by organism type (fish, insects, invertebrates, and plants) and arranged alphabetically by common name. A short description of the organism and its habitat is provided, as well as why it is a threat and how it may be managed. A selection of native aquatic plants, which may be mistaken for invasive species, are included after the invasive species section. These are arranged by growth form or habit (floating-leaved or submersed).

REPORTING AN INVASIVE SPECIES

Users of this guide are encouraged to survey and monitor their waterways and scout for invasive species. Users of this guide are also urged to document their observations using photos and descriptions and to upload them to iMapInvasives.org. Photographed specimens are best examined when placed on a white background, such as a piece of paper.

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INVASIVE SPECIES

EASTERN MOSQUITOFISH, WESTERN MOSQUITOFISH

Gambusia holbrooki, Gambusia affinis

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. Mosquitofish can live in a variety of freshwater habitats including rivers, springs, and marshes, although they prefers shallow, warmer waters lacking predatory fish.

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.

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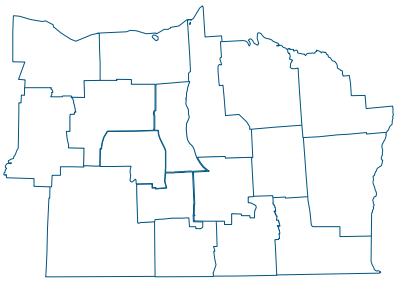

COMMON NAME *Eastern Mosquitofish, Western Mosquitofish*

SCIENTIFIC NAME *Gambusia holbrooki, Gambusia affinis*

ORIGIN *Southern Atlantic and Gulf slope drainages, Mississippi Basin*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Prevention*

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Poeciliidae by Fishes of North Carolina-Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

ORIENTAL WEATHERFISH, DOJO, WEATHER LOACH

Misgurnus anguillicaudatus

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. These fish are often found in shallow, slow-moving waters with muddy or silty substrates. They can survive in oxygen-poor waters, 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 may increase.

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.

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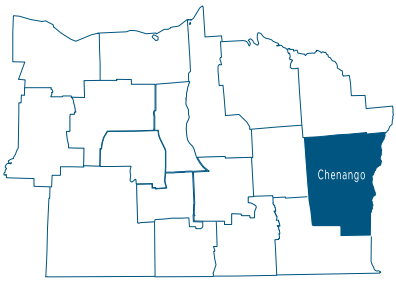

COMMON NAME *Oriental Weatherfish, Dojo, Weather Loach*

SCIENTIFIC NAME *Misgurnus anguillicaudatus*

ORIGIN *Eastern Asia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Physical, Prevention*

Bernard Kuhajda, Department of Biological Sciences, University of Alabama, Tuscaloosa, AL, CC BY-NC 3.0 US via Bugwood.org

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ROUND GOBY

Neogobius melanostomus

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

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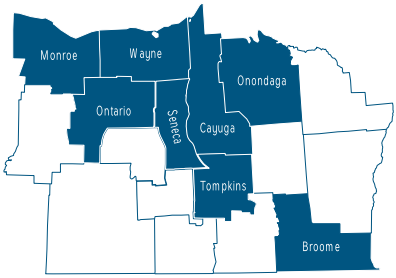

COMMON NAME *Round Goby*

SCIENTIFIC NAME *Neogobius melanostomus*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Prevention*

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ASIAN LONGHORNED BEETLE

Anoplophora glabripennis

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. The larvae are cream-colored, cylindrical, and up to 6 cm in length; they produce wood-shaving like frass and deep, round exit holes. These beetles live in a wide range of native hardwoods, but prefer maple trees.

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.

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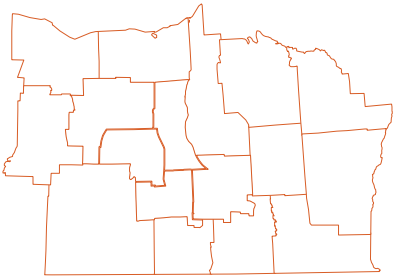


COMMON NAME *Asian longhorned beetle*

SCIENTIFIC NAME *Anoplophora glabripennis*

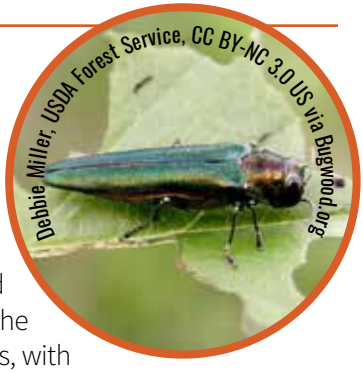
ORIGIN *Asia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

EMERALD ASH BORER

Agrilus planipennis



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 a elongated, narrow, metallic green body with a 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 two pincer like spines on the last segment. 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. When recreating and camping, only local firewood should be used. Biocontrol with the use of parasitic wasps is currently being deployed. This is a long-term management method rather than immediate control.

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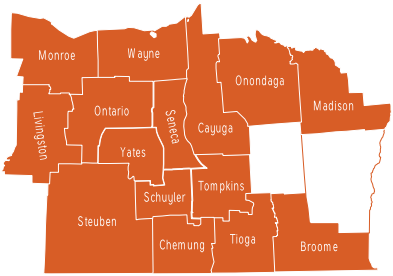

COMMON NAME *Emerald ash borer*

SCIENTIFIC NAME *Agrilus planipennis*

ORIGIN *Northern China, Korea*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Biocontrol, Prevention*

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HEMLOCK WOOLLY ADELGID

Adelges tsugae

The hemlock woolly adelgid (HWA) is a small, aphid-like insect that attacks hemlock trees. They are most easily recognized by the white "woolly" masses of wax they produce to protect themselves and their eggs from desiccation and predation. Hemlock woolly adelgids feeds on native eastern hemlock (*Tsuga canadensis*), and on any ornamental species of hemlock. They are found on twigs at the base of needles. Their ovisacs can be readily observed from late fall to early summer.

THREAT

HWA use their long, sucking mouth-parts 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. HWA reproduces 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. Early detection and treatment of new infestations, and limiting the movement of infested nursery stock will slow its spread. Biological controls are under development and are the best long term management option, but in the interim treatment is crucial to preserve hemlocks in New York.

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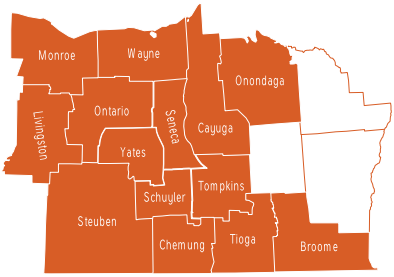

COMMON NAME *Hemlock woolly adelgid*

SCIENTIFIC NAME *Adelges tsugae*

ORIGIN *Asia, Southern Japan*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Biocontrol, Prevention*

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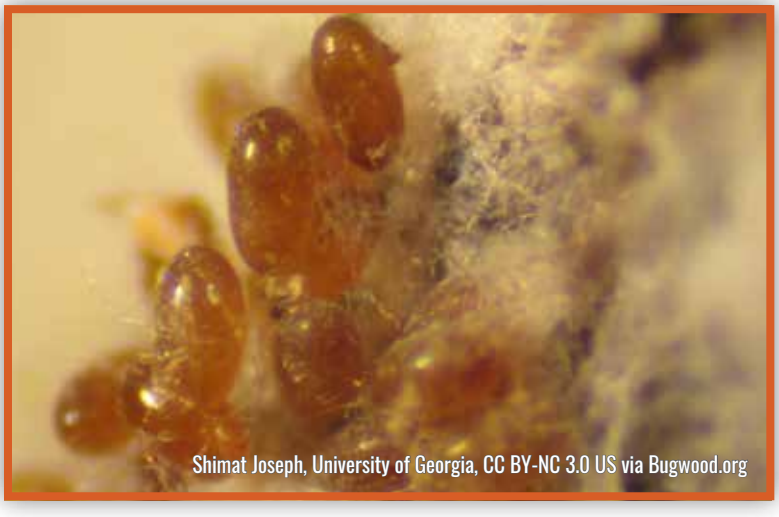

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ASIAN CLAM

Corbicula fluminea

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. The Asian clam is a filter feeder found in warmer regions of freshwater systems, on or slightly buried in the sediment.

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 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.

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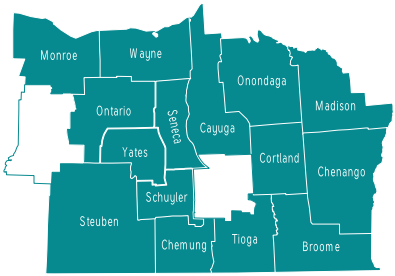

COMMON NAME *Asian clam*

SCIENTIFIC NAME *Corbicula fluminea*

ORIGIN *Asia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

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BLOODY RED SHRIMP

Hemimysis anomala

Bloody red shrimp are small invertebrates that can grow to about 0.5-1.5 cm. Their coloring ranges 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. They 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, generally from 6-10 m deep.

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.

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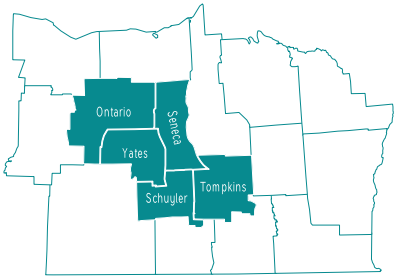


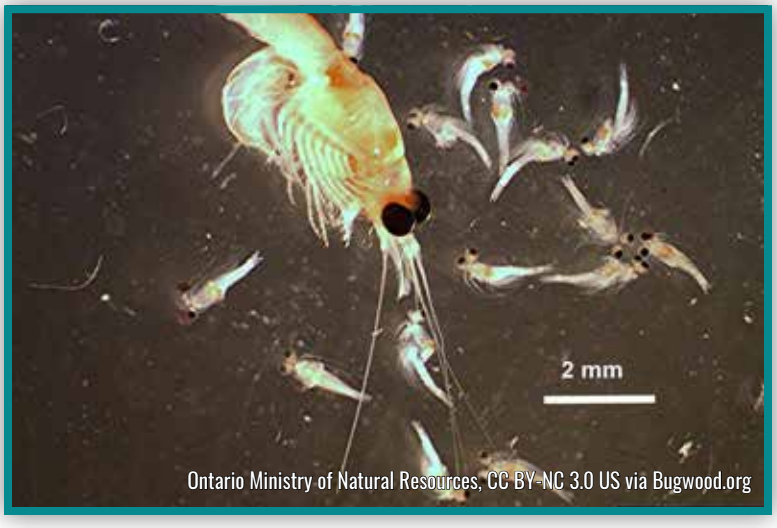
COMMON NAME *Bloody red shrimp*

SCIENTIFIC NAME *Hemimysis anomala*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Prevention*



CHINESE MYSTERYSNAIL

Cipangopaludina chinensis

The shell of the Chinese mysterysnail is up to 6 cm tall, smooth, light to dark olive-green with vertical striping, and has six or seven whorls. They can occupy any slow-moving body of water with a muddy substrate.

