

Invasive Species Definition

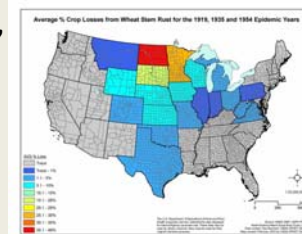
Executive Order 13112, approved by the Invasive Species Advisory Council (ISAC) in 2006, defines an *invasive species* as **“an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health”**

National Invasive Species Management Plan
further clarifies invasive species as

**“a species that is non-native to the ecosystem
under consideration and whose introduction
causes or is likely to cause economic or
environmental harm or harm to human health”**

Guiding Principle #1 provides context:

“many alien species are non-invasive and support human livelihoods or a preferred quality of life”



“The negative effects that the organism causes or is likely to cause are deemed to outweigh any beneficial effects”

Species that become invasive have the ability to survive a multi-step process of arrival, establishment and dispersal into natural communities

Rhode Island Criteria:

"Not indigenous to RI"



“Have become Naturalized”

“Have the biological potential
for rapid and widespread
dispersion and establishment”





“Have the biological potential for dispersing over spatial gaps away from the site of introduction”



“Have the biological potential for existing in high numbers away from intensively managed artificial habitats”



“Be widespread in Rhode Island, or at least common in a region or habitat type”

Richard Fox



“Have numerous individuals in many populations”

“Be able to out-compete other Species in the same natural Community”





“Have the potential for rapid reproduction and establishment in natural communities”

Criteria for Determining Which Species
Would Provide Useful Metrics

Unique Taxon
Invasive Species
Potential for Distribution Change
Potential for Significant Impact
Potential for Occurring in Rhode Island



Hydrilla verticillata, hydrilla



Hydrilla verticillata, hydrilla

Environmental impacts: threat to fisheries habitats – low growth rates of fish species, decreases dissolved oxygen, reduced macro invertebrate communities

Health impacts: stagnant water created by heavy infestation provides mosquito breeding grounds; substrate for toxic cyanobacteria linked to avian vacuolar myelinopathy (linked to Bald Eagle deaths in Southern US)

Economic impacts: levels potential economic impacts great – Interferes with recreational and commercial travel in water ways, clogs intake valves, spillways

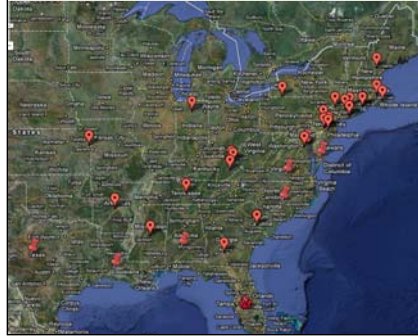
Mass. \$40,000/yr on one pond since 2002, MD - \$1,200.00/acre to harvest Hydrilla on the Potomac River to clear boat lanes

Vectors: Aquarium trade - human (potential also for birds) transportation vector

Potential for Establishment in RI: Great - not known to be present, but present in 2 locations in Mystic, Connecticut

Early Detection Rapid Response Examples in New England

Maine and Vermont have strong EDRR protocols in place



Connecticut, Maine,
and Massachusetts
have management
experience

Track: As an EDRR species with potential for planning and developing an EDRR strategy in the state

Eichhornia crassipes, water hyacinth



Eichhornia crassipes, water hyacinth

Environmental impacts: threat to fisheries habitats – intercepts incident illumination that phytoplankton use, decomposition of decayed leaves decreases dissolved oxygen; threat to freshwater plant communities

Health impacts: Roots and leaves are efficient absorbers of heavy metals in water systems (use in sewage treatment) – release through decay

Economic impacts: Rapid growth in southern US interferes with recreational and commercial travel in water ways, clogs intake valves, spillways

Vectors: Aquarium trade - human vector – thought to improve recreational fishing opportunities, seed where reproduction is possible due to climate

Potential for Establishment in RI: Low at the moment, only seasonal presence

Track: Species could serve as an indicator of warming climate if over-wintering; Presently reported to survive moderate freezes

