VERMONT

Agency of Agriculture, Food & Markets
116 State Street
Montpelier, VT 05620-2901

Office of the Secretary

May 6, 2024

RE: Designation of Plant Species as Plant Pests

Introduction
Invasive plant species are capable of being introduced into Vermont in a variety of ways, including through human or natural spread. To mitigate the risk of introduction, the Vermont Agency of Agriculture, Food and Markets (VAAFM) is utilizing its authority in Title 6, Ch. 84 to designate specifically identified species of invasive plants as *plant pests,* and to preclude their import, sale, and/or movement without a State permit.

The Secretary of Agriculture, Food and Markets designates the following eight plant species as plant pests:

1. *Aldrovanda vesiculosa*, Waterwheel
2. *Ampelopsis glandulosa var. brevipedunculata*, Porcelain berry
3. *Eichhornia crassipes*, Water hyacinth
4. *Microstegium vimineum*, Japanese stiltgrass
5. *Persicaria perfoliata*, Mile-a-minute
6. *Pueraria montana var. lobata*, Kudzu
7. *Rubus phoenicolasius*, Wineberry
8. *Stratiotes aloides*, Water Soldiers

The identified plant pests were developed in consultation with the Agency of Natural Resources, including its Departments of Forests, Parks and Recreation, Environmental Conservation, and Fish and Wildlife.

The designated plant pests are not native to Vermont or currently in Vermont (except perhaps in very limited/isolated locations), but may be found in commercial nursery stock, either intentionally or unintentionally. The designated invasive plants present an ecological and/or economic threat to Vermont.
VAAFM will regulate these plant pests by requiring a permit before anyone may sell, offer for sale, barter, expose, move, transport, deliver, ship, or offer for shipment [any plant pest] into or within this State. Additionally, if plant pests are discovered in commercial trade, VAAFM may issue a stop sale order and offer the option to request a permit.

Requiring permits for plant pests plays a crucial role in safeguarding the environment from these invasive species. If it is appropriate to issue a permit, the permit conditions can help mitigate the risk that plant pests may spread and/or damage the environment and may include containment or monitoring requirements.

Given the designation, any person who wants to introduce, move, or sell any of these plant pests must first obtain a permit from VAAFM. Permits will only be issued in accordance with the requirements in 6 V.S.A. § 1035, which states:

> 'No person shall sell, offer for sale, barter, expose, move, transport, deliver, ship, or offer for shipment into or within this State any plant pest or biological control agent in any living stage without first obtaining a federal permit, where applicable, and a State permit from the Secretary. A State permit may only be issued after it has been determined by the Secretary that the plant pests or biological control agents are not injurious, are generally present already, or are for scientific purposes subject to specified safeguards.'

Effective Date: June 1st, 2024

Sincerely,

Anson Tebbetts
Secretary

Aldrovanda vesiculosa, **Waterwheel**

Common Name:	Waterwheel
Scientific Name:	*Aldrovanda vesiculosa*
Current Distribution in US and VT:	New Hampshire - Merrimack River, New Jersey - Succasunna and Lake Owassa New York - Big Pond, Virginia - Fort A.P. Hill
Habitat:	Waters with high organic matter and high levels of CO2, increasingly eutrophic waters
Regulated/restricted in these Northeastern states:	NY, NH, NJ
Concern:	Waterwheel is a free-floating, carnivorous aquatic plant that can grow very rapidly and colonize and entire waterbody. It competes with native plants and consumes zooplankton, decreasing their availability as food sources. It may impact the food web through predation of aquatic invertebrates. There is a concern that it may impact rare, threatened, and endangered aquatic invertebrates. *A. vesiculosa* is still a new invader in North America and peer reviewed literature and studies about the impacts on native macrophytes and native invertebrates are limited.
Means of Introduction and Spread:	Waterwheel spreads by seeds, leaf material, and turions (modified vegetative bundles that can go dormant during winter months). It is likely to be introduced through the aquarium trade and via transport on personal watercraft.

Plant Pest Designation Rationale

Ecological Threat:
Aldrovanda vesiculosa forms dense floating mats on the water surface, which can inhibit sunlight penetration and disrupt the natural balance of aquatic habitats. Its aggressive growth can outcompete native aquatic vegetation, leading to reduced biodiversity and altering the structure and function of aquatic ecosystems. *Aldrovanda vesiculosa's* carnivorous nature may pose a threat to native aquatic fauna, as it preys on small invertebrates and zooplankton, potentially disrupting food webs and ecological processes in affected water bodies. The presence of *Aldrovanda vesiculosa* may lead to habitat degradation and loss of ecosystem services, such as water filtration and nutrient cycling, which are essential for maintaining healthy aquatic environments.

Economic Impact:
An infestation of waterwheel in Vermont could have a significant economic impact across multiple sectors, including tourism, recreation, agriculture, and ecosystem services. The development of dense mats by waterwheel plants can hinder water flow, disturb navigation, and disrupt recreational activities like boating and fishing. Infestations of waterwheel plants may lead to habitat deterioration and a

decrease in ecosystem processes such as water filtration and nutrient cycling, vital for preserving balanced aquatic ecosystems.

Feasibility of control and spread prevention:

Mechanical methods such as hand harvesting can help manage smaller infestations, especially when followed by proper disposal to prevent regrowth. Biological control methods, which involve introducing natural predators or specific pathogens targeting waterwheel plants, present potential solutions to limit its population growth; however more research is needed. Public outreach is another key tool in preventing spread of aquatic plants. Boaters should carefully clean boats and equipment when moving between bodies of water; all soil and organic debris should be removed as well as bilge water. Gardeners and hobbyists should only plant non-invasive or native plants in ponds or aquariums. Aquarium water should be disposed of in a way that does not contaminate natural water-bodies.