THREAT

Chinese mysterysnails can be hosts for parasites which 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 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. If established, 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.

DISTRIBUTION

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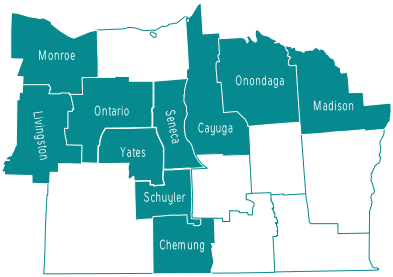

COMMON NAME *Chinese mysterysnail*

SCIENTIFIC NAME *Cipangopaludina chinensis*

ORIGIN *Southeast Asia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Prevention*

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FAUCET SNAIL

Bithynia tentaculata

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 specimens and photos should always be submitted to an expert for identification. They 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.

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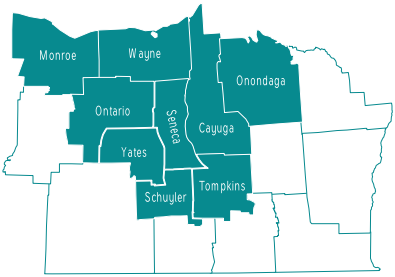

COMMON NAME *Faucet snail*

SCIENTIFIC NAME *Bithynia tentaculata*

ORIGIN *Europe*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Prevention*

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FISHHOOK WATERFLEA, SPINY WATERFLEA

Cercopagis pengoi & Bythotrephes longimanus

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. They live in freshwater or brackish lakes, preferring cooler areas of a waterbody.

THREAT

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

MANAGEMENT

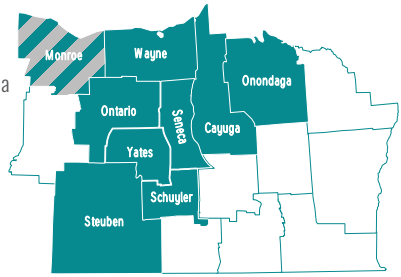
The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water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

DISTRIBUTION

(As of 2/2018)

= Fishhook Waterflea

= Spiny Waterflea



COMMON NAME *Fishhook waterflea, Spiny waterflea*

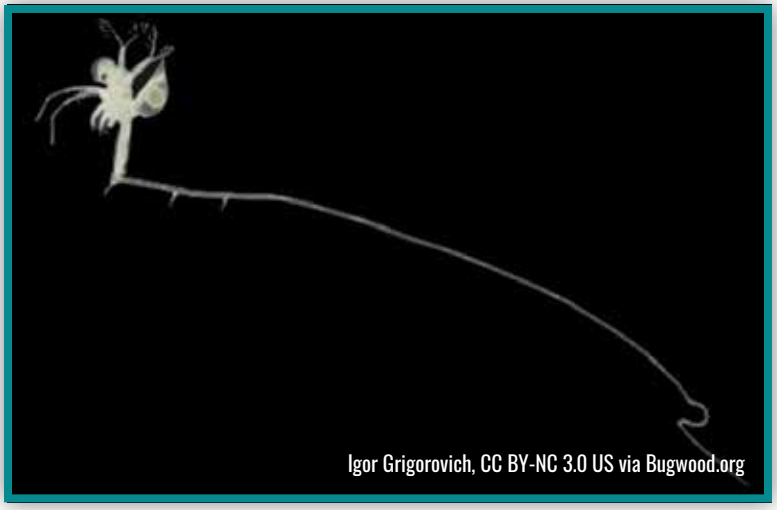
SCIENTIFIC NAME *Cercopagis pengoi, Bythotrephes longimanus*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Prevention*

J. Liebig, NOAA GLERL (public domain)



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NEW ZEALAND MUD SNAIL

Potamopyrgus antipodarum

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. This species can live in fresh and brackish water where it may be found 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

These snails alter nutrient (nitrogen and carbon) flows and consume large amounts of food. Abundant populations may outcompete other grazing invertebrates and inhibit colonization by other macroinvertebrates. It is not yet found in streams in the Great Lakes basin, but these are areas where the snail is expected to have significant impact.

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.

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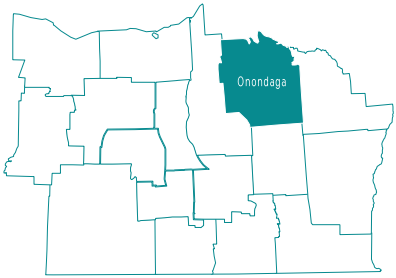

COMMON NAME *New Zealand mud snail*

SCIENTIFIC NAME *Potamopyrgus antipodarum*

ORIGIN *New Zealand and nearby islands*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Prevention*

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RUSTY CRAYFISH

Orconectes rusticus

Rusty crayfish grow to about 10 cm in length and are dark brown with rust-colored spots on both sides of the carapace. They have 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. Rusty crayfish live in waterbodies and waterways with clear, well-oxygenated water and rocks, logs, and debris for shelter. They prefer cobbly bottom sediment but will tolerate a variety of substrates including silt, clay, sand, and gravel.

THREAT

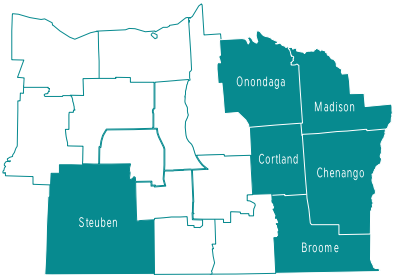
Rusty crayfish are aggressive, reproduce quickly, and can outcompete and displace native crayfish species. This causes declines in native crayfish, plant, invertebrate, and fish populations, and reduces biodiversity of the aquatic community.

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 2/2018)



COMMON NAME *Rusty crayfish*

SCIENTIFIC NAME *Orconectes rusticus*

ORIGIN *Ohio River Basin*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Prevention*

Jeff Gunderson

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ZEBRA MUSSEL, QUAGGA MUSSEL

Dressina polymorpha,
Dreissena rostriformis bugensis

Zebra and quagga mussels are freshwater, filter-feeding, bivalve mussels. Both can be found on a variety of natural and manmade substrate, up to depths of over 100m, depending on the temperature. Both species are D-shaped and grow up to about 4 cm long. When placed on a flat surface zebra mussels are stable on their flattened underside while quagga mussels, which have a ridge, will fall over. These mussels inhabit freshwater lakes, rivers, reservoirs, streams, and ponds. They attach to any stable substrate including sand, silt, cobbles, macrophytes, concrete, and metal.

THREAT

These 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 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

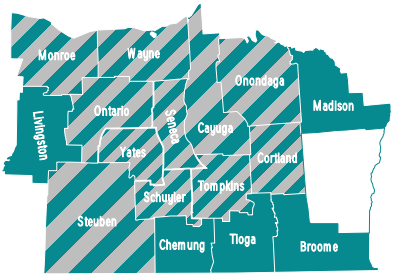
The best management strategy is prevention through education and stewardship. As these species are most commonly spread through fishing and boating equipment, it is important to use precautions such as cleaning, draining, and drying your boat and other aquatic equipment before moving to another water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

DISTRIBUTION

(As of 2/2018)

= Zebra Mussel

= Quagga Mussel



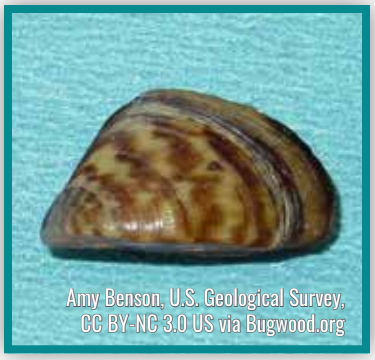
COMMON NAME *Zebra mussel, quagga mussel*

SCIENTIFIC NAME *Dressina polymorpha, Dreissena rostriformis bugensis*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

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



ZEBRA MUSSEL

QUAGGA MUSSEL

ZEBRA MUSSEL INFESTATION

BLACK SWALLOWWORT, PALE SWALLOWWORT

Vincetoxicum nigrum, Vincetoxicum rossicum

Black and pale swallowwort are invasive, herbaceous, perennial vines. Leaves are opposite, shiny dark green, and narrowly oval or heart-shaped with smooth edges and sharply pointed tips. Stems grow in a spiral and are covered in tiny hairs. Flowers are small, five petaled, and clustered at the base of leaf stems. Pale swallowwort blooms from May through mid-July; its petals are twice as long as they are wide and range from pink to dark burgundy. Black swallowwort blooms in June and July; its petals are dark purple, about as wide as they are long, and covered in fine hairs. Swallowworts closely resemble common milkweed (*Asclepias syriaca*). Both species are shade tolerant, but grow more aggressively in sunlight. They occur in disturbed areas, agricultural and garden lands, forests, limestone rich environments with thin soil, and along the edges of low lying marshy areas. They 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

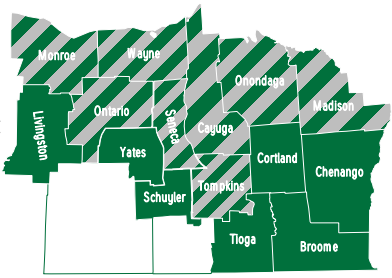
When populations are small, these plants can be physically removed by thoroughly digging up root masses prior to seed dispersal. They may also be treated with herbicides once flowering has begun. Spread of swallowworts can be reduced if mowed consistently every year before seed pods are mature, although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

DISTRIBUTION

(As of 2/2018)

= Pale Swallowwort

= Black Swallowwort



COMMON NAME *Black swallowwort, pale swallowwort*

SCIENTIFIC NAME *Vincetoxicum nigrum, Vincetoxicum rossicum*

ORIGIN *Europe*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

BRAZILIAN WATERWEED

Egeria densa

Brazilian waterweed is a submerged aquatic plant with bright green stems and leaves and a very leafy appearance. Linear leaves up to 3 cm long by ½ cm wide with finely toothed margins 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.; they reproduce via stolons and fragmentation. Brazilian waterweed inhabits mild to warm slow-flowing freshwaters with a wide range of temperatures and light levels, and can occur as deep as 7 m.

