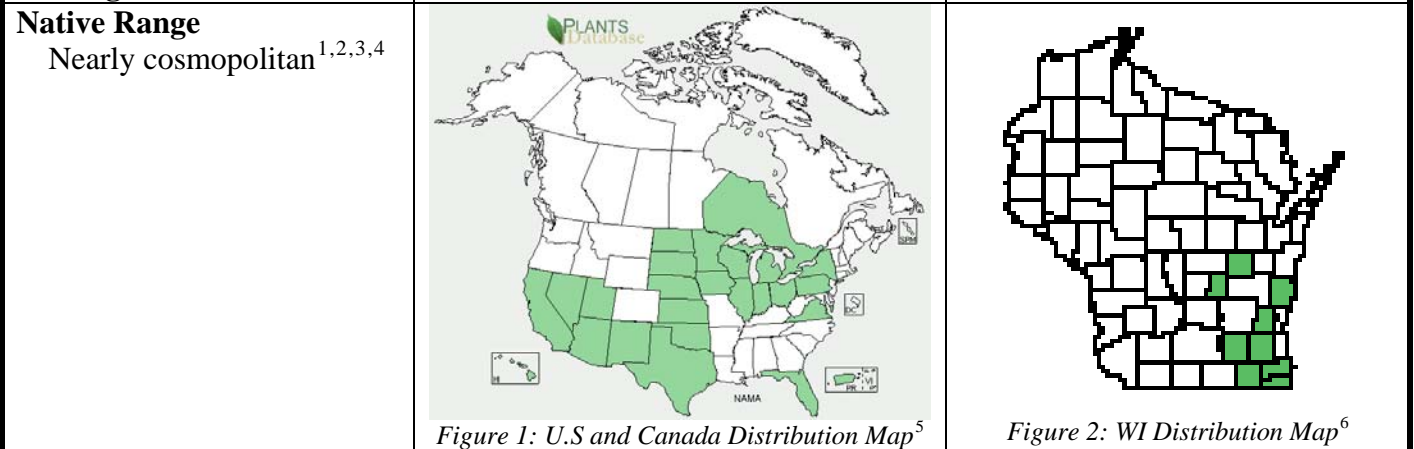


I. Current Status and Distribution *Najas marina*

a. Range	Global/Continental	Wisconsin
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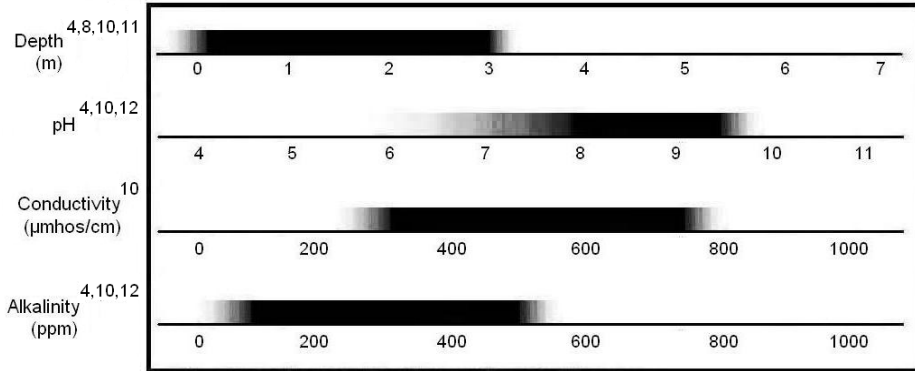
<p>Abundance/Range Widespread: Locally Abundant: Sparse:</p>	<p>Undocumented Great Lakes region⁴; considered exotic in New Zealand⁷ Southwestern United States⁴; endangered in New York & Pennsylvania⁵</p>	<p>Not widespread Considered introduced and naturalized in Southeastern WI^{4,6} Undocumented</p>
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<p>Range Expansion Date Introduced: Rate of Spread:</p>	<p>First sighting in Lake Ontario drainage in 1864^(8,9) May be increasing its range in certain areas of North America⁴</p>	<p>First collected in 1941⁽⁶⁾ Undocumented</p>
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<p>Density Risk of Monoculture: Facilitated By:</p>	<p>Can become dominant under certain environmental conditions Undocumented</p>	<p>Undocumented Undocumented</p>
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b. Habitat Fresh or brackish wetlands, ponds, lakes, reservoirs, slow-moving streams, rivers, canals, coastal and inland marshes^{1,2,8}

