### I. Current Status and Distribution

#### a. Range

| Native Range | Eurasia¹ |

#### Abundance/Range

- **Widespread:** North America²; Sweden³,⁴; New Zealand⁴
- **Locally Abundant:** Shallow, slow-moving systems
- **Sparse:** Fast-flowing or deep water⁵; shaded areas; acidic conditions⁶; soft water⁷

#### Range Expansion

- **Date Introduced:** Winchester, Massachusetts, 1882⁸
- **Rate of Spread:** Regionally slow⁹; a single plant can produce over 100 new plants in 12 weeks¹⁰; production of more than 3000 seeds/m² has been observed¹¹
- **Date First Reported:** 2007
- **Rate of Spread:** Uncertain; several isolated populations reported

#### Density

- **Risk of Monoculture:** High: 107-1575 g/m² dry mass typical⁸
- **Facilitated By:** Ability to reproduce vegetatively and sexually
- **Removal:** High; biomass must be removed yearly to prevent dominance

#### b. Habitat

Shallow, slow-moving lakes, ponds, rivers and swamps⁸

#### Tolerance

Chart of tolerances: Increasingly dark color indicates increasingly optimal range

![Tolerance Chart](chart.png)

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Figure 1: U.S and Canada Distribution Map²

Figure 2: WI Distribution Map
### Preferences

Shallow, slow moving water bodies, can also grow on mud; rich, loamy soils; neutral and alkaline soils; sunny position; well-buffered water bodies.

### c. Regulation

<table>
<thead>
<tr>
<th>Noxious/Regulated:</th>
<th>CT, MA, ME, OR, VT, WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnesota Regulations:</td>
<td>Not regulated</td>
</tr>
<tr>
<td>Michigan Regulations:</td>
<td>Prohibited; One may not knowingly possess or introduce</td>
</tr>
<tr>
<td>Washington Regulations:</td>
<td>Priority Species of Concern; Class B Noxious Weed; State Wetland and Aquatic or Noxious Weed Quarantine List</td>
</tr>
</tbody>
</table>

### II. Establishment Potential and Life History Traits

#### a. Life History

- **Aquatic, bottom-rooted, floating-leaved perennial species**

#### Fecundity

- **High**

#### Reproduction

- **Importance of Seeds:** Sexual; Asexual
- **Vegetative:** Important; periods of drawdown facilitate germination; unable to germinate under hypoxia
- **Hybridization:** Undocumented

#### Overwintering

- **Winter Tolerance:** High; forms dormant tuberous rhizomes
- **Phenology:** Growing season from April/May to late October

### b. Establishment

#### Climate

- **Weather:**
- **Wisconsin-Adapted:** Yes
- **Climate Change:** Likely to facilitate growth and distribution

#### Taxonomic Similarity

- **Wisconsin Natives:** Medium; family Menyanthaceae
- **Other US Exotics:** High; *N. cristata*, and *N. indica*; similar to other ornamental waterlilies

#### Competition

- **Natural Predators:** *Anas platyrhynchos* (mallard), *Fulica atra* (coot), *Cyprinus carpio* (carp), *Ondatra zibethicus* (muskrat), *Asellus aquaticus* (sowbug), *Lymnaea stagnalis* (snail), *Nausinoe nymphaeata* (moth larvae), *Cricotopus trifasciatus* (midge), *Dero ceras laeve* (slug), *Cataclysta lemnata* (caterpillar)
- **Natural Pathogens:** *Septoria villarsiae* (fungus)
- **Competitive Strategy:** Vigorous competitor for light; can tolerate turbid, eutrophic waters
- **Known Interactions:** Competition for light with phytoplankton; outcompetes *Trapa bispinosa* and *Zizania latifolia*

#### 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
- Single plant can colonize large areas within a few years
### III. Damage Potential

#### a. Ecosystem Impacts

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

#### b. Socio-Economic Effects

| Benefits | Ornamental use; edible and medicinal uses |
| 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; negatively affects water quality and flow; can impede drainage areas; diminishes aesthetic value |
| 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 *Nuphar variegata*, *Brasenia schreberi*, and *Nymphaea odorata*<sup>5,12</sup> |
| Benefits of Early Response: | High; may be able to hand pull small pioneer populations |

#### b. Control

**Management Goal 1**

| Tool: | Eradication |
| Caveat: | Hand pulling |
| Cost: | Only feasible for small infestations |
| Efficacy, Time Frame: | Affordable |

- **Tool:** Chemical control (dichlobenil)<sup>5</sup>
- **Caveat:** Can't treat more than 20% of water body at a time; can't use with flows greater than 90m/hour<sup>5</sup>; non-target plant species are negatively impacted
- **Cost:** Expensive
- **Efficacy, Time Frame:** Must be vigilantly monitored, likely multi-year treatment scheme<sup>25</sup>

- **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<sup>25</sup>
- **Cost:** Very expensive
- **Efficacy, Time Frame:** Efficacy and long term effects uncertain

**Management Goal 2**

| Tool: | Nuisance relief |
| Caveat: | Mechanical harvesting |
| Cost: | Necessary to remove cut material<sup>5</sup>; non-target plant species are negatively impacted<sup>23</sup> |
| Efficacy, Time Frame: | Expensive |

- **Tool:** Mechanical harvesting
- **Caveat:** Necessary to remove cut material<sup>5</sup>; non-target plant species are negatively impacted<sup>23</sup>
- **Cost:** Expensive
- **Efficacy, Time Frame:** Multiple cuts necessary; rhizomes still present in the sediment; labor intensive

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Van Der Velde, G. 1979. *Nymphoides peltata* (Gmel.) O. Kuntze (Menyanthaceae) as a food plant for *Cataclysta lemnata* (L.) (Lepidoptera, pyralidae). Aquatic Botany 7:301-304.


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