THREAT

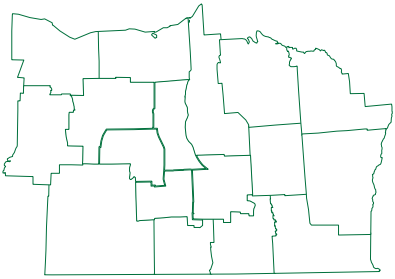
Dense populations of Brazilian waterweed can disrupt water flow, trap sediment, and alter water quality, as well as reduce the abundance and diversity of native vegetation. Severe infestations may impair recreational uses of a water body including boating, fishing, and swimming.

MANAGEMENT

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. Brazilian waterweed may be physically removed only if extreme care is taken to remove fragments from the water. Chemical control can reduce infestations, although may damage other beneficial aquatic plants in the area. Triploid Grass Carp (*Ctenpharyngodon idella*) may also be used to control Brazilian waterweed infestations, but would require a permit.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Brazilian waterweed*

SCIENTIFIC NAME *Egeria densa*

ORIGIN *South America*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Mechanical, Biocontrol, Prevention*

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BRITTLE WATERNYMPH, BRITTLE NAIAD

Najas minor

Brittle waternymph is an annual submersed aquatic plant that is compact but bushy in appearance with thin, bran-ching stems up to 1.5m in length. Leaves are oppositely arranged, stiff, curled, and pointed, with visible spines along the margins. Seeds, which grow along the stem, are slightly recurved, purplish in color, and have tiny, rectangular pits arranged in longitudinal rows. Care should be taken when identifying this species, as it is similar in appearance to native waternymph species. Brittle waternymph inhabits still or slow-moving waterbodies 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 waternymph can form dense stands in shallow water. This inhibits the growth of native aquatic macrophytes, resulting 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.

DISTRIBUTION

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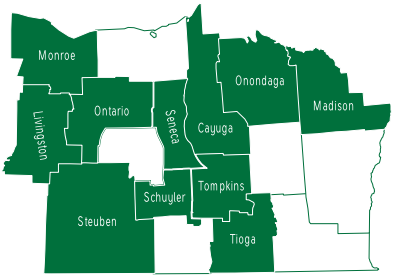


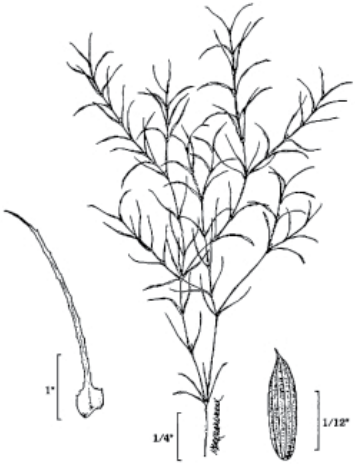
COMMON NAME *Brittle waternymph, brittle naiad*

SCIENTIFIC NAME *Najas minor*

ORIGIN *Eurasia and Northern Africa*

INVASIVE RANKING, NYS *Moderate*

MANAGEMENT STRATEGY *Prevention, Physical, Mechanical, Chemical*



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CURLY-LEAVED PONDWEED

Potamogeton crispus

Curly-leaved pondweed is a submerged perennial aquatic plant that can grow 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, and also produces overwintering buds called turions. It grows in a wide variety of freshwater or brackish environments to about 6 m deep.

THREAT

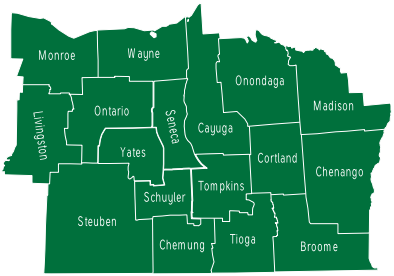
This species is one of the first to grow in the spring and grows quickly, allowing it to outcompete native plants for light and space thereby reducing the biodiversity and value of aquatic habitat. Curly-leaved pondweed's midsummer senescence can cause a critical loss of dissolved oxygen levels. The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

DISTRIBUTION

(As of 2/2018)



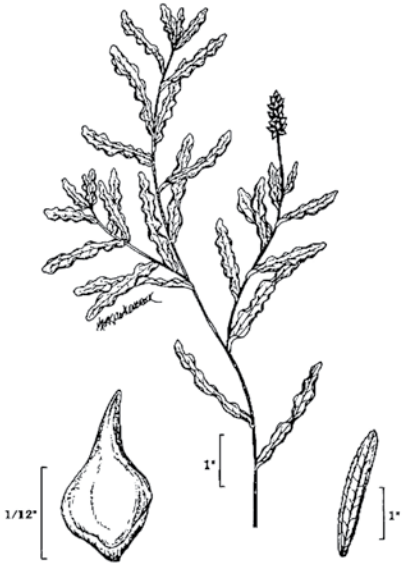
COMMON NAME *Curly-leaved pondweed*

SCIENTIFIC NAME *Potamogeton crispus*

ORIGIN *Europe, Africa, and Australia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Mechanical, Physical, Prevention*



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EURASIAN WATERMILFOIL

Myriophyllum spicatum

Eurasian watermilfoil is an invasive submerged aquatic plant 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 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. They are found to depths of 1-10 m in lakes, ponds, and quieter sections of rivers and streams. Eurasian milfoil 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

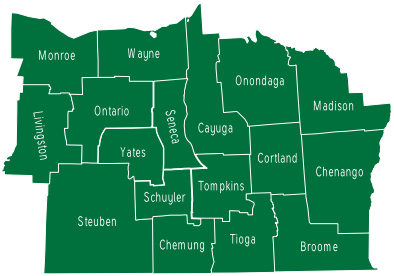
Eurasian watermilfoil can spread very easily through fragmentation. This species forms dense mats that outcompete and displace native species, degrade habitat, and inhibit recreational activities.

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. 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 manually removed. Many herbicides can control milfoil populations. Biocontrol insects or the triploid Grass Carp (*Ctenpharyngodon idella*) may also be options for control.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Eurasian watermilfoil*

SCIENTIFIC NAME *Myriophyllum spicatum*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

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

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EUROPEAN FROGBIT

Hydrocharis morsus-ranae

European frogbit is a free-floating annual aquatic plant. Leaves are small, kidney or heart shaped (1.5-6.5 cm long), and leathery, with undersides that may be dark purple. Although smaller in size, they may resemble white and yellow water lily leaves. Leaf stems lack a midline groove, distinguishing it from American frogbit (*Limnobium spongia*). Three-petaled white flowers with yellow centers bloom in summer. European frogbit grows well in quiet, open waters including marshes, ditches, swamps, and sheltered coves; it grows well in calcium rich waters.

THREAT

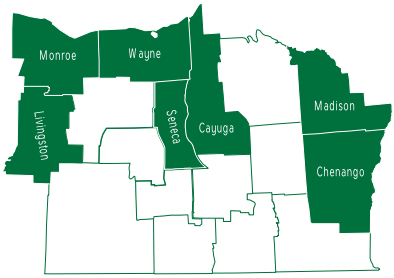
European frogbit has rapid vegetative spread and forms dense mats, which can crowd out other macrophytes and limit light penetration into the water column. With limited light below the vegetative mats, native plants may not survive, limiting native biodiversity. It can also inhibit recreational use such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

DISTRIBUTION

(As of 2/2018)



COMMON NAME *European frogbit*

SCIENTIFIC NAME *Hydrocharis morsus-ranae*

ORIGIN *Europe*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Physical, Mechanical, Prevention*

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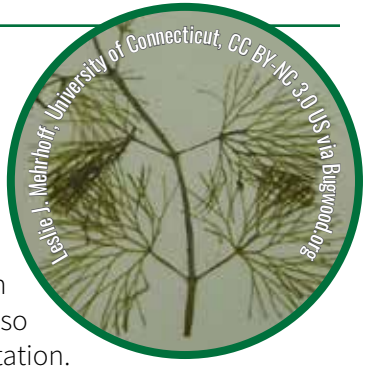
FANWORT

Cabomba caroliniana



Fanwort is a submerged invasive aquatic plant with green, delicate, fan-like underwater leaves oppositely arranged and usually 5 cm across. Small oval floating leaves are occasionally present. Small (2 cm or smaller) white flowers bloom in late spring and summer. It can also reproduce vegetatively via fragmentation. Fanwort grows up to 10 m deep, rooted in the muddy substrate of slow moving waters of lakes, ponds, and occasionally rivers. It can grow under a wide range 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 are effective in controlling fanwort populations. Benthic barriers can also be effective in small areas, although they are not species specific.

DISTRIBUTION

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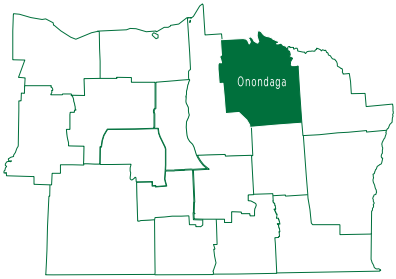

COMMON NAME *Fanwort*

SCIENTIFIC NAME *Cabomba caroliniana*

ORIGIN *South America*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Mechanical, Prevention*

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FLOATING PRIMROSE-WILLOW, CREEPING WATER PRIMROSE

Ludwigia peploides

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 between 1-4 cm long. 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

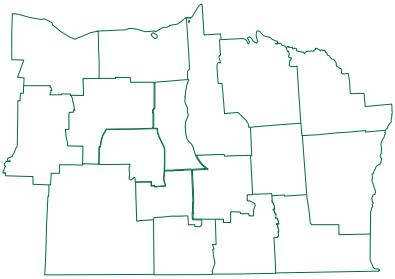
Floating primrose-willow can form thick mats on the water's surface, which crowds native vegetation and blocks sunlight from penetrating into the water column. This can cause submerged aquatic plants to die from lack of sunlight and negatively affect water chemistry and aquatic communities.