Waterwheel infestation

Photo Credit Fort A.P. Hill, US ARMY 2015

Waterwheel infestation

Photo Credit [Fort A.P. Hill, US ARMY 2015]

Reported US distribution of *Aldrovanda vesiculosa* in EDDMaps

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed February 16, 2024.

References:

Species Profile: Waterwheel (usgs.gov)

Department of Defense Legacy Resource Management Program: Waterwheel

Delaware Invasive Species Council Fact Sheet: Waterwheel

Maryland Invasive Species Council Fact Sheet: Waterwheel

*This content was edited with the assistance of a generative artificial intelligence, ChatGPT. The content has been reviewed and verified to be accurate and complete and represents the intent of the Plant Health Section of the VT Agency of Agriculture, Food and Markets.

Ampelopsis glandulosa var. *brevipedunculata*, **Porcelain Berry**

Common Name:	Porcelain Berry (Amur peppervine)
Scientific Name:	*Ampelopsis glandulosa* var. *brevipedunculata*
Current Distribution in US and VT:	Porcelain Berry is widespread in the eastern US from New England to North Carolina and west to Michigan (USDA Plants) and is reported to be invasive in twelve states in the Northeast: Connecticut, Delaware, Massachusetts, Maryland, New Jersey, New York, Pennsylvania, Rhode Island, Virginia, Washington D.C., West Virginia, and Wisconsin. iNaturalist reports 9 locations in Vermont, 3 of which are research grade confirmed
Habitat:	Porcelain Berry grows well in most soils, especially forest edges, pond margins, stream banks, thickets, and waste places, where there is full sunlight to partial shade, and where it is not permanently wet. Porcelain Berry appears to be less tolerant of heavily shaded areas, such as those found in mature forest interiors.
Regulated/restricted in these Northeastern states:	CT, MA, NH, NY, ME, RI
Concern:	This perennial woody vine in the grape family (Vitaceae) is a vigorous invader of open and wooded habitats where it shades out native shrubs and young trees. As it spreads, it climbs over and blankets existing plants and weakens/ kills them by blocking sunlight. In the US Forest Service's Eastern Region, Amur peppervine (Porcelain Berry) is classified as a Category 1 invasive species. Plants in this category are "nonnative, highly invasive plants which invade natural habitats and replace native species". (FEIS)
Means of Introduction and Spread:	Porcelain Berry is native to Asia and was introduced to the U.S. in the 1870s as an ornamental landscape plant. Initially only found in the eastern U.S., in recent years, it has been found in a few scattered locations in Minnesota, Wisconsin, and Iowa. Porcelain Berry is spread primarily through seeds; dispersal is assisted by birds and other small animals that eat the fruit. Evidence shows that Porcelain Berry sprouts readily after the aboveground stem is cut.

Plant Pest Designation Rationale

Ecological Threat:

Porcelain Berry (*Ampelopsis glandulosa* var. *brevipedunculata*) poses a significant ecological threat to the northeastern United States due to its invasive characteristics and rapid spread. Porcelain Berry exhibits aggressive growth patterns, quickly outcompeting native vegetation by forming dense thickets that cover and smother existing plants. Its ability to climb and overtop native trees and shrubs further exacerbates its impact, altering the structure and composition of native plant communities. This alteration can lead to the loss of biodiversity and disrupt crucial ecological processes such as nutrient cycling and habitat provision.

The ecological threat of Porcelain Berry is compounded by its prolific seed production and dispersal mechanisms. Each plant can produce hundreds of berries annually, which are readily eaten and dispersed by birds, aiding in its spread over large distances. Furthermore, porcelain berry exhibits a high

tolerance to a variety of environmental conditions, allowing it to thrive in diverse habitats ranging from forests to disturbed areas.

Economic Impact:
The economic impact of Porcelain Berry in the northeastern US stems primarily from its invasive behavior, which can result in significant costs associated with control and management efforts, as well as potential damage to agricultural and forestry industries. The aggressive growth and spread of porcelain berry can lead to the degradation of natural habitats, reducing their value for recreational activities such as hiking, hunting, and birdwatching. Additionally, Porcelain Berry's ability to outcompete native vegetation can impact ecosystem services, such as water filtration and soil stabilization, which are essential for maintaining healthy landscapes and supporting local economies.

Porcelain Berry's impact on agriculture and forestry in the northeastern US can result in economic losses for farmers and landowners. The vine's ability to climb and smother trees and shrubs can interfere with timber production and reduce crop yields by shading out desirable vegetation and competing for resources. This can necessitate costly control measures, such as herbicide applications or manual removal, to mitigate the spread of Porcelain Berry and minimize its economic impact on agricultural and forestry operations.

Feasibility of control and spread prevention:
Controlling and preventing the spread of Porcelain Berry in Vermont presents significant challenges but is feasible with targeted management strategies. Mechanical removal, including cutting, mowing, and hand-pulling, can effectively reduce existing populations of porcelain berry, especially when combined with follow-up treatments to prevent regrowth. Chemical control methods, such as herbicide application, may also be employed. Preventing the introduction and establishment of porcelain berry in new areas is essential for minimizing its impact and reducing the need for costly control measures.

