

Aquatic Plant

Yellow Floating Heart

I. Current Status and Distribution *Nymphoides peltata*

a. Range **Global/Continental** **Wisconsin**

Native Range
Eurasia¹



Figure 1: U.S and Canada Distribution Map²

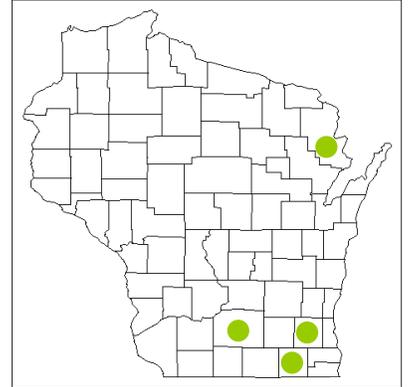


Figure 2: WI Distribution Map

Abundance/Range
Widespread:
Locally Abundant:
Sparse:

North America²; Sweden^{3,4}; New Zealand¹
Shallow, slow-moving systems

Fast-flowing or deep water⁵; shaded areas; acidic conditions⁶; soft water⁷

Not applicable

Recently discovered in several storm water ponds and water gardens in Southern Wisconsin Marinette Co. artificial pond

Range Expansion
Date Introduced:
Rate of Spread:

Winchester, Massachusetts, 1882⁸
Regionally slow⁹; a single plant can produce over 100 new plants in 12 weeks¹⁰; production of more than 3000 seeds/m² has been observed¹¹

First reported in 2007
Uncertain; several isolated populations reported

Density
Risk of Monoculture:

Facilitated By:

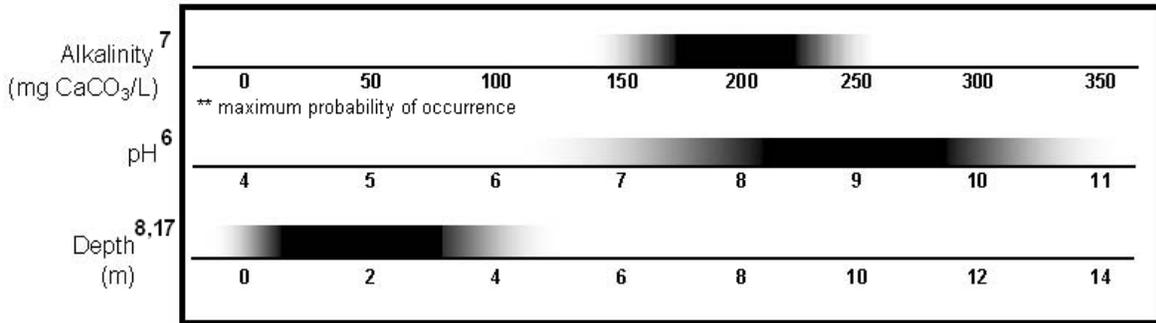
High: 107-1575 g/m² dry mass typical⁸

Ability to reproduce vegetatively and sexually

High; biomass must be removed yearly to prevent dominance
Unknown

b. Habitat Shallow, slow-moving lakes, ponds, rivers and swamps⁸

Tolerance Chart of tolerances: Increasingly dark color indicates increasingly optimal range



Preferences	Shallow, slow moving water bodies, can also grow on mud ⁸ ; rich, loamy soils; neutral and alkaline soils; sunny position ⁶ ; well-buffered water bodies ⁷
c. Regulation	
Noxious/Regulated ² :	CT, MA, ME, OR, VT, WA
Minnesota Regulations:	<i>Not regulated</i>
Michigan Regulations:	<i>Prohibited</i> ; One may not knowingly possess or introduce
Washington Regulations:	<i>Priority Species of Concern</i> ; Class B Noxious Weed; State Wetland and Aquatic or Noxious Weed Quarantine List
II. Establishment Potential and Life History Traits	
a. Life History	Aquatic, bottom-rooted, floating-leaved perennial species ^{8,12}
Fecundity	High
Reproduction	Sexual; Asexual ⁸
Importance of Seeds:	Important; periods of drawdown facilitate germination ⁸ ; unable to germinate under hypoxia ⁷
Vegetative:	Important; can form new plant from fragments of rhizomes, stolons, or separated leaves ⁸
Hybridization	Undocumented
Overwintering	
Winter Tolerance:	High; forms dormant tuberous rhizomes ¹
Phenology:	Growing season from April/May to late October ^{1,8}
b. Establishment	
Climate	
Weather:	Temperate regions ¹³
Wisconsin-Adapted:	Yes
Climate Change:	Likely to facilitate growth and distribution
Taxonomic Similarity	
Wisconsin Natives:	Medium; family Menyanthaceae
Other US Exotics:	High; <i>N. cristata</i> , and <i>N. indica</i> ¹⁴ ; similar to other ornamental waterlilies ¹²
Competition	
Natural Predators:	<i>Anas platyrhynchos</i> (mallard), <i>Fulica atra</i> (coot), <i>Cyprinus carpio</i> (carp) ¹⁵ , <i>Ondatra zibethicus</i> (muskrat), <i>Asellus aquaticus</i> (sowbug), <i>Lymnaea stagnalis</i> (snail) ¹⁶ , <i>Nausinoe nymphaeata</i> (moth larvae), <i>Cricotopus trifasciatus</i> (midge), <i>Deroceras laeve</i> (slug) ¹⁶ , <i>Cataclysta lemnata</i> (caterpillar) ¹⁷
Natural Pathogens:	<i>Septoria villarsiae</i> (fungus) ¹⁶
Competitive Strategy:	Vigorous competitor for light; can tolerate turbid, eutrophic waters ¹
Known Interactions:	Competition for light with phytoplankton ¹ ; outcompetes <i>Trapa bispinosa</i> ¹⁰ and <i>Zizania latifolia</i> ¹⁸
Reproduction	
Rate of Spread:	High
Adaptive Strategies:	Prolific seed production and vegetative growth
Timeframe	In 40 years went from single plant to covering an area of 0.45km ² ⁽³⁾ ; single plant can colonize large areas within a few years ⁴