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 currently the preferred control method for floating primrose-willow. The fruit, rhizomes, and seeds should be targeted for removal. Any fragments left remaining can result in further spread and unsuccessful control. Floating primrose-willow is also susceptible to herbicides. Water-primrose flea beetles (*Lysathia ludoviciana*) and triploid Grass Carp (*Ctenpharyngodon idella*) are potential biocontrol agents.

DISTRIBUTION

(As of 2/2018)



COMMON NAME	*Floating primrose-willow, creeping water primrose*
SCIENTIFIC NAME	*Ludwigia peploides*
ORIGIN	*Southeastern United States*
INVASIVE RANKING, NYS	*Very High*
MANAGEMENT STRATEGY	*Physical, Biocontrol, Chemical, Prevention*

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FLOWERING RUSH

Butomus umbellatus

Flowering rush is an aquatic 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. It lives where cattails are typically found, growing in freshwater lakes, riparian areas, and wetlands. It can tolerate 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 and requires multiple treatments.

DISTRIBUTION

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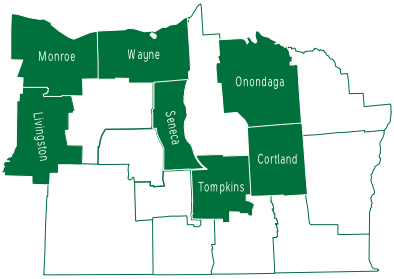

COMMON NAME *Flowering rush*

SCIENTIFIC NAME *Butomus umbellatus*

ORIGIN *Africa, Asia, and Europe*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

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GIANT HOGWEED

Heracleum mantegazzianum

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.

THREAT

Giant hogweed's sap causes skin to become sensitive to ultraviolet light. This can result in severe burns when the affected areas are exposed to sunlight, producing swelling and severe, painful blistering. 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 an increase 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.

DISTRIBUTION

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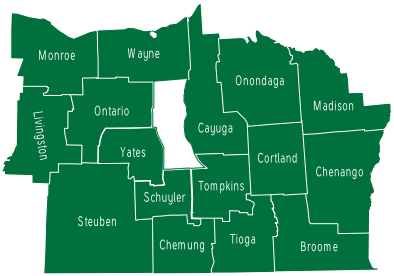

COMMON NAME *Giant hogweed*

SCIENTIFIC NAME *Heracleum mantegazzianum*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

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HYDRILLA

Hydrilla verticillata

Hydrilla is a submerged herbaceous perennial plant with visibly serrated leaves that grow in whorls of three to eight, often five. 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, see top picture to the right), 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 aquatic and aquarium plant, which has smooth leaves usually arranged in whorls of three and no tubers or turions. Hydrilla commonly 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

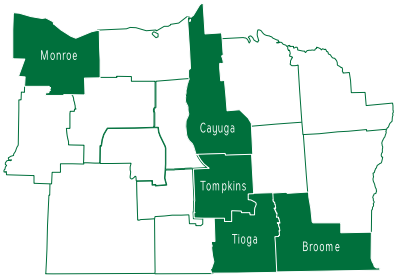
Hydrilla spreads quickly, and once established, forms dense stands that crowd out native species and disrupt aquatic habitats. Hydrilla can also clog waterways and restrict water flow, which may damage water control structures and inhibit recreational activities such as swimming, boating, and fishing.

MANAGEMENT

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.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Hydrilla*

SCIENTIFIC NAME *Hydrilla verticillata*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

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


Hilary Mosher


Kathryn Des Jardin

JAPANESE KNOTWEED

Fallopia japonica

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 coming to a sharply pointed tip, about 15 cm long and 7-12 cm wide. 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. It 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 effective on smaller infestations, including foliar spray, cut-and-wipe, and stem injection. If plant materials are 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.

DISTRIBUTION

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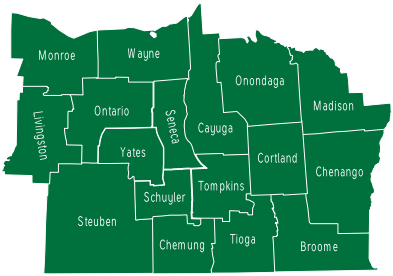

COMMON NAME *Japanese knotweed*

SCIENTIFIC NAME *Fallopia japonica*

ORIGIN *Eastern Asia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

Jan Samanek, Phytosanitary Administration, CC BY-NC 3.0 US via Bugwood.org

Randy Westbrooks, Invasive Plant Control, Inc., CC BY-NC 3.0 US via Bugwood.org

JAPANESE STILTGRASS

Microstegium vimineum

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. Leaves are alternate and 3-13 cm long, asymmetrical with an off-center mid-rib. 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 in one or two delicate spikes at the top of each stem. Roots are weak, but can form at any stem node. Japanese stiltgrass grows in a wide range of habitats, from roadsides to undisturbed forest understory. It readily takes advantage of disturbed areas, and is most often associated with moist, acidic to neutral soils that are high in nitrogen.

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.

DISTRIBUTION

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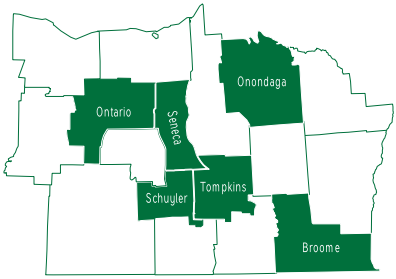

COMMON NAME *Japanese stiltgrass*

SCIENTIFIC NAME *Microstegium vimineum*

ORIGIN *Asia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Mechanical, Physical, Prevention*

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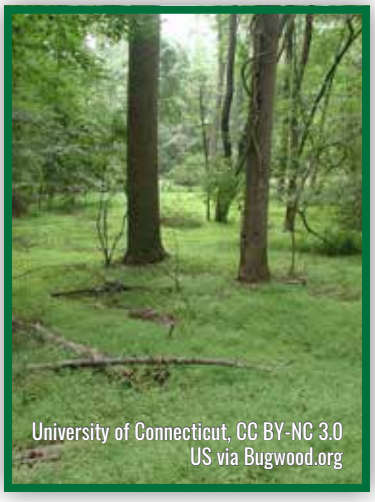

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LEAFY SPURGE

Euphorbia esula

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

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 every 2 to 4 weeks during the growing season will reduce seed production. Herbicides are most effective when applied after flowering, but have limited effectiveness when used alone due to the waxy layer on leaves and stems. Some effective biological controls are available, and can be effective especially when combined with herbicide treatment and/or grazing by sheep or goats.

DISTRIBUTION

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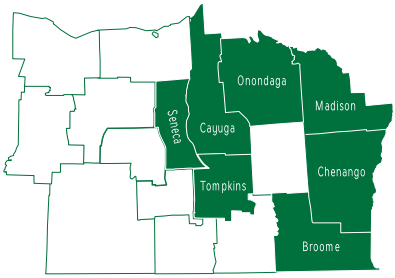

COMMON NAME *Leafy spurge*

SCIENTIFIC NAME *Euphorbia esula*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *High*

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

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LESSER CELANDINE, FIG BUTTERCUP

Ranunculus ficaria

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. 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 can 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.

DISTRIBUTION

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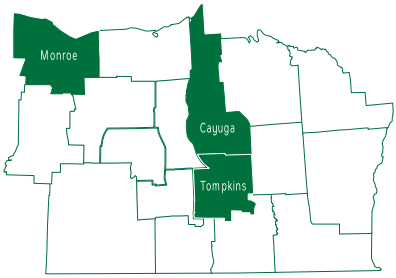

COMMON NAME *Lesser celandine, fig buttercup*

SCIENTIFIC NAME *Ranunculus ficaria*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

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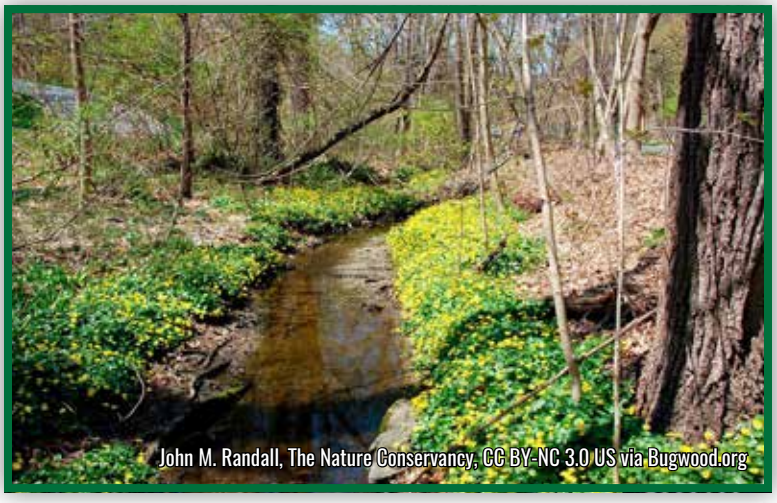

John M. Randall, The Nature Conservancy, CC BY-NC 3.0 US via Bugwood.org

MILE-A-MINUTE VINE

Persicaria perfoliata

Mile-a-minute vine is an annual herbaceous vine with distinctly triangular leaves and prickly stems. Leaves are 5-7 cm wide and 7-9 cm long, light green with barbs on the underside, and alternately arranged. Vines are narrow and covered in small, curved spines; older vines are reddish and woody. The flowering structure 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 deep purple-blue from mid July until the first frost. The plant reaches for maximum sunlight by growing over shrubs and trees. Mile-a-minute is generally found in disturbed open areas like the edges of woods, streams, wetlands, and roads. It will grow in drier soils, but prefers wet soil with poor structure. The species is most aggressive in full sun, but tolerates minimal shade.

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

Vines can be mowed, cut, or removed by hand and disposed of in plastic bags before seeds are produced; dry plants 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 are also effective against this species.