Infestation of Porcelain Berry

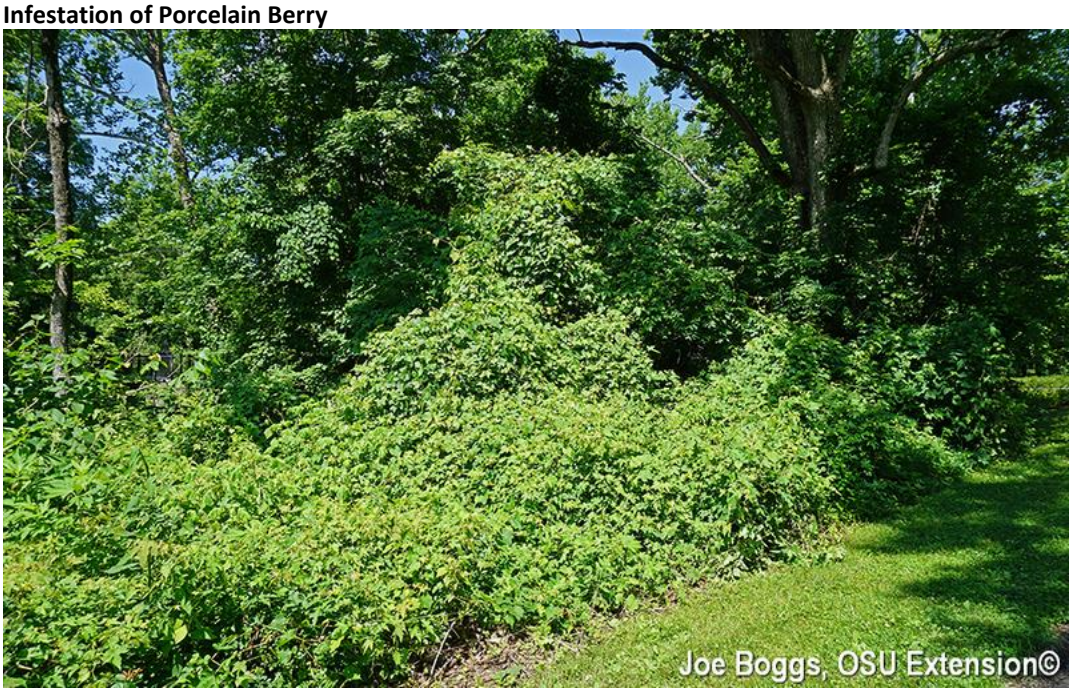
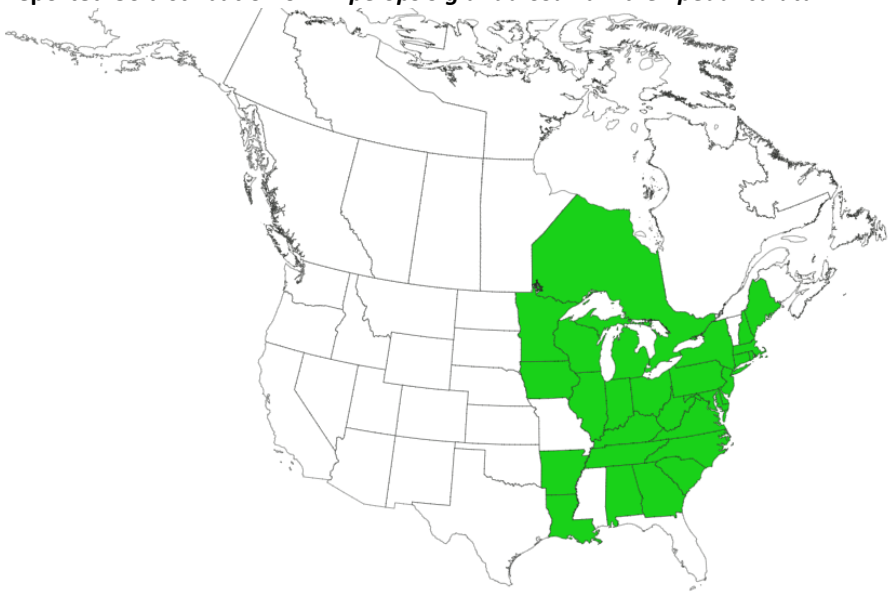


Photo credit: Joe Boggs, OSU Extension (https://bygl.osu.edu/node/1129)

Infestation of Porcelain Berry

Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Reported US distribution of *Ampelopsis glandulosa var. brevipedunculata* in EDDMaps



EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed February 16, 2024

References:

https://vtinvasives.org/invasive/porcelain-berry

https://www.invasive.org/alien/pubs/midatlantic/ambr.htm

https://www.fs.usda.gov/database/feis/plants/vine/ampbre/all.html

https://woodyinvasives.org/woody-invasive-species/porcelain-berry/#1571683267259-c65fd76c-7490fa11-61a14714-3122ef93-98d1fa06-88e3

https://www.inaturalist.org/observations?place_id=47&subview=map&taxon_id=204237

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Eichhornia crassipes, **Water hyacinth**

Common Name:	Water hyacinth, common water-hyacinth, floating water-hyacinth
Scientific Name:	*Eichhornia crassipes*
Current Distribution in US and VT:	Found in: Alabama (1971), Arkansas (1934), Arizona (1934), California (1934), Colorado (2000), Connecticut (1893), Delaware (1993), District of Columbia (2010), Florida (1890), Georgia (1902), Hawaii (1930), Illinois (1975), Indiana (2000) Iowa (2019), Kansas (1998), Kentucky (1986), Louisiana (1884), Maryland (1998), Massachusetts (1992), Michigan (2011), Montana (2013), Mississippi (1916), Missouri (1930), New Hampshire (1956), New Jersey (2002), New Mexico (2022), New York (1929), North Carolina (1949), Ohio (1995), Oregon (1956), Pennsylvania (1993), Rhode Island (2009), South Carolina (1952), Tennessee (1972), Texas (1931), Virginia (1977), Wahington (1995), Wisconsin (2005).
Habitat:	Water hyacinth is a free floating, perennial aquatic plant. It grows in a variety of freshwater habitats including lakes, rivers, canals, ponds, ditches
Regulated/restricted in these Northeastern states:	NY, MA
Concern:	Creates large mats that shade out other native aquatic plants and interrupts recreational activities. When this plant dies the large mats sink to the bottom, which will take up other dissolved oxygen and impact fisheries. It also creates more habitat for mosquito larvae.
Means of Introduction and Spread:	Water hyacinth is native to South America. Introduction would likely be from water hyacinth bought online or in-store and placed in an ornamental pond or aquarium, then released to the wild. The plant can then spread by fragmentation and through watercraft entering different waterbodies.

