

Assessment date 26 Sept 2016

<b><i>Hygrophila polysperma</i> ALL ZONES</b>		<b>Answer</b>	<b>Score</b>
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	2	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	n	0
3.03	Weed of agriculture	y	4
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	unk	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	y	1
4.05	Toxic to animals	n	0
4.06	Host for recognised pests and pathogens	n	0
4.07	Causes allergies or is otherwise toxic to humans	n	0
4.08	Creates a fire hazard in natural ecosystems	unk	0
4.09	Is a shade tolerant plant at some stage of its life cycle	unk	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	n	0
4.11	Climbing or smothering growth habit	unk	0
4.12	Forms dense thickets	y	1
5.01	Aquatic	y	5
5.02	Grass	n	0
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1

6.03	Hybridizes naturally	unk	-1
6.04	Self-compatible or apomictic	?	
6.05	Requires specialist pollinators	unk	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	1	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	y	1
7.04	Propagules adapted to wind dispersal	unk	-1
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	unk	-1
7.07	Propagules dispersed by other animals (externally)	y	1
7.08	Propagules dispersed by other animals (internally)	unk	-1
8.01	Prolific seed production	unk	-1
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	unk	-1
8.03	Well controlled by herbicides	n	1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05		?	
<b>Total Score</b>			<b>25</b>
<b>Implemented Pacific Second Screening</b>			<b>no</b>
<b>Risk Assessment Results</b>			<b>High</b>

section	# questions answered	satisfy minimum?
A		11 yes
B		8 yes
C		15 yes
total		34 yes