DISTRIBUTION

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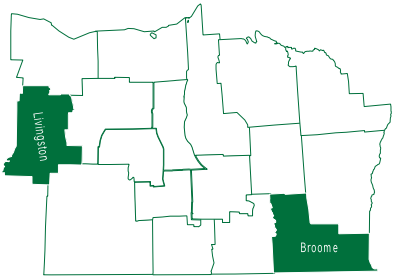

COMMON NAME *Mile-a-minute vine*

SCIENTIFIC NAME *Persicaria perfoliata*

ORIGIN *Asia*

INVASIVE RANKING, NYS *Very High*

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

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PARROT FEATHER

Myriophyllum aquaticum

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

THREAT

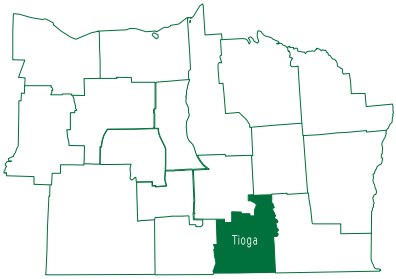
Parrot feather can form dense mats, which may compete with native vegetation, constrict water flow, and reduce dissolved oxygen concentrations leading to stress of aquatic organisms. These can all negatively impact human activities in the water.

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 tend to 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.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Parrot feather*

SCIENTIFIC NAME *Myriophyllum aquaticum*

ORIGIN *South America*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Prevention*

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PURPLE LOOSESTRIFE

Lythrum salicaria

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. 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

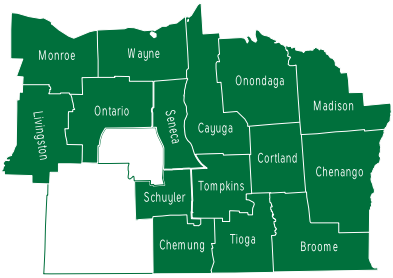
Once established, purple loosestrife outcompetes and replaces native wetland species, which decreases biodiversity. This reduces the quality of habitat and food sources important to wetland wildlife, such as marsh birds and waterfowl. Dense stands of purple loosestrife also alter biogeochemical and hydrological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

MANAGEMENT

Small infestations can be pulled by hand before seeds are produced. The root crown must be completely removed to prevent resprouting. Minimize soil disturbance when removing plants to minimize the release of seeds from the seedbank. All plant parts should be bagged and removed, and may be burned. Herbicides approved for aquatic use can also effectively control small stands. Several biocontrol options are available and can suppress populations to nonsignificant levels, although they do not eradicate them.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Purple loosestrife*

SCIENTIFIC NAME *Lythrum salicaria*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Physical, Biocontrol, Prevention*

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SLENDER FALSE BROME

Brachypodium sylvaticum

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. It 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

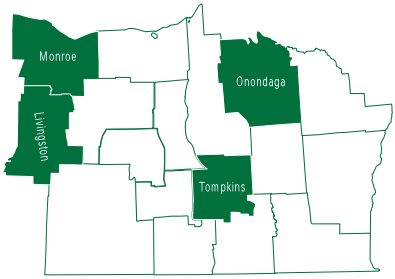
Slender false brome emerges earlier than many native species in the spring and can outcompete and replace native vegetation, which decreases biodiversity and habitat quality. It can prevent tree seedling establishment and has little nutritional value for wildlife. This plant is self-fertilizing and can 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 of the plant in the spring before seed set can be effective for small populations. Herbicides have been effective at controlling larger populations of slender false brome. Mowing can prevent seed set if timed appropriately, but will not kill existing plants. 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.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Slender false brome*

SCIENTIFIC NAME *Brachypodium sylvaticum*

ORIGIN *Eurasia and North Africa*

INVASIVE RANKING, NYS *Very High*

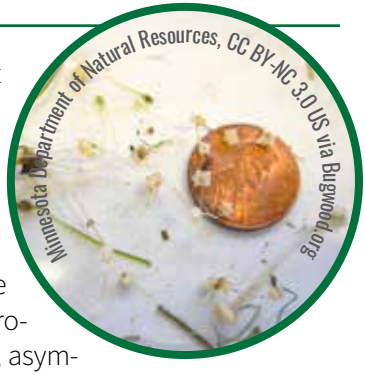
MANAGEMENT STRATEGY *Chemical, Mechanical, Physical, Prevention*


Andie Graham


Andie Graham

STARRY STONEWORT

Nitellopsis obtusa



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, 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. 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

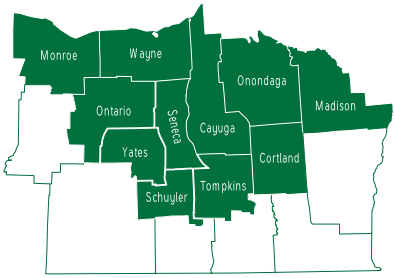
Starry stonewort forms dense 'pillows' of vegetation, which outcompete aquatic plants and interfere with human and fish movement. Dense infestations are correlated with low abundance and diversity of other plant species, and can completely block fish spawning.

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 plant fragments, making manual or mechanical control challenging. Starry stonewort's response to copper-based algaecides and herbicides is mixed and requires further research, although this may be a feasible management option.

DISTRIBUTION

(As of 2/2018)



COMMON NAME *Starry stonewort*

SCIENTIFIC NAME *Nitellopsis obtusa*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Not Ranked*

MANAGEMENT STRATEGY *Chemical, Mechanical, Physical, Prevention*


Kathryn Des Jardin


Kathryn Des Jardin

VARIABLE-LEAF WATERMILFOIL

Myriophyllum heterophyllum

Variable-leaf watermilfoil is an invasive, rooted aquatic plant with both submerged and emergent leaves. Submerged leaves are feather-like, with five to fourteen pairs of green to reddish leaflets, and are arranged in whorls of four to six 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. 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. Hand pulling, diver assisted suction harvesting, benthic barrier placement, as well herbicide treatment are all effective options for management of variable-leaf watermilfoil. Care should be taken to remove all parts and fragments of the plant to prevent further spread.

DISTRIBUTION

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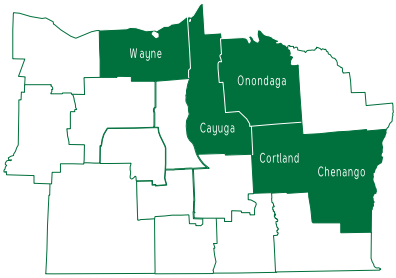


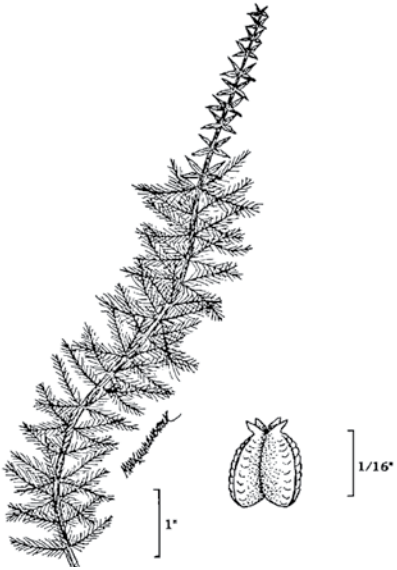
COMMON NAME *Variable-leaf watermilfoil*

SCIENTIFIC NAME *Myriophyllum heterophyllum*

ORIGIN *Eastern Asia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Mechanical, Physical, Prevention*



USDA PLANTS Database, USDA NRCS PLANTS Database, CC BY-NC 3.0 US via Bugwood.org

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WATER CHESTNUT

Trapa natans

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. 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.

DISTRIBUTION

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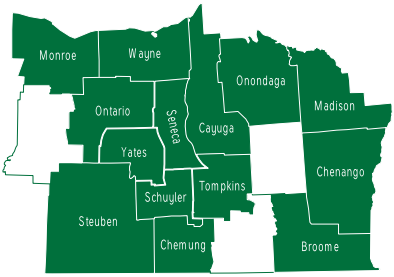


COMMON NAME *Water chestnut*

SCIENTIFIC NAME *Trapa natans*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *Very High*

MANAGEMENT STRATEGY *Chemical, Mechanical, Physical, Prevention*


Kathryn Des Jardin


Kathryn Des Jardin


Kathryn Des Jardin

WATERWHEEL

Aldrovanda vesiculosa

Waterwheel is a rootless, free-floating, submerged, carnivorous aquatic plant. Approximately 1 cm-long leaves grow in whorls of six to eight 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. Waterwheel grows in slightly acidic, nutrient poor waters with high organic matter content.

THREAT

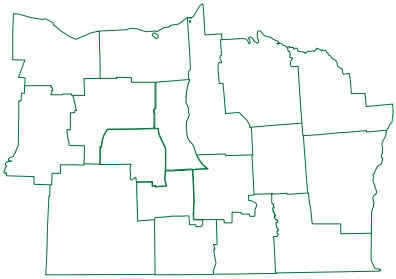
This species may compete with other submersed, carnivorous species, including native bladderworts. It could also affect invertebrate populations and food webs in the aquatic community.

MANAGEMENT

The best management strategy is prevention through education and stewardship. As 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 2/2018)



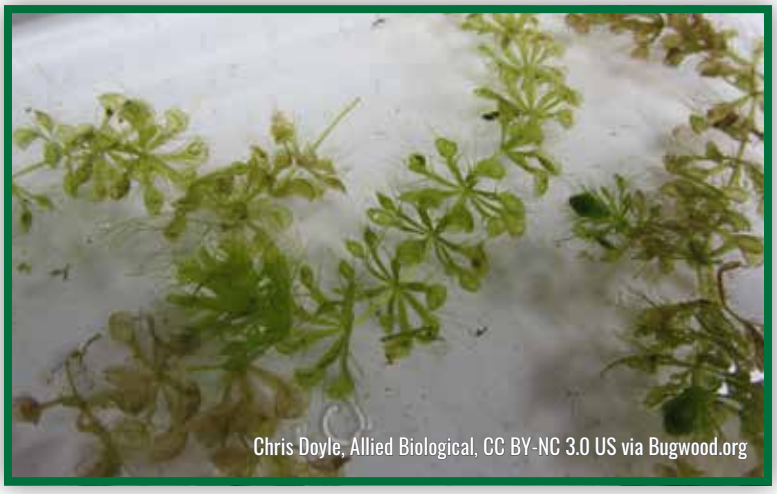
COMMON NAME *Waterwheel*

SCIENTIFIC NAME *Aldrovanda vesiculosa*

ORIGIN *Europe, Asia, and Africa*

INVASIVE RANKING, NYS *Not Ranked*

MANAGEMENT STRATEGY *Prevention*



YELLOW FLOATING HEART

Nymphoides peltata

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. Two to five bright yellow, five-petaled flowers may bloom between May and October depending on the temperature. These produce a capsule of flat, shiny seeds that have margins of stiff hairs. 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.