Plant Pest Designation Rationale

Ecological Threat:
Water hyacinth (*Eichhornia crassipes*) poses a significant ecological threat in the northeastern United States due to its invasive characteristics and rapid spread in aquatic environments. This invasive aquatic plant grows vigorously, forming dense mats on the water surface, which can quickly cover large areas and outcompete native aquatic vegetation. These thick mats of water hyacinth block sunlight from reaching submerged plants and disrupt the natural balance of aquatic ecosystems. The dense growth of water hyacinth reduces oxygen levels in the water, leading to hypoxic conditions that can harm fish and other aquatic organisms. Its ability to reproduce rapidly through vegetative propagation and the production of abundant seeds further exacerbates its impact, allowing water hyacinth to colonize new areas and displace native species.

Economic Impact:
Water hyacinth poses an economic threat in Vermont due to its invasive nature and adverse effects on various sectors, including tourism, recreation, agriculture, and water management. As an invasive aquatic plant, water hyacinth can form dense mats on the surface of water bodies, impeding navigation and hindering recreational activities such as boating, fishing, and swimming. The presence of water

hyacinth in water bodies can disrupt water flow and drainage systems, leading to increased maintenance costs for infrastructure and water management facilities.

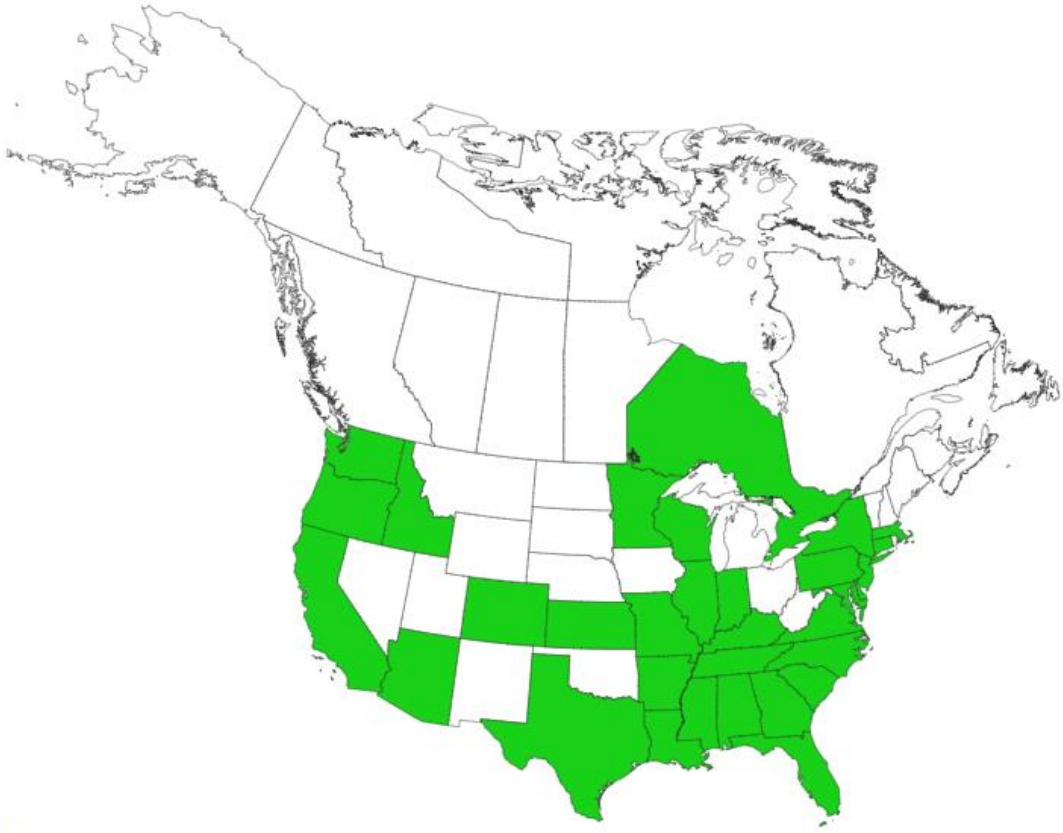
Water hyacinth can negatively impact agriculture by clogging irrigation systems, reducing water availability for crops, and impeding agricultural activities such as irrigation and harvesting. In addition, the dense growth of water hyacinth can degrade water quality.

Feasibility of control and spread prevention:
Controlling and preventing the spread of water hyacinth in Vermont is feasible with a combination of management strategies. Mechanical control methods such as hand-pulling and cutting can be effective in smaller infestations, especially when combined with follow-up treatments to prevent regrowth. Biological control methods such as the introduction of natural enemies or pathogens specific to water hyacinth can help suppress its population growth. Monitoring and surveillance programs can help track the spread of water hyacinth and identify new infestations early, allowing for timely intervention and containment efforts. Public outreach is another key tool in preventing spread of aquatic plants. Boaters should carefully clean boats and equipment when moving between bodies of water; all soil and organic debris should be removed as well as bilge water. Gardeners and hobbyists should only plant non-invasive or native plants in ponds or aquariums. Aquarium water should be disposed of in a way that does not contaminate natural water-bodies.

Hyacinth invasion

Photo credit: Ted D. Center, USDA ARS.

Reported US distribution of *Eichhornia crassipes* in EDDMaps



EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed February 16, 2024.