Polygonum cuspidatum, Japanese knotweed

Mortgages refused over invasive weed

The Telegraph, March 13, 2010

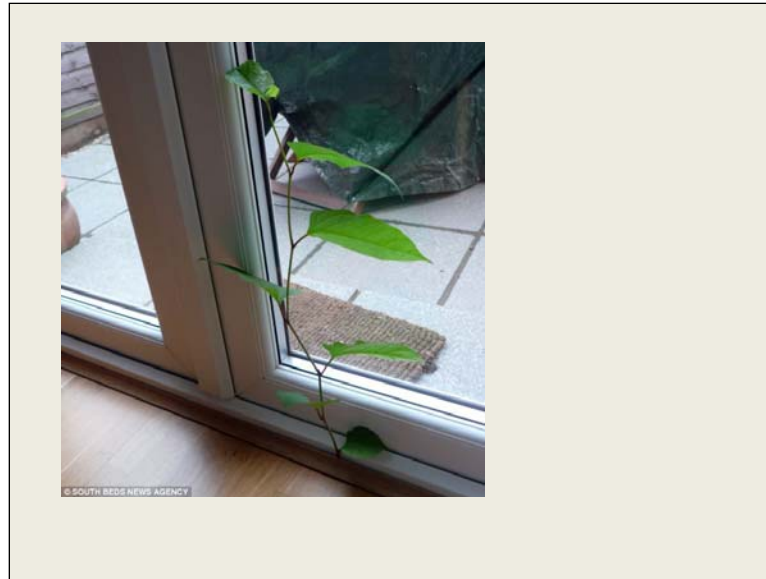


Mortgage lenders claim Japanese knotweed, which is capable of pushing through concrete, poses a risk to the structure and fabric of the building, and so reduces the value of a property Photo: ALAMY

***Polygonum cuspidatum*, Japanese knotweed**

Environmental impacts: Rapidly growing, tall herbaceous perennial, threat to habitat along roadsides, river corridors, salt marshes, and forest edges; outcompetes native plants, reduces micro organism (decomposers) diversity in soil, impacts on amphibian and reptile populations; increased erosion potential

Health impacts: Water quality impacts due to increased erosion potential



Economic impacts: economic impacts to municipal and state budgets for roadside maintenance, potential for reduced property values

Vectors: human transportation vector (limited evidence of seed dispersal/regeneration) through fragments resulting from improper management techniques

Potential for Establishment in RI: present and widespread with many ineffective attempts at control

Track: Cost of control efforts at present

Berberis thunbergii, Japanese barberry



Berberis thunbergii, Japanese barberry

Environmental impacts: shade tolerant shrub, threat to native plant diversity and forest regeneration

Health impacts: increased incidence of deer ticks

Vectors: animal vector, human use as landscape ornamental

Economic impacts: Negative impacts on forest regeneration, research also indicates relationships with earth worms which speed up decomposition of organic matter, sequestering soil nutrients in forest habitats

Potential for Establishment in RI: present and widespread throughout much of the state

Track: relatively easy to control; control efforts and protocols in place – track success, efforts to control



***Berberis vulgaris*, common barberry**

Environmental impacts: shade tolerant shrub that hybridizes with *B. thunbergii*. In the hybrid form it has the potential to be a threat to native plant diversity and forest regeneration

Health impacts: Not the same habit as *B. thunbergii*, so it does not present a refuge for small mammals, or a moist habitat for deer ticks – although hybrids could

Vectors: No longer for sale (Nationwide eradication program 1918 – 1981) Remnant populations in RI forests, animal dispersal, hybridization with *B. thunbergii*.

Economic impacts: potential for economic impacts (alternative host for stem of wheat rust) Resistent strains of wheat developed and eradication program has effectively controlled wheat rust in the US for the last 50 years, however, in 1999, a new strain of wheat rust developed in Uganda that attacks previously resistant wheat cultivars. It is feared that it will eventually reach the US, and impact wheat production. *B. vulgaris* serves as an alternate host for the stem rust, meaning that on barberry, the fungus can undergo genetic changes between generations. Hybrids and *B. thunbergii* cultivars are being examined relative to their ability to also serve as an alternate host.

Potential for Establishment in RI: straight species and hybrid (*B. x ottawaensis*) present with limited but increasing distribution; animal vector; relatively easy to control; control efforts and protocols in place

Track: Although Rhode Island (NE) is not considered a high wheat production state, the value for using the species as a metric presents itself in the ability to track economic losses.