THREAT

Yellow floating heart can form dense patches of vegetation that 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.

DISTRIBUTION

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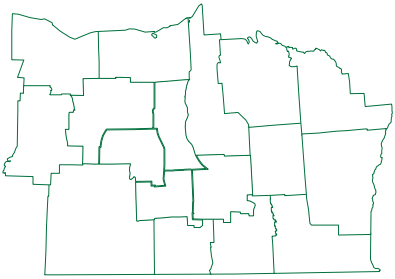

COMMON NAME *Yellow floating heart*

SCIENTIFIC NAME *Nymphoides peltata*

ORIGIN *Eurasia*

INVASIVE RANKING, NYS *High*

MANAGEMENT STRATEGY *Chemical, Physical, Mechanical, Prevention*

Rob Andress, Department of Conservation & Natural Resources, CC BY-NC 3.0 US via Bugwood.org

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NATIVE SPECIES

AMERICAN LOTUS

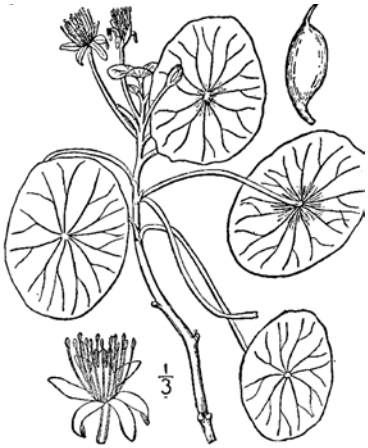
Nelumbo lutea

American lotus is a native, floating-leaved plant with round, bluish-green leaves that can grow up to 60 cm in diameter. The leaves are whole and do not have a slit such as the water lilies (*Nymphaeaceae*). They may be floating on the water surface or emergent. The flowers of the American lotus have many petals (more than 20), are up to 26 cm across, and are yellow-white to yellow in color. The center of the flower is yellow and cone-shaped, resembling an upside-down shower head. American lotus can be found in slow-moving waters as well as quiet areas of lakes and ponds as deep as 2 m.

WATERSHIELD

Brasenia schreberi

Watershield is a floating, native plant with oval shaped leaves that grow up to 13 cm in diameter. The leaves are whole and do not have a slit such as the water lilies (*Nymphaeaceae*). They are green above and reddish-purple with a distinctive gelatinous slime below. The stems attach in the middle of the leaves. Emergent dull-red or pink flowers grow to 2 cm in diameter with three or four sepals and petals. This species grows in slow-moving or still waters up to 2 m deep.



USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913. An illustrated flora of the northern United States, Canada and the British Possessions. 3 vols. Charles Scribner's Sons, New York. Vol. 2: 76.

WHITE WATERLILY

Nymphaea odorata

White waterlily is a floating-leaved aquatic plant that has large, round, green floating leaves growing from rhizomes. The leaves range between 10 and 30 cm wide and have a split radiating from the center of the leaf. The leaf lobes are sharply pointed. The waterlily blossom is about 10 - 20 cm wide with up to 25 white petals arranged around a yellow center. It can be found in quiet, shallow waters of lakes or ponds.

YELLOW POND-LILY

Nuphar advena

Yellow pond-lily is a native floating-leaved aquatic plant. It has large heart-shaped leaves that look similar to those of white waterlily. However, yellow pond-lily leaves have rounded, overlapping lobes. These leaves are often growing emergently, above the water surface. Petioles are round in cross-section. The flowers are yellow and appear “half opened”. Yellow pond-lily grows in quiet, slow-moving waters up to depths of 3 m.

PAINTING:
Homer D. House, New York State Botanist. Walter B. Starr of the Matthews-Northrup Company, Buffalo, and Harold H. Snyder of the Zeese-Wilkinson Company, New York, photographers. [Public domain], via Wikimedia Commons

VARIGATED YELLOW POND-LILY

Nuphar variegata

A native, floating-leaved aquatic plant whose leaves are oval to heart-shaped. They are 10-30 cm long and about ²/₃ as wide, with a rounded tip and deep cleft at the base. Unlike yellow pond-lily, its leaves are only floating and the rounded lobes are spread apart. The yellow flower has dark red coloring at the inner surfaces of the sepals and a petiole that is flattened on one side. Varigated yellow pond-lily also grows in quiet, slow-moving waters up to depths of 3 m.

COMMON DUCKWEED, LESSER DUCKWEED

Lemna minor

Common duckweed is a native, free-floating aquatic plant. Individuals can grow to about 0.5 cm and have one to three greenish-yellow leaves, each of which have three faint veins and a single root hanging down below the surface. Duckweed grows in colonies on the surface of quiet waters.

STAR DUCKWEED

Lemna trisulca

Star duckweed is a native, free-floating aquatic plant that can grow to a little over 1 cm long. Each leaf is flat and star-shaped with an elongated, stalk-like protrusion. Star-duckweed grows in colonies that typically float in the water column, under the water surface.

GREATER DUCKWEED

Spirodela polyrrhiza

This native, free-floating, aquatic plant that can easily be confused with common duckweed. Each floating body can grow to one centimeter and has up to 5-15 faint veins radiating out from a single purple-red spot located in the middle of the leaf. The underside of the plant is a purple-red with five to twelve roots hanging down below the surface.

PACIFIC MOSQUITOFERN

Azolla filiculoides

Mosquitofern is a native, floating, aquatic fern that can be found growing in colonies, covering the surfaces of ponds, lakes, and swamps. Individuals can grow to 2 cm. It is difficult distinguish between species of *Azolla*.

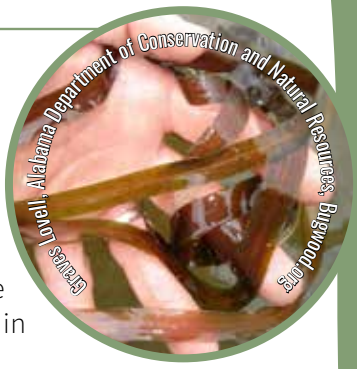
WATERMEAL

Wolffia spp.

Watermeal is a tiny, free-floating aquatic plant that is smaller than duckweed. They resemble light green dots, about 1 mm in diameter, floating in colonies on the water surface. They absorb nutrients directly from the water, since they lack roots, stems, or true leaves. Watermeal is generally considered the smallest flowering plant on Earth. A few species live in our region, however, these are difficult to tell apart without a microscope or strong hand lens.

EELGRASS, WILD CELERY

Vallisneria americana



Eelgrass is a native, submersed aquatic macrophyte with long, green, ribbon-like leaves. Leaves can grow up to 2 m long and have a narrow strip along the center. The leaves grow in clusters from tubers in the sediment. It can be found where substrate is solid and in depths up to several meters.

CANADIAN AND WESTERN WATERWEED

Elodea canadensis & Elodea nuttallii

Waterweeds are native, submerged aquatic plants that have smooth, slender leaves arranged in whorls of three. The whorls become more crowded near the growing tip. During the summer, waterweed produces tiny white flowers, with 3 petals at the ends of thin stalks. Western waterweed's leaves are tapered to a slender point that is much thinner than that of Canadian waterweed. The native waterweeds may appear very similar to each other and are capable of hybridizing. Both Canadian waterweed and western waterweed look similar to hydrilla (*Hydrilla verticillata*) and Brazilian waterweed (*Egeria densa*). However, unlike the native waterweeds, Hydrilla has tubers and serrated leaves in whorls of four to eight, often five, and Brazilian waterweed has dense whorls of four to six leaves, often four.

COONTAIL

Ceratophyllum demersum

Coontail is a native, submerged aquatic plant with whorls of bristle-like, toothed, linear leaves. The leaf whorls are tightly packed at the growing end, which gives the tip of the plant a raccoon tail appearance. Coontail remains stiff when removed from the water. It can be found in slow-moving waters as well as lakes and ponds.

NORTHERN WATERMILFOIL

Myriophyllum sibiricum

This is a native, submerged aquatic plant that looks similar to the invasive Eurasian watermilfoil (*M. spicatum*). Northern watermilfoil remains stiff out of the water, and each feather-like leaf is made up of five to twelve leaflets. Eurasian watermilfoil's leaves are made up of 14-20 pairs of thread- like leaflets and is limp when out of the water. Tips and shoots of the northern watermilfoil are green and lack the reddish-brown color of Eurasian watermilfoil.

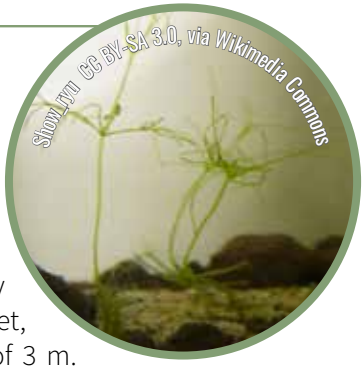
MUSKGRASS, SKUNKWEED

Chara spp.

Muskgrass is a plant-like macroalgae with cylindrical, whorled branches of 6-16 branchlets growing around each node. Calcium carbonate covering the macroalgae gives it a crusty texture. Muskgrass can be found in freshwater or brackish water with moderate to high alkalinities. The native *Chara vulgaris* has a musty, garlic-like odor when removed from the water and crushed. Individual species may be difficult to distinguish from one another. Muskgrass may also be confused for the invasive starry stonewort. Macroalgaes have a distinctive pop when crushed between one's fingers as the cell walls explode.