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Virgina Invasive Species: water hyacinth

Water Hyacinth | FWC (myfwc.com)

Water hyacinth.doc (mass.gov)

Common water-hyacinth | U.S. Geological Survey (usgs.gov)

Ontario Invasive Species

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Microstegium vimineum, **Japanese Stiltgrass**

Common Name:	Japanese stiltgrass
Scientific Name:	*Microstegium vimineum*
Current Distribution in US and VT:	Occurs across the eastern US, from southern Maine (where it was first reported in 2021) south to Florida and Texas. In Vermont, this species is currently localized and restricted to the Champlain and Connecticut River Valleys. Populations are known from Addison County (Middlebury), Rutland County (Benson, Poultney), Bennington County (North Pownal), and Windham County (Brattleboro, Rockingham). First reported from Vermont in 2020 and actively spreading north (Gilman, 2023).
Habitat:	This annual grass is adapted to shaded forest environments. It also occurs on forest edges, ditches, floodplain forests, and roadsides.
Regulated/restricted in these Northeastern states:	NH, CT, NY, ME, MA
Concern:	Japanese stiltgrass forms extensive carpets that can outcompete native vegetation. It rapidly colonizes forest habitats and disturbed areas.
Means of Introduction and Spread:	Native to Japan, India, Malaysia, and China, this species was likely introduced accidentally to the US around 1918. It spreads primarily by seed (individual plants can produce up to 1000 seeds) through roads and waterways (Hunt, 1992). Seeds can remain viable in the soil for over five years.

Plant Pest Designation Rationale

Ecological Threat:
Japanese stiltgrass (*Microstegium vimineum*) is considered a significant ecological threat in the northeastern United States due to its invasive nature and ability to outcompete native plant species. Japanese stiltgrass grows aggressively, which allows it to form dense mats that choke out native vegetation and inhibit tree regeneration. This leads to reduced biodiversity and alters ecosystem functions, impacting wildlife habitat and food sources. Additionally, Japanese stiltgrass thrives in a wide range of environmental conditions, from full sun to deep shade, enabling it to colonize diverse habitats.

Japanese stiltgrass alters soil chemistry and nutrient cycling, which can further disrupt native plant communities and affect ecosystem health. Its shallow root system contributes to soil erosion and destabilization, exacerbating the degradation of natural habitats.

Economic Impact:
The economic impacts related to Japanese stiltgrass in the northeastern United States are multifaceted and include costs associated with ecosystem restoration, loss of agricultural productivity, and impacts on recreational activities such as hunting, fishing, and hiking.

One significant economic consequence of Japanese stiltgrass invasion is the expense of controlling and managing infestations. Land managers, including federal, state, and local agencies, as well as private landowners, incur costs for labor, equipment, and herbicides to

mitigate the spread of this invasive species. These expenditures can be substantial, especially in areas where Japanese stiltgrass has established dense populations.

Japanese stiltgrass infestations can lead to reduced agricultural productivity in affected areas. This invasive grass may compete with desirable forage species and agricultural crops, decreasing yields and potentially necessitating additional inputs to maintain productivity. Farmers may face increased costs for weed control measures and experience diminished profits because of reduced crop yields. This species has also been implicated in reducing growth of timber species in the Southeast.

Feasibility of control and spread prevention:
Japanese stiltgrass is a late-flowering annual, and small populations can be controlled by hand-pulling, which is most effective in late summer. Prescribed fire and mowing have been shown to cause significant reductions in Japanese stiltgrass biomass. While controlling and preventing the spread of Japanese stiltgrass presents challenges, a combination of management strategies, community involvement, research, and monitoring can enhance the feasibility and effectiveness of control measures.

Japanese stiltgrass infestation

Photo Credit: Chris Evans, University of Illinois, Bugwood.org

Access road and clearing invaded with Japanese Stiltgrass

Photo credit: John M. Randall, The Nature Conservancy, Bugwood.org

Reported US distribution of M*icrostegium vimineum* EDDMaps

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed February 16, 2024.

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Flory, S. Luke; Lewis, Jason. 2009. Nonchemical methods for managing Japanese stiltgrass (Microstegium vimineum). Invasive Plant Science and Management. 2(4): 301-308.

Fryer, J.L. 2011. *Microstegium vimineum*. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory.

Gilman, A.V. 2023. Additions to the New Flora of Vermont — III. Phytoneuron 2023-33: 1–18. Published 6 September 2023. ISSN 2153 733X

Hunt, David M.; Zaremba, Robert E. 1992. The northeastward spread of *Microstegium vimineum* (Poaceae) into New York and adjacent states. Rhodora. 94(878): 167-170. [44638]

USDA National Invasive Species Information Center

NH Department of Agriculture: Japanese Stiltgrass

ME Department of Agriculture: Japanese Stiltgrass Fact Sheet

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Persicaria perfoliate, **Mile-a-minute**

Common Name:	Mile-a-minute vine
Scientific Name:	*Persicaria perfoliata*
Current Distribution in US and VT:	Connecticut, Delaware, Massachusetts, Maryland, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Virginia, West Virginia, and Washington, DC. This area comprises an estimated 20 percent of its likely potential range. One confirmed report in Chittenden County in 2023. Staff from VAAFM, FPR and F&W collaborated to eradicate detected population (follow up monitoring planned).
Habitat:	This herbaceous, annual, trailing vine colonizes open and disturbed areas with a preference for very wet soil. Typical infestation areas include stream banks, open fields, roadsides, forest edges, and fence lines. Mile-a-minute weed thrives with abundant sunlight and uses its recurved barbs to attach to and climb over other plants.
Regulated/restricted in these Northeastern states:	CT, MA, ME, NH, NY
Concern:	Can grow up to 25' in six to eight weeks. Dense, prickly thickets overtake native vegetation. Christmas tree farms, orchards, reforestation and restoration areas are at risk because of the vine's propensity to smother tree and plant seedlings. Seeds may survive in the soil for up to six years.
Means of Introduction and Spread:	Mile-a-minute is native to Asia and was first introduced to the US in the early 1900s, possibly by seeds in nursery stock. It has been found growing in root balls in an adjacent New England state nursery. It reproduces primarily through seeds; each fruit contains a single seed, and vines can produce up to 3,500 seeds per year. Fruits are eaten by birds, deer and small mammals which can spread seeds miles away from the original plant. I