Tolerance Chart of tolerances: Increasingly dark color indicates increasingly optimal range^{10,11,12}



Preferences Highly alkaline waters^{8,10,12}; soft, low cohesive sediments¹³

c. Regulation	
Noxious/Regulated ⁵ :	<i>Not regulated</i>
Minnesota Regulations:	Listed as a species of special concern in 1996 ⁽¹²⁾
Michigan Regulations:	<i>Not regulated</i>
Washington Regulations:	<i>Not regulated</i>
II. Establishment Potential and Life History Traits	
a. Life History	Submerged herbaceous rooted annual aquatic plant ⁴ ; can also survive free-floating ¹³
Fecundity	High
Reproduction	
Importance of Seeds:	Reproduces primarily by seed ^{2,8,12,14,15}
Vegetative:	Can reproduce by fragmentation ^{2,8,14}
Hybridization	
Overwintering	
Winter Tolerance:	Populations persist as dormant seed banks through winter ¹⁵
Phenology:	Germination occurs from late April to June ^{15,16} ; optimum growth June to September ^{17,18} ; flowers and seeds ripen from September to November ⁸
b. Establishment	
Climate	
Weather:	Tropical and temperate regions ⁴ ; prefers warm summers and cold winters ¹⁵
Wisconsin-Adapted:	Yes
Climate Change:	May have opposing effects of an increased growing season and delayed germination ¹⁵
Taxonomic Similarity	
Wisconsin Natives:	High; <i>Najas</i> spp. ⁶
Other US Exotics:	High; <i>N. minor</i> , <i>N. graminea</i> , <i>N. wrightiana</i> ⁵
Competition	
Natural Predators:	Waterfowl ^{4,12}
Natural Pathogens:	Undocumented
Competitive Strategy:	Can thrive and become abundant in highly eutrophic conditions ¹²
Known Interactions:	Exhibits a competitive inter-relationship with <i>Myriophyllum spicatum</i> ^{19,20,21}
Reproduction	
Rate of Spread:	Undocumented
Adaptive Strategies:	Undocumented
Timeframe	Undocumented
c. Dispersal	
Intentional:	Ornamental ⁹
Unintentional:	Waterfowl ^{4,22} ; fish ²³ ; shipping and solid ballast ⁹
Propagule Pressure:	High; fragments easily accidentally introduced



Figure 3: Courtesy of USACE ERDC-PMIS²⁴

Figure 4: Courtesy of Kristian Peters, Wikimedia Commons²⁵

III. Damage Potential

a. Ecosystem Impacts	
Composition	Forms dense mats that choke out other species ²
Structure	Undocumented
Function	Undocumented
Allelopathic Effects	Yes ²⁶
Keystone Species	Undocumented
Ecosystem Engineer	Poses a nuisance threat to ecosystems ⁹
Sustainability	Undocumented
Biodiversity	Undocumented
Biotic Effects	Undocumented
Abiotic Effects	Undocumented
Benefits	Beneficial waterfowl food ^{8,14,27} ; provides habitat for fish ²⁸ ; provides habitat for macroinvertebrates ^{29,30}

b. Socio-Economic Effects

Benefits	Ornamental trade ⁹
Caveats	Risk of release and population expansion may outweigh benefits of use
Impacts of Restriction	Increase in monitoring, education, and research costs
Negatives	Can interfere with boating and recreation ⁹
Expectations	Undocumented
Cost of Impacts	Undocumented
“Eradication” Cost	Undocumented

IV. Control and Prevention

a. Detection	
Crypsis:	May be confused with <i>N. minor</i> or other <i>Najas</i> spp.
Benefits of Early Response:	Undocumented
b. Control	
Management Goal 1	Control
Tool:	Biocontrol (<i>Tilapia zilli</i> , redbelly tilapia) ³¹
Caveat:	Non-native to the United States; feeds on many other macrophyte species; competes and reduces populations of native fish species
Cost:	Undocumented
Efficacy, Time Frame:	Likely not very effective; no long-term biocontrol studies

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