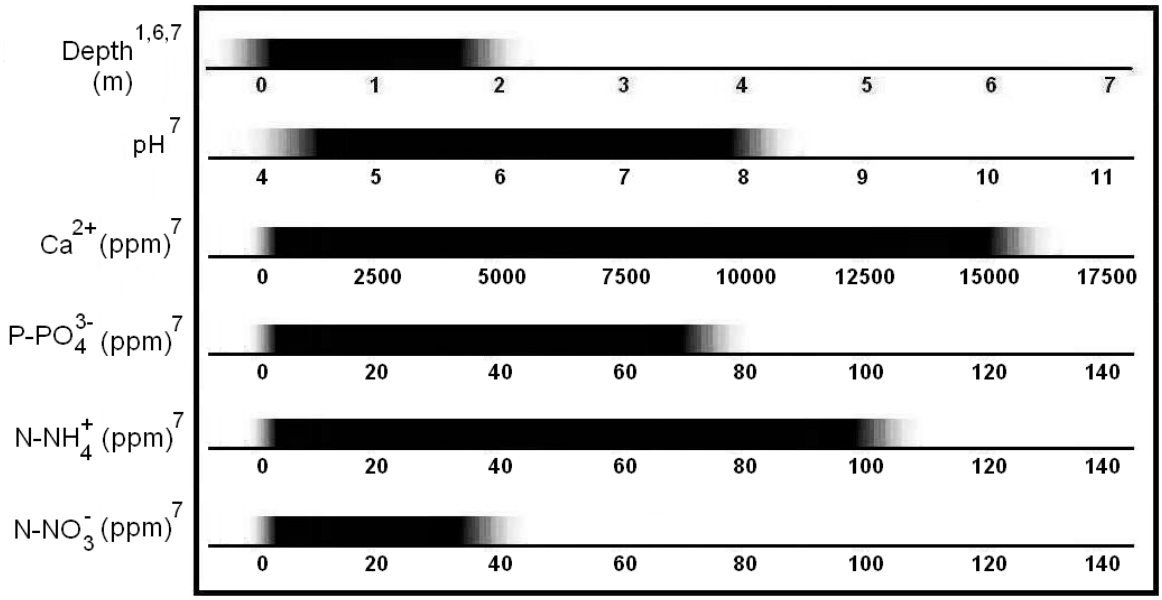
Aquatic Plant	Old World arrowhead; Giant arrowhead; Hawaii arrowhead

I. Current Status and Distribution		***Sagittaria sagittifolia***
a. Range	**Global/Continental**	**Wisconsin**
Native Range Temperate Europe and Asia[1,2]	Not recorded in the United States[3]	Not recorded in Wisconsin
Abundance/Range		
Widespread:	Undocumented	Not applicable
Locally Abundant:	Hawaii, Mexico, Cuba, Argentina, New Zealand, Australia[4,5]	Not applicable
Sparse:	Undocumented	Not applicable
Range Expansion		
Date Introduced:	Undocumented	Not applicable
Rate of Spread:	Undocumented	Not applicable
Density		
Risk of Monoculture:	Can produce up to 236 plants/m^2 [(7)]	Undocumented
Facilitated By:	Undocumented	Undocumented
b. Habitat	Ponds, lakes, canals, swamps, marshes, bogs, reservoirs, rivers, bays, oxbows, rice paddies, coastal pools[1,4,5]	
Tolerance	Chart of tolerances: Increasingly dark color indicates increasingly optimal range[1,6,7]	



Preferences	Slow-flowing shallow waters[4,5,6,7]; muddy or loamy substrates[4,7]; eutrophic conditions[7]
c. Regulation	
Noxious/Regulated[3]:	Federal Noxious Weed List; AL, CA, MA, NC, OR, SC, VT
Minnesota Regulations:	*Not regulated*
Michigan Regulations:	*Not regulated*
Washington Regulations:	*Not regulated*

II. Establishment Potential and Life History Traits	
a. Life History	Perennial, herbaceous, stoloniferous emergent aquatic or wetland plant[4,5]
Fecundity	Undocumented
Reproduction	
Importance of Seeds:	Can produce up to 25,000 seeds/m^2 (7)
Vegetative:	Can reproduce vegetatively by tubers[1,7]
Hybridization	*Sagittaria* x *lunata* (*S. sagittifolia* x *S. natans*)[1,8]
Overwintering	
Winter Tolerance:	Frost tolerant[4,6]; can survive temperatures to at least -10°C(6)
Phenology:	Flowers in mid-summer with seeds ripening through the fall[4,6]
b. Establishment	
Climate	
Weather:	Sub-arctic to tropical environments[4,5]
Wisconsin-Adapted:	Likely
Climate Change:	Undocumented
Taxonomic Similarity	
Wisconsin Natives:	High (genus *Sagittaria*)[3]
Other US Exotics:	High (*S. guayanensis*, *S. montevidensis*)[3]
Competition	
Natural Predators:	*Lymnaea stagnalis* (snail)[9,10,11]; *Cyprinus carpio* (common carp)[12]; *Anas platyrhynchos* (mallard)[13]; *Anas crecca* (teal)[13]; water rodents[7]; wild pigs[7]
Natural Pathogens:	*Alternaria bahraichensis* (fungus)[14]
Competitive Strategy:	Undocumented
Known Interactions:	Undocumented
Reproduction	
Rate of Spread:	Undocumented
Adaptive Strategies:	Highly adaptable in morphology and physiology to varying environmental conditions[4,5,7]
Timeframe	Undocumented
c. Dispersal	
Intentional:	Ornamental[7]
Unintentional:	Wind/water currents[4,5,7]; ichthyochory[12]; waterfowl[7,13,15]
Propagule Pressure:	Low; fragments easily introduced but source populations not reported in the United States

Figure 2: Courtesy of Christian Fischer, Wikimedia Commons[16]
Figure 3: Courtesy of Malcolm Storey, BioImages[17]

III. Damage Potential	
a. Ecosystem Impacts	
Composition	Can rapidly overgrow entire ponds[7]
Structure	Stands of plants can increase sediment retention[18]
Function	Undocumented
Allelopathic Effects	Undocumented
Keystone Species	Undocumented
Ecosystem Engineer	Undocumented
Sustainability	Undocumented
Biodiversity	Undocumented
Biotic Effects	Undocumented
Abiotic Effects	Can alter the oxygen regime[7]
Benefits	Provides habitat for juvenile fish and zooplankton[19]; provide egg laying habitat for dragonflies and damselflies[20]
b. Socio-Economic Effects	
Benefits Caveats	Ornamental trade[7]; ethno-medicinal plant[4,6,21,22]; remediation of water contaminated with heavy metals[23,24,25,26]; feed for farm animals[7] Risk of release and population expansion outweigh benefits of use
Impacts of Restriction	Increase in monitoring, education, and research costs
Negatives	Can disrupt water flow in irrigation systems, drains, and waterways[4,5]; predominant weed of rice fields[27,28,29]
Expectations	Undocumented
Cost of Impacts	Decreased recreational and aesthetic value; decline in ecological integrity; increased research expenses
"Eradication" Cost	Undocumented
IV. Control and Prevention	
a. Detection	
Crypsis: Benefits of Early Response:	High; several species of *Sagittaria* spp. Undocumented
b. Control	Undocumented

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