Plant Pest Designation Rationale

Ecological Threat:
Mile-a-minute weed grows rapidly, scrambling over shrubs and other vegetation, blocking the foliage of covered plants from available light, and reducing their ability to photosynthesize, which stresses and weakens them. In addition, the weight and pressure of the vine causes distortion of stems and branches of covered plants. If left unchecked, reduced photosynthesis can kill a plant. Large infestations of mile-a-minute weed eventually reduce native plant species in natural areas. Small populations of extremely rare plants may be eliminated entirely. Because it can smother tree seedlings, mile-a-minute weed has a negative effect on Christmas tree farms, forestry operations on pine stands and reforestation of natural areas. It has the potential to be a problem or nursery and horticulture crops that are not regularly tilled as a cultivation practice.

Economic Impact:
The economic impact of Mile-a-minute vine (*Persicaria perfoliata*) in the northeastern United States is significant, affecting various sectors including agriculture, forestry, and horticulture. This invasive weed grows rapidly, scrambling over shrubs and other vegetation, blocking their access to light and reducing their ability to photosynthesize. This reduction in photosynthesis can weaken and stress affected plants,

leading to decreased crop yields in agricultural settings and reduced forest productivity in forestry operations.

The weight and pressure of the vine can cause distortion of stems and branches, further compromising the health of covered plants. In Christmas tree farms and pine stands, Mile-a-minute vine poses a threat by smothering tree seedlings and inhibiting reforestation efforts, thereby impacting the productivity and profitability of these operations. Additionally, the potential for Mile-a-minute vine to invade nursery and horticulture crops that are not regularly tilled exacerbates its economic impact by posing challenges to production and management practices. The elimination of small populations of extremely rare plants due to Mile-a-minute vine encroachment further underscores its economic impact by diminishing biodiversity and jeopardizing conservation efforts.

Feasibility of control and spread prevention:
As an annual, mile-a-minute weed can be controlled by regular tilling or mowing to prevent flowering or seeding. Young and mature plants can be removed manually before fruits ripen. It can be weed whacked at ground level, and there is a biocontrol agent available; a weevil called *Rhinocominus latipes.* Pre- and post-emergence pesticides can be used, with additives. See https://extension.psu.edu/mile-a-minute for more details on this technique. Triclopyr or a combination of triclopyr and glyphosate can be applied to foliage. Shading out the plants is possible too, by planting trees and ensuring that they grow unimpeded by the vines until they are large enough to survive on their own.

Mile-a-minute vine: infestation

Photo Credit: Ambrose Clancy

Mile-a-minute vine infestation

Photo credit: Cornell Cooperative Extension of Suffolk County

Reported US distribution of *Persicaria perfoliata*in EDDMaps

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed February 16, 2024.

References:

Vtinvasives.org

NH Department of Agriculture: MAM Factsheet

Penn State Extension

Cornell Cooperative Extension

USDA-National Invasive Species Information Center

VA Natural Heritage

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Pueraria montana var. lobata, **Kudzu**

Common Name:	Kudzu, Japanese arrowroot
Scientific Name:	*Pueraria montana var. lobata*
Current Distribution in US and VT:	According to EDDmaps confirmed in 33 states and Ontario, Canada (see map below). The majority of the infestation is in the Southeastern states. Not known to be in Vermont currently.
Habitat:	Forest edges, roadsides, abandoned fields and disturbed areas in almost any soil type. Prefers full sun
Regulated/restricted in these Northeastern states:	CT, MA, NH, NY, PA
Concern:	Kudzu is a perennial, semi-woody vine that grows extremely rapidly and smothers or girdles other vegetation. It can grow up to 60 ft a years and has a massive underground root systems that can survive changing environmental conditions (droughts, floods)
Means of Introduction and Spread:	Native to Japan/ China, kudzu was introduced to U.S. in 1876 as ornamental and intentionally spread in the Dust Bowl Era for erosion control. Generally spreads through vegetative means (runners); can also spread through seeds (less common)

Plant Pest Designation Rationale

Ecological Threat:
Kudzu (*Pueraria montana var. lobata*) is a non-native, perennial, semi-woody vine that is widespread throughout the southern US and has been found as far north as New York. Kudzu vines have massive underground root systems and grow extremely rapidly, over 60 feet in one season. Kudzu is a landscape threat because it smothers other plants with a dense blanket of leaves and girdles or uproots trees. IT is known as “the vine that ate the South”. Kudzu is not established in Vermont, but VAAFM has determined that it poses a significant threat to the state’s ecosystems and agriculture. With increasingly milder winters, kudzu may be able thrive in many parts of Vermont. Kudzu can grow in a wide range of soil types and appears acclimated to neighboring Northeastern states. Because it is a legume and fixes its own nitrogen, it can rapidly outcompete native plants in poorer soils, creating a virtual monoculture. Vermont’s landscape is already impacted by a large number of invasive plants and kudzu could further threaten rare & endangered species.

Economic Impact:
The economic impact of kudzu infestation in the northeastern United States is significant, posing challenges to various sectors, including agriculture, forestry, infrastructure, and land management. Kudzu's rapid growth rate and dense vine coverage can smother and outcompete native vegetation, reducing crop yields and forest productivity. In agricultural settings, kudzu infestations can result in decreased land productivity, increased costs for control measures, and potential losses for farmers due to reduced crop quality and yield. Additionally, the presence of kudzu along roadsides, utility lines, and other infrastructure can lead to maintenance and safety concerns, requiring costly efforts for clearance and maintenance. Kudzu's ability to degrade natural habitats and alter ecosystem functions can have broader economic implications, including impacts on ecosystem services, biodiversity, and recreational activities, which contribute to local economies.