c. Dispersal

Intentional:	Ornamental use
Unintentional:	Wind and water currents; waterfowl ^{2,9} ; escape from cultivation ⁹ ; boats, trailers ¹⁹
Propagule Pressure:	High; fragments very easily accidentally introduced



Figure 3: Courtesy of Ann Bove, University of Florida²⁰



Figure 4: Courtesy of Mark Malchoff, University of Florida²¹

III. Damage Potential

a. Ecosystem Impacts

Composition	Monotypic patches can exclude native plants ⁸ ; functions as an important nutrient pump from the sediment ¹ ; negatively impacts fish and wildlife habitat ¹³ ; floating leaves shade out native submerged aquatic vegetation ²²
Structure	Dense monocultures; major habitat modification ³
Function	Decreased light penetration and dissolved oxygen
Allelopathic Effects	Undocumented
Keystone Species	Undocumented
Ecosystem Engineer	Yes; dense canopy decreases light penetration
Sustainability	Undocumented
Biodiversity	Decreases ²³
Biotic Effects	Impacts native species at multiple trophic levels
Abiotic Effects	Can create stagnant, low-oxygen conditions ⁸ ; increases organic content ³
Benefits	Undocumented

b. Socio-Economic Effects

Benefits	Ornamental use ¹³ ; edible and medicinal uses ⁶
Caveats	Risk of release and population expansion outweighs benefits of use
Impacts of Restriction	Increase in monitoring, education, and research costs
Negatives	Mat-like patches impede recreational activities ⁸ ; negatively affects water quality and flow ²³ ; can impede drainage areas ²⁴ ; diminishes aesthetic value ²³
Expectations	More negative impacts can be expected in shallow, slow-moving or stagnant systems
Cost of Impacts	Decreased recreational and aesthetic value; decline in ecological integrity; increased research expenses
“Eradication” Cost	Expensive

IV. Control and Prevention	
a. Detection	
Crypsis:	Medium; confused with <i>Nuphar variegata</i> , <i>Brasenia schreberi</i> , and <i>Nymphaea odorata</i> ^{5,12}
Benefits of Early Response:	High; may be able to hand pull small pioneer populations
b. Control	
Management Goal 1	Eradication
Tool:	Hand pulling
Caveat:	Only feasible for small infestations
Cost:	Affordable
Efficacy, Time Frame:	Must be vigilantly monitored, likely multi-year treatment scheme ²⁵
Tool:	Chemical control (dichlobenil) ⁵
Caveat:	Can't treat more than 20% of water body at a time; can't use with flows greater than 90m/hour ⁵ ; non-target plant species are negatively impacted
Cost:	Expensive
Efficacy, Time Frame:	Treat early spring
Tool:	Weed bottom barriers
Caveat:	Non-target plant species are negatively impacted; will not work in areas with any water flow, wave action, or boat traffic ²⁵
Cost:	Very expensive
Efficacy, Time Frame:	Efficacy and long term effects uncertain
Management Goal 2	Nuisance relief
Tool:	Mechanical harvesting
Caveat:	Necessary to remove cut material ⁵ ; non-target plant species are negatively impacted ²³
Cost:	Expensive
Efficacy, Time Frame:	Multiple cuts necessary; rhizomes still present in the sediment; labor intensive

¹ Global Invasive Species Database. 2006. *Nymphoides peltata*. Retrieved December 28, 2010 from: <http://www.issg.org/database/species/ecology.asp?fr=1&si=225&sts=>

² United States Department of Agriculture, Natural Resources Conservation Service. 2010. The PLANTS Database. National Plant Data Center, Baton Rouge, LA, USA. Retrieved December 28, 2010 from: <http://plants.usda.gov/java/profile?symbol=NYPE>

³ Josefsson, M. and B. Andersson. 2001. The environmental consequences of alien species in the Swedish lakes Mälaren, Hjälmaren, Vänern and Vättern. *AMBIO: A Journal of the Human Environment* 30(8):514–521.

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⁵ National Environmental Research Council Centre for Ecology and Hydrology. 2004. Information Sheet 6: Fringed Water Lilly. Retrieved December 28, 2010 from: http://www.ceh.ac.uk/sci_programmes/documents/FringedWaterlily.pdf

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http://www.nwcb.wa.gov/weed_info/yfloatingheart.html
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<http://fl.biology.usgs.gov/nymphoides.pdf>
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<http://www.envbop.govt.nz/Environment/Weed224.aspx>
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