STONEWORT

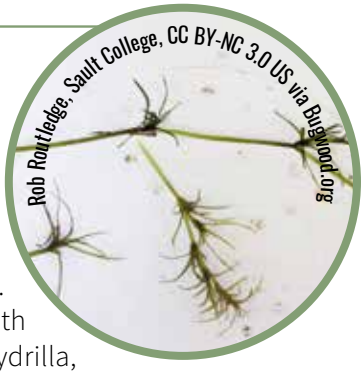
Nitella spp.



Stonewort is a native macroalgae that may be mistaken for the invasive starry stonewort or other native macroalgaes or aquatic plants. Stonewort has whorls of six to eight smooth, flexible, translucent green branchlets. These species typically grow up to 30 cm and inhabit quiet, slow-moving waters up to depths of 3 m. Macroalgaes have a distinctive pop when crushed between one's fingers as the cell walls explode.

SLENDER NAIAD

Najas flexilis



Slender naiad is a small, native, aquatic plant that has narrow, finely toothed, linear leaves. The leaves grow 1-4 cm long and 0.5 mm wide and are arranged in pairs, crowded around leaf axils. This species inhabits ponds, lakes, and streams. Slender naiad may be confused with the invasive species brittle naiad, Hydrilla, and Brazilian waterweed.

SOUTHERN NAIAD

Najas guadalupensis

Southern naiad is a native, submerged plant with many branches of long stems. The finely toothed, narrow leaves grow 1-3 cm long and 0.5-2 mm wide, in an opposite arrangement, and are particularly clustered toward the ends of the stems. Southern naiad grows in lakes and ponds and is less common than slender naiad. This species may be confused with the invasive species brittle naiad, Hydrilla, and Brazilian waterweed.

WATER BUTTERCUP

Ranunculus aquatilis

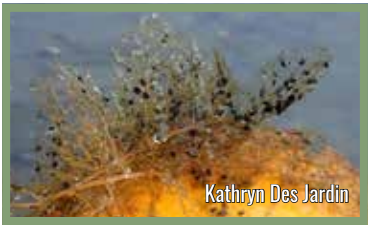
This buttercup is a native, submerged aquatic plant. The leaves are alternately arranged and finely divided into many thread-like segments, round to fan-shaped in outline. Emergent flowers bloom during the summer months. They have 5 white petals and a yellow center and grow to 2 cm in diameter. The water buttercup can be confused with fanwort

(*Cabomba caroliniana*), an invasive submerged aquatic plant. However, the leaves of the water buttercup are single and alternate along the stem compared to the opposite, paired leaves of fanwort. Buttercup leaves are also stiff and remain erect when removed from the water.

COMMON BLADDERWORT

Utricularia vulgaris

Bladderwort is a native, submerged aquatic plant that is carnivorous and uses tiny bladders located on its leaves to trap small organisms. The fan-shaped leaves are alternately arranged, finely dissected, and grow to 2-5 cm. Bright yellow flowers, which resemble snapdragon



(a common garden plant) flowers, grow in clusters on a stout stem up to 25 cm above the waterline during summer months.

WATER STARGRASS

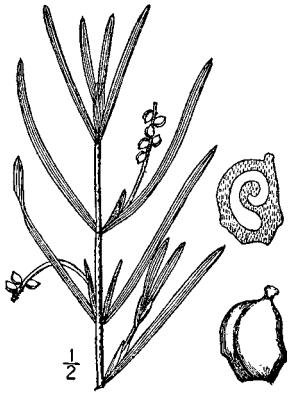
Zosterella dubia

Water stargrass is a native, submerged aquatic macrophyte. The leaves grow alternately along the stem, reach about 15 cm long, and appear smooth, lacking prominent midveins. Yellow, star-shaped flowers emerge about 10 cm above the water surface and bloom during mid-summer. Water stargrass grows in water depths ranging from very shallow to several meters deep and can survive in a range of sediment types.

FLAT-STEM PONDWEED

Potamogeton zosteriformis

This pondweed is a native submerged aquatic plant that has flattened winged stems. Stems are slender, branched, and rooted; leaves may grow up to 0.5 cm wide and 20 cm long and have one main leaf vein running down the middle, with many smaller veins running parallel down the length of the leaf. Flat-stem pondweed inhabits shallow, quiet waters.



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LEAFY PONDWEED

Potamogeton foliosis

This pondweed is a native, submerged aquatic macrophyte usually grows in shallow waters with soft sediments. The leaves are very narrow with tapered, pointed tips, three to five veins, and can be up to 8cm long. Flowers bloom at the tips of short stalks and produce clusters of small, flat, keeled nutlets. This pondweed typically grows in depths of about 1 m.

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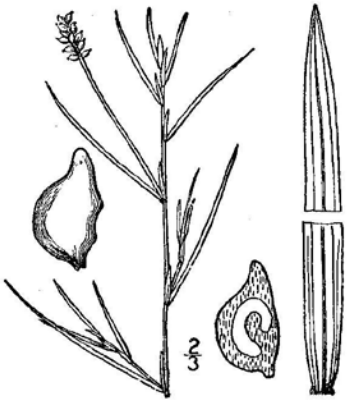
NARROWLEAF PONDWEED

Potamogeton strictifolius

A native, submersed aquatic macrophyte found in alkaline lakes and rivers. The leaves are alternate or whorled along the stem and grow between lengths of 1 cm and 6 cm. The leaves are linear in shape, bristle-tipped, rigid, and very thin, growing only up to 2 mm in width. The stipules (small leaf-like structures at the bases of the leaves) fully enclose the stem in a sheath.



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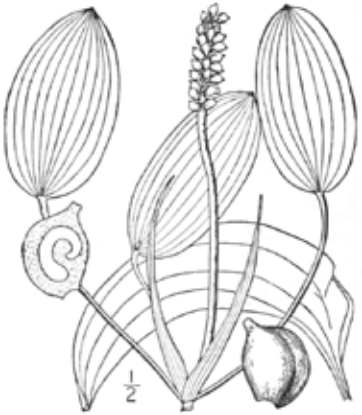
LARGELEAF PONDWEED

Potamogeton amplifolius

This pondweed is a native, aquatic plant with the broadest submerged leaves of the pondweeds, ranging up to 15 cm long and 8 cm wide. Each submerged leaf is translucent green and appears slightly folded along the edges with many prominent veins. Floating leaves are smaller, growing up to 5 cm in width, and are oval or elliptic in shape. A stout fruiting stalk emerges in midsummer with tiny flowers that produce small and densely packed seeds. Largeleaf pondweed grows in lakes, ponds, rivers, and streams, often in deeper water than other pondweeds.



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FLOATING PONDWEED

Potamogeton natans

This pondweed is a native, aquatic macrophyte that has submerged and floating leaves. The submerged leaves are thread or ribbon-like and can grow up to 10 cm long and 1 cm wide. The floating leaves are light green, leathery, oval or heart-shaped with a short, pointed tip, and can grow to 11 cm long. Pink flowers, about 4 mm in diameter, grow on a spike just above the water surface. Floating pondweed grows in quiet ponds and streams.

LONGLEAF PONDWEED

Potamogeton nodosus

This pondweed is a native aquatic macrophyte that has submerged and floating leaves. Submerged leaves are lance-shaped and grow up to 30 cm long and 1-7.5 cm wide. The submerged leaves have the longest petioles of the pondweeds, usually between 4 and 10 cm long. The floating leaves are leathery and grow up to 12 cm long and 5 cm wide. Green to red flowers grow on 2-6 cm long spikes above the water surface. Longleaf pondweed grows in still or slow-moving lakes and rivers.

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WHITE-STEM PONDWEED

Potamogeton praelongus

A native, submerged pondweed with a 2-3 m white-tinged, zig-zagged stem that emerges from a stout, rust-spotted rhizome. Lance-shaped leaves grow to 30 cm long and 4 cm wide and have wavy margins. Leaf bases are heart-shaped and wrap around ⅓ to ½ the stem's diameter. The leaves have three to five main veins with a tip. Flowers grow on a cylindrical spike. White-stem pondweed grows in lakes and streams.

CLASPING-LEAF PONDWEED

Potamogeton perfoliatus

This is a native, submerged pondweed. It can grow up to 2.5 m long and may branch several times. Its leaves grow up to 7 cm and 3 cm wide, are oval-shaped, and have fine teeth on the tips. They clasp the entire diameter of the stem where they attach. Flowers grow on spikes at or under the water surface. Clasping-leaf pondweed grows in freshwater lakes and streams.

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RICHARDSON'S PONDWEED

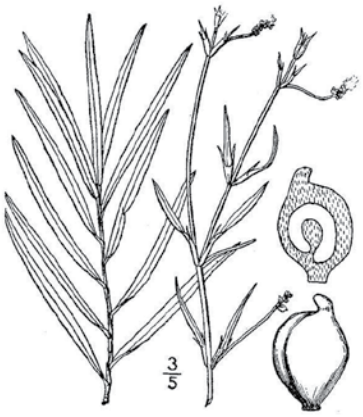
Potamogeton richardsonii

This pondweed is a native submerged macrophyte. The leaves are lanceolate, widest below the middle, and grow up to 12 cm long and 3 cm wide. The leaves have acute tips, wavy margins, and clasp ½ to ¾ of the way around the stem. Flowers grow in dense spikes up to 4 cm long. This pondweed grows in a wide range of depths in lakes and streams.

ROBBIN'S PONDWEED

Potamogeton robbinsii

This is a native, submerged aquatic plant. The stem grows to 1 m long, or longer if creeping along sediment, with more branching occurring toward the top of the plant. Linear, ribbon-like leaves grow in an alternate arrangement up to 10 cm long and 7 mm wide. The leaves, brown to olive-green in color, have a pronounced mid-vein.



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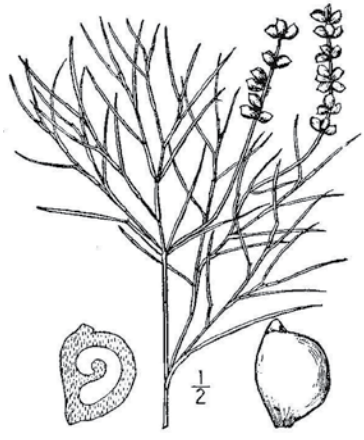
SAGO PONDWEED

Stuckenia pectinata

Sago pondweed is a native, submerged, aquatic plant. Stems are round, slender, and grow up to 1 m long and 2 mm wide. Leaves grow in layers, are thread-like, and grow up to 12 cm long and 1.5 mm wide. The layers of leaves at the ends of the stems may appear fan-shaped. Sago pondweed grows in lakes, ponds, and streams.