Feasibility of control and spread prevention:
The best way to protect against the damage caused by kudzu is to prevent its introduction. Kudzu primarily spreads vegetatively (runners & rhizomes) but also can spread though seed. Soil should not be transported from infested areas and any transplanted plants should be bare rooted; nursery owners should carefully monitor new stock. Equipment and tools should be thoroughly cleaned after being used in kudzu invaded areas. Stone or wood products could be a pathway of spread if they have viable vines or seeds on them.

Once established, Kudzu is extremely difficult to eradicate even with chemical means. It may take 5 to 10 years of intense effort to eradicate a mature population. The main reason that kudzu is so difficult to eradicate is that it has a massive root/rhizome system that stores large amounts of starch and can regrow new shoots rapidly if the tops are removed. If using herbicides, they should be applied multiple times during the growing season to deplete the rhizome storage. Smaller populations can be mowed or cut every two weeks while actively growing; all plant crowns must be cut so that the vine network is depleted. Cut material should be disposed of by burning or landfilling. In some cases, intensive grazing by goats or sheep can reduce long-term growth.

Overgrowth of kudzu over natural vegetation

Kerry Britton, USDA Forest Service, Bugwood.org

Kudzu overgrowth of a southern highway embankment

Photo credit: Chris Evans, Illinois Wildlife Action Plan, Bugwood.org

Reported US distribution of *Pueraria montana var. lobata* in EDDMaps

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Rubus phoenicolasius, **Wineberry**

Common Name:	**Wineberry**
Scientific Name:	*Rubus phoenicolasius*
Current Distribution in US and VT:	The North American distribution is from eastern Canada, New England and New York south to Georgia and west to Michigan, Illinois, and Arkansas. It is considered invasive in Maryland, Pennsylvania, Tennessee, Virginia, North Carolina, West Virginia, and the District of Columbia. According to iNaturalist, there are 2 unconfirmed possible locations in Vermont, Brattleboro and Burlington.
Habitat:	It prefers moist conditions and full sun to partial shade. It grows in forests, fields, streams and wetland edge habitats, open woods, savannas and prairie habitats. Many species of birds and mammals use the brambles for nesting and shelter.
Regulated/restricted in these Northeastern states:	MA, RI, NY, PA, MD, DE
Concern:	Wineberry creates spiny, impenetrable thickets that reduce an area's value for wildlife habitat and recreation. Wineberry replaces native vegetation, including native edible berry shrubs, thus decreasing food resources for wildlife.
Means of Introduction and Spread:	It was introduced to North America in the 1890s as breeding stock for raspberries. It was found invading natural areas by the 1970s, and it is currently recorded in most states east of the Mississippi River and in Alabama (USDA PLANTS Database). Wineberry spreads through seeds dispersed by animals consuming the fruit and through rooting of plant cane tips (vegetative).

Plant Pest Designation Rationale

Ecological Threat:
Wineberry's growth habits, prolific seed production, and ability to form dense thickets enables this plant species to outcompete native vegetation and disrupt ecosystem dynamics. It is more aggressive than many of the native raspberry and blackberry species, and has a wider range of tolerance for light, soil type, and moisture. Its establishment in forest understories as disturbance occurs can lead to its spread even in mature forests. Research conducted by Blossey and Skinner (2001) highlights the ecological impacts of *Rubus phoenicolasius* in invaded habitats, particularly in forests and riparian areas. The study found that wineberry can alter soil properties, reduce native plant diversity, and disrupt ecosystem processes, such as nutrient cycling. Furthermore, its ability to spread rapidly through both seed dispersal and vegetative reproduction exacerbates its ecological threat.

In addition to its direct ecological impacts, wineberry invasion can also have indirect consequences for native wildlife. For example, the displacement of native vegetation by dense wineberry thickets can reduce habitat availability and foraging opportunities for native species, potentially leading to declines in biodiversity.

Economic Impact:
The economic impact of wineberry infestation in the northeast United States can be substantial, affecting various sectors such as agriculture, forestry, and recreation. While specific economic studies on wineberry infestation may be limited, research on the economic impacts of other invasive plant species can provide valuable insights into the potential costs associated with managing wineberry.