	Reference	Source data
1.01		Cultivated, but no evidence of selection for reduced weediness
1.02		Skip to 2.01
1.03		Skip to 2.01
2.01	<p>1. Global Plant Hardiness Zones for Phytosanitary Risk Analysis. <a href="http://naldc.nal.usda.gov/download/36586/PDF">http://naldc.nal.usda.gov/download/36586/PDF</a> (Accessed: 30 August 2016) 2. GRIN US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380</a> (Accessed: 30 August 2016) 3. Angerstein, M.B., and D.E. Lemke. 1994. First records of the aquatic weed <i>Hygrophila polysperma</i> (Acanthaceae) from Texas. <i>Sida</i> 16(2):365-371. 4. IUCN Red List. <a href="http://www.iucnredlist.org/details/168988/0">http://www.iucnredlist.org/details/168988/0</a> (Accessed: 30 August 2016) 5. Global Biodiversity Information Facility. <a href="http://www.gbif.org/species/5415355">http://www.gbif.org/species/5415355</a> (Accessed: 30 August 2016) 6. Dave's Garden. <a href="http://davesgarden.com/guides/pf/go/32039/#b">http://davesgarden.com/guides/pf/go/32039/#b</a> (Accessed: 31 August 2016) 7. Florida Natural Areas Inventory. <a href="http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf">http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf</a> (Accessed: 31 August 2016)</p>	<p>1. Figure 3. Florida North Zone: Hardiness zones 8 and 9. Central Zone: Hardiness zones 9 and 10. South Zone: Hardiness zone 10. 2. Native to China (Guangdong, Yunnan, Guangxi), Taiwan, Bangladesh, Bhutan, India, Nepal, and Pakistan. Naturalized in Mexico (Tamaulipas) and the United States (Texas, Florida). 3. Native Range: India, Malaysia, Bangladesh, Bhutan, Nepal, Cambodia, Laos, Myanmar, Thailand, and Vietnam 4. "<i>Hygrophila polysperma</i> is native to temperate and tropical Asia from China to Thailand, Viet Nam and India. It is naturalized in North America where it has been declared as noxious weed."; "Native: Bangladesh; Bhutan; Cambodia; China (Guangdong, Guangxi, Yunnan); India; Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Thailand; Viet Nam" 6. USDA Hardiness zones 7b, 8, 9, 10, and 11. 7. "USDA Hardiness Zone: 7b - 11"</p>
2.02		Native range is well known.
2.03	<p>1. The University of Melbourne. Köppen-Geiger Climate Map of the World. <a href="http://people.eng.unimelb.edu.au/mpeel/koppen.html">http://people.eng.unimelb.edu.au/mpeel/koppen.html</a> (Accessed: 30 August 2016) 2. GRIN US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380</a> (Accessed: 30 August 2016) 3. Angerstein, M.B., and D.E. Lemke. 1994. First records of the aquatic weed <i>Hygrophila polysperma</i> (Acanthaceae) from Texas. <i>Sida</i> 16(2):365-371. 4. IUCN Red List. <a href="http://www.iucnredlist.org/details/168988/0">http://www.iucnredlist.org/details/168988/0</a> (Accessed: 30 August 2016) 5. Global Biodiversity Information Facility. <a href="http://www.gbif.org/species/5415355">http://www.gbif.org/species/5415355</a> (Accessed: 30 August 2016)</p>	<p>1. Native to Köppen-Geiger Climate Zones: Am, Aw, BWh, BSh, Cwa, Cwb, Cfa, and Dwc. 2. Native to China (Guangdong, Yunnan, Guangxi), Taiwan, Bangladesh, Bhutan, India, Nepal, and Pakistan. Naturalized in Mexico (Tamaulipas) and the United States (Texas, Florida). 3. Native Range: India, Malaysia, Bangladesh, Bhutan, Nepal, Cambodia, Laos, Myanmar, Thailand, and Vietnam 4. "<i>Hygrophila polysperma</i> is native to temperate and tropical Asia from China to Thailand, Viet Nam and India. It is naturalized in North America where it has been declared as noxious weed."; "Native: Bangladesh; Bhutan; Cambodia; China (Guangdong, Guangxi, Yunnan); India; Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Thailand; Viet Nam"</p>
2.04	<p>1. Climate Charts. World Climate Maps. <a href="http://www.climate-charts.com/World-Climate-Maps.html#rain">http://www.climate-charts.com/World-Climate-Maps.html#rain</a> (Accessed: 30 August 2016) 2. GRIN US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380</a> (Accessed: 30 August 2016) 3. Angerstein, M.B., and D.E. Lemke. 1994. First records of the aquatic weed <i>Hygrophila polysperma</i> (Acanthaceae) from Texas. <i>Sida</i> 16(2):365-371. 4. IUCN Red List. <a href="http://www.iucnredlist.org/details/168988/0">http://www.iucnredlist.org/details/168988/0</a> (Accessed: 30 August 2016) 5. Global Biodiversity Information Facility. <a href="http://www.gbif.org/species/5415355">http://www.gbif.org/species/5415355</a> (Accessed: 30 August 2016)</p>	<p>1. Native and naturalized in areas with rainfall within these ranges. 2. Native to China (Guangdong, Yunnan, Guangxi), Taiwan, Bangladesh, Bhutan, India, Nepal, and Pakistan. Naturalized in Mexico (Tamaulipas) and the United States (Texas, Florida). 3. Native Range: India, Malaysia, Bangladesh, Bhutan, Nepal, Cambodia, Laos, Myanmar, Thailand, and Vietnam 4. "<i>Hygrophila polysperma</i> is native to temperate and tropical Asia from China to Thailand, Viet Nam and India. It is naturalized in North America where it has been declared as noxious weed."; "Native: Bangladesh; Bhutan; Cambodia; China (Guangdong, Guangxi, Yunnan); India; Lao People's Democratic Republic; Myanmar; Nepal; Pakistan; Thailand; Viet Nam"</p>