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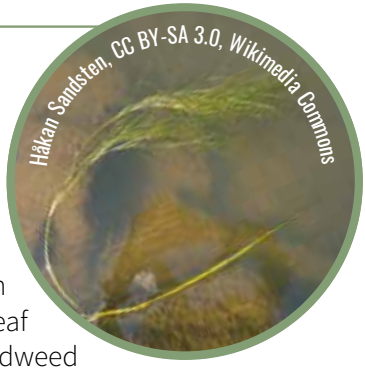
SHEATHED PONDWEED

Stuckenia vaginata



Sheathed pondweed is a native, submerged, aquatic plant. Stems are round and up to 1.5 m long and 2 mm wide. Leaves can grow up to 20 cm long and 2 mm wide, are crowded, thread-like, and have inflated, sheathing stems. These can be observed by slowly peeling the leaf away from the stem. Sheathed pondweed grows in streams and lakes.

FINELEAF PONDWEED

Stuckenia filiformis

This pondweed is a native, submerged, aquatic plant with long, thread-like leaves that can grow to 50 cm long and 1 mm wide on round stems. The leaves of fineleaf pondweed are alternately arranged. Flowers grow in whorls around underwater cylindrical spikes. Fineleaf pondweed grows in shallow waters (depths of 1 m or less) of lakes and rivers.

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HORNED PONDWEED

Zannichellia palustris

Horned pondweed is a native, submerged aquatic plant that can grow up to 1 m long, with occasional branches. Stems are light green and about 0.5 mm thick. Light green, linear leaves grow 2-8 cm long in an opposite arrangement. The stems and leaves often darken with age or become brown from a coating of algae. This species has unique, crescent shaped fruits (pictured below). This species grows in lakes, ponds, and marshes.

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Donald Cameron

GLOSSARY

Alternate arrangement
Only one leaf or branch growing from a node.

Annual
Plants with a life cycle that lasts only one year.

Axil
The upper angle between a branch, leaf, or petiole and the stem on which it is supported.

Brackish
Slightly salty, a mixture of fresh and salt water.

Carapace
Hard upper shell.

Emergent
Rooted in water with stems and leaves extending above the water surface.

Internode
The space between two nodes.

Lanceolate
Shaped like a lance head, narrow and tapering to a point.

Node
Plant structure on stems that holds leaves or buds.

Opposite arrangement
A pair of leaves or branches growing from a node, directly across from each other.

Perennial
Plant with a life cycle that lasts for multiple years.

Petiole
Stalk that attaches a leaf to the stem.

Pinnate
Having leaflets on each side of a stalk, resembling a feather.

Rhizoid
Short filaments on algaes and plants that secure the growing body to a substrate and absorb water or nutrients.

Rhizome
An underground stem that sprouts shoots or roots from its nodes.

Rosette
A growth habit in which a plant grows a circular cluster of leaves.

Serrated
Having a jagged edge, toothed.

Stipule
Leaf-like appendage located at the base of a leaf or petiole.

Stolon
A stem that grows along the ground and produces new shoots from its nodes.

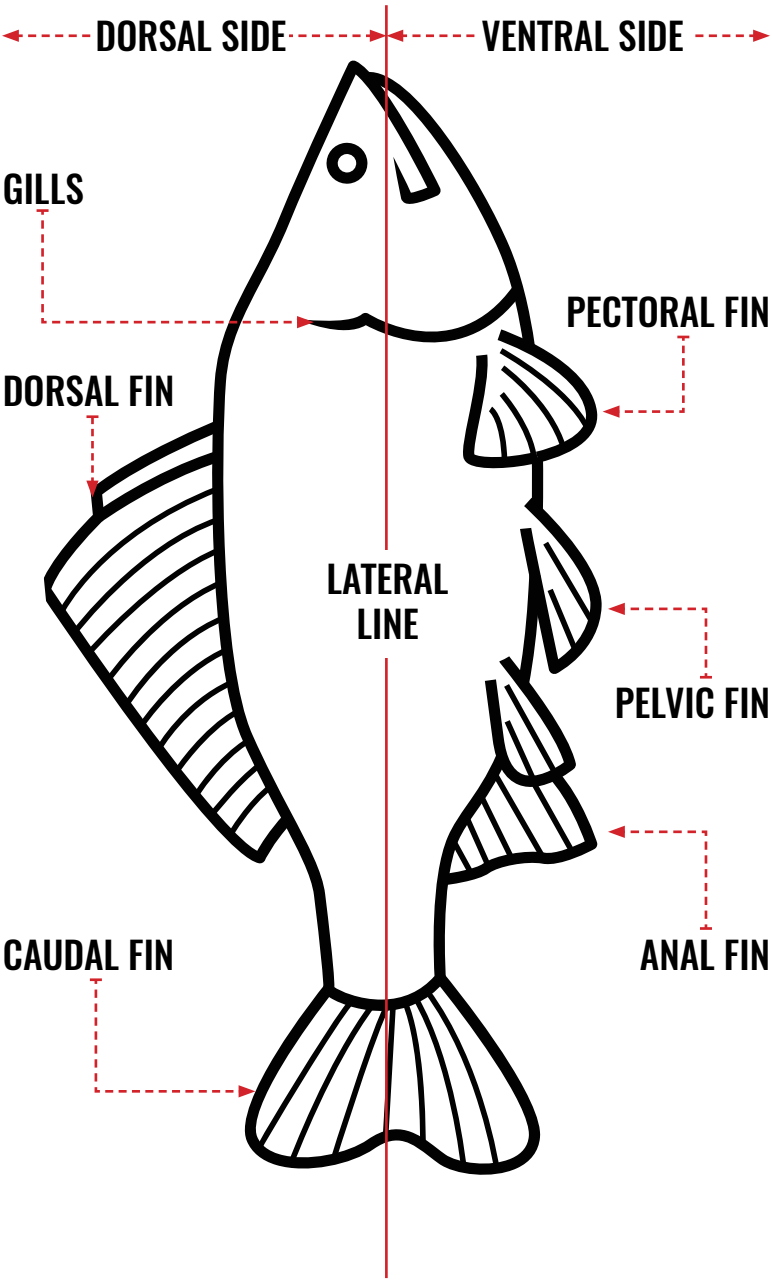
Submerged
Under water.

Tuber
A enlarged root or stem that grows underground and is used to store nutrients.

Turion
A vegetative bud capable of growing into a new plant.

Whorl
Multiple (more than two) leaves or branches growing from a node.

FISH DIAGRAM

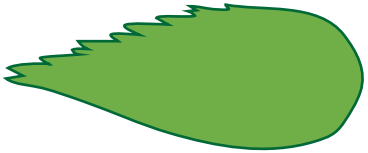


PLANT DIAGRAMS

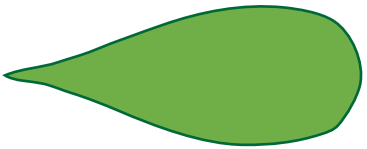
LEAF SHAPES

Wavy Margin

Serrated Margin



Whole Margin



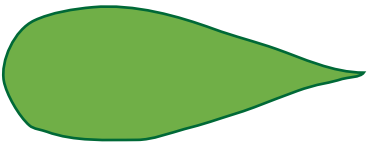
Simple

Compound

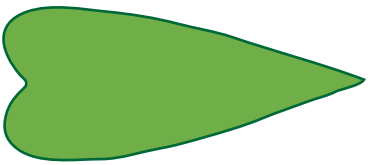
Thread

Linear

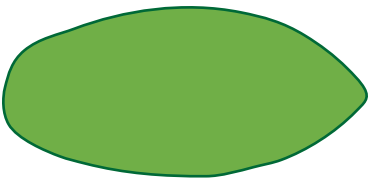
Elliptic



Lanceolate

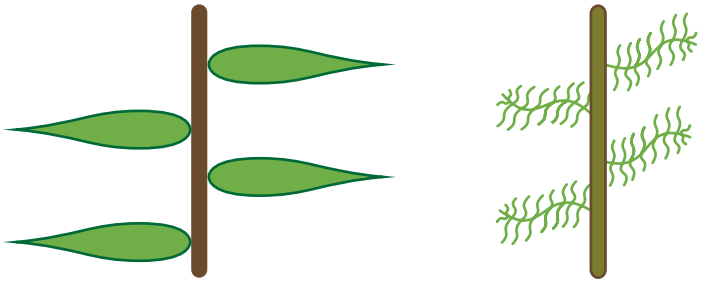


Heart

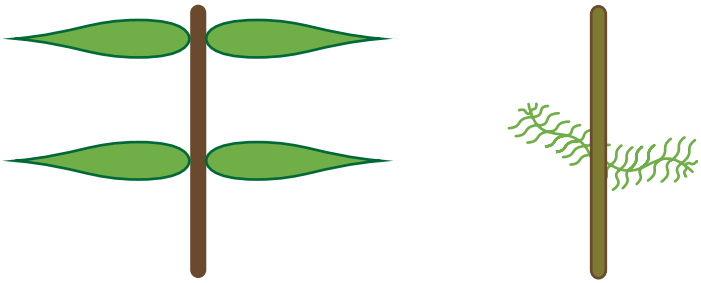


Ovate

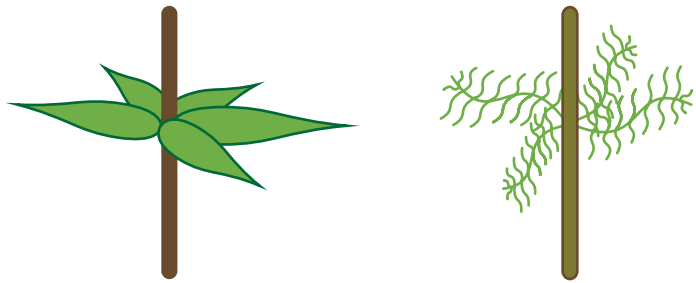
LEAF ARRANGEMENTS



Alternate



Opposite



Whorled

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NOTES

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