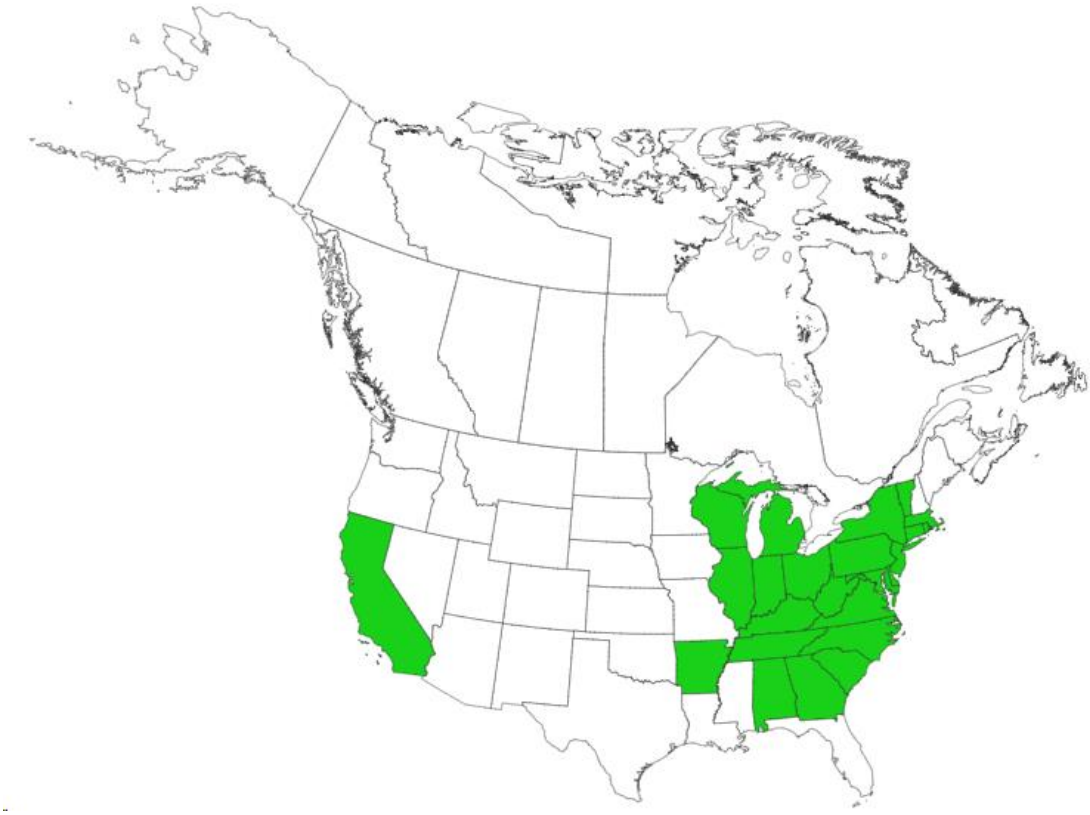
A study by Pimentel et al. (2005) estimated the economic costs of invasive species in the United States, including impacts on agriculture, forestry, and recreational tourism. The study found that invasive plants, in general, impose significant economic burdens through reduced crop yields, increased management expenses, and losses in ecosystem services. Wineberry's ability to outcompete native vegetation and form dense thickets can lead to similar economic consequences, such as reduced timber production, decreased agricultural productivity, and increased costs associated with invasive species management.

Feasibility of control and spread prevention:
Mechanical methods, such as manual removal and mowing, can be effective in reducing wineberry populations, especially in smaller infestations and sensitive habitats where herbicide use may not be desirable. A study by Guo et al. (2020) evaluated the efficacy of different mechanical control methods for managing invasive plants and found that manual removal combined with follow-up treatments can significantly reduce plant cover and prevent re-establishment. This approach can be adapted for controlling wineberry infestations in the northeastern US, particularly in natural areas and conservation sites.

Wineberry plants choking understory of second growth forest

Photo: John M. Randall, The Nature Conservancy. Bugwood.org

Reported US distribution of *Rubus phoenicolasius* in EDDMaps



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Stratiotes aloides, **Water soldier**

Common Name:	Water soldier, Water pineapple, Saw tooth, Water aloe
Scientific Name:	*Stratiotes aloides*
Current Distribution in US and VT:	Trent River and Redhorse Lake, Ontario CA
Habitat:	Shallow stagnant waters; may grow submerged or floating
Regulated/restricted in these states:	IL, MI
Concern:	Water soldier is a perennial aquatic plant that grows in a large rosette resembling an aloe plant or pineapple. Water soldier may easily escape a managed area such as an ornamental pond and form dense mats that alter water quality and crowd native vegetation.
Means of Introduction and Spread:	The native range is Europe and northwest Asia. It spreads mainly vegetatively through the aquarium/pond trade, watercraft movement, and by wildlife. Spread by seed is also possible

Plant Pest Designation Rationale

Ecological Threat:
Stratiotes aloides, commonly known as water soldier or water pineapple, presents a significant ecological threat to the northeastern United States due to its invasive nature and detrimental impacts on aquatic ecosystems. This submerged aquatic plant forms dense mats on the water surface, particularly in slow-moving or stagnant water bodies such as lakes, ponds, and wetlands. These mats can inhibit water flow, block sunlight from reaching submerged plants, and deplete oxygen levels in the water, leading to hypoxic conditions that are harmful to fish and other aquatic organisms. The dense growth of water soldier can outcompete native aquatic vegetation, reducing biodiversity and altering the structure and function of aquatic habitats.

Economic Impact:
The potential economic impact caused by water soldier in the northeastern U.S. is significant, affecting various sectors such as tourism, recreation, agriculture, and water management. This invasive aquatic plant forms dense mats on the water surface, hindering navigation and impeding recreational activities like boating, fishing, and swimming. These disruptions can deter tourists and outdoor enthusiasts, leading to potential revenue loss for businesses reliant on tourism and recreational industries. Additionally, the presence of water soldier can increase maintenance costs for infrastructure and water management facilities due to its interference with water flow and drainage systems. Water soldier can negatively impact agriculture by clogging irrigation systems, reducing water availability for crops, and impeding agricultural activities such as irrigation and harvesting.

Feasibility of control and spread prevention:
Mechanical methods such as hand harvesting can help manage smaller infestations, especially when followed by proper disposal to prevent regrowth. Public outreach is another key tool in preventing spread of aquatic plants. Boaters should carefully clean boats and equipment when moving between

bodies of water; all soil and organic debris should be removed as well as bilge water. Gardeners and hobbyists should only plant non-invasive or native plants in ponds or aquariums. Aquarium water should be disposed of in a way that does not contaminate natural water-bodies.

Water soldier invading the Trent Waterway (Ontario, Canada)

Photo: F. MacDonald, NDMNRF

Water soldier infestation

Credit: Ontario Invasive Species Awareness Program, OFAH

Reported US distribution of *Stratiotes aloides* in EDDMaps

EDDMapS. 2024. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at http://www.eddmaps.org/; last accessed February 16, 2024.

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MI Department of Agriculture Weed Risk Assessment: Water Soldier

Ontario Invasive Species Awareness Program: Water Soldier

Species Profile - Water soldiers (usgs.gov)

Water soldiers (Stratiotes aloides) ERSS (fws.gov)

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