2.05	<p>1. Angerstein, M. B., and D. E. Lemke. 1994. First records of the aquatic weed <i>Hygrophila polysperma</i> (Acanthaceae) from Texas. <i>Sida</i> 16(2):365-371. (Accessed: 8 September 2016) 2. Campbell, Higman, Slaughter, and Schools. A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf</a> (Accessed: 31 August 2016) 3. Hussner, A., M. Josephs and U. Schmitz. 2007. Occurrences of <i>Hygrophila polysperma</i> (Roxb.) T. Anderson, <i>Pontederia cordata</i> in North-Rhine-Westphalia. <i>Floristische Rundbriefe</i> 40:25-30. (Accessed: 8 September 2016)</p>	<p>1. Introduced to Texas "directly through cultivation by local aquatic plant nurseries" 2. "Mode of spread: Introduced through aquarium trade" 3. Reported in Europe</p>
3.01	<p>1. GRIN US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380</a> (Accessed: 30 August 2016) 2. IUCN Red List. <a href="http://www.iucnredlist.org/details/168988/0">http://www.iucnredlist.org/details/168988/0</a> (Accessed: 30 August 2016) 3. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 31 August 2016) 4. Kasselman, C. 2003. <i>Aquarium plants</i>. Krieger Publishing Company, Malabar, Florida. 518 pp. (Accessed: 3 September 2016) 5. Kartesz, J. T. 2014. <i>North American Plant Atlas</i> [maps generated from Kartesz, J.T. 2010. <i>Floristic Synthesis of North America</i>, Version 1.0. <i>Biota of North America Program (BONAP)</i>. (in press)]. The Biota of North America Program, Chapel Hill, N.C. <a href="http://www.bonap.org/MapSwitchboard.html">http://www.bonap.org/MapSwitchboard.html</a>. (Archived at PERAL). (Accessed: 3 September 2016)</p>	<p>1. Naturalized in Mexico (Tamaulipas) and the United States (Texas, Florida). 2. "It is naturalized in North America where it has been declared as noxious weed." 3. "Currently only naturalised at a few locations in south-eastern Queensland and north-eastern New South Wales. Also naturalised overseas in eastern USA (i.e. Florida, Texas and Virginia)." 4. Naturalized in Mexico 5. Naturalized in Alabama</p>
3.02		
3.03	<p>1. Moody, K. 1989. <i>Weeds: reported in rice in South and Southeast Asia</i>. International Rice Research Institute (IRRI), Manila, Philippines. 442 pp. (Accessed: 9 September 2016) 2. Cuda, J. P., and D. L. Sutton. 2000. Is the aquatic weed <i>Hygrophila</i>, <i>Hygrophila polysperma</i> (Polemoniales: Acanthaceae), a suitable target for classical biological control? Pages 337-348 in N. R. Spencer, (ed.). <i>Proceedings of the X International Symposium on Biological Control of Weeds</i>, Montana State University, Bozeman, Montana. July 4-14, 1999. (Accessed: 9 September 2016)</p>	<p>1&amp;2. Weed of rice fields</p>

3.04	<p>1. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 31 August 2016) 2. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016) 3. HEAR Global Compendium of Weeds. <a href="http://www.hear.org/gcw/species/hygrophila_polysperma/">http://www.hear.org/gcw/species/hygrophila_polysperma/</a> (Accessed: 6 September 2016) 4. Nault, M. E., and A. Mikulyuk. 2009. East Indian Hygrophila (<i>Hygrophila polysperma</i>). A technical review of distribution, ecology, impacts, and management. PUB-SS-1049. Wisconsin Department of Natural Resources Bureau of Science Services, Madison, Wisconsin. (Accessed: 7 September 2016) 5. GRIN US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380</a> (Accessed: 8 September 2016) 7. United States Department of Agriculture Animal and Plant Health Inspection Service. <a href="https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf">https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf</a> (Accessed: 8 September 2016)</p>	<p>1. "East Indian hygrophila (<i>Hygrophila polysperma</i>) is regarded as an emerging environmental weed in Queensland and New South Wales."; "East Indian hygrophila (<i>Hygrophila polysperma</i>) is fast growing invasive plant that out-competes native aquatic plants. It can occupy the entire water column and also creates problems as an emergent plant along the margins of waterbodies."; "It forms dense stands and floating mats of vegetation in waterways, canals and drainage ditches, which obstruct water flow and displace native vegetation. Its ability to form a dense canopy at the water-air interface is of particular concern, because this enables it to shade out all other submerged plants." 2. "Hygrophila polysperma is a fast-growing and fast-spreading invasive that can outshade and therefore outcompete other submerged plants; it can occupy the entire water column; many adventitious roots at stem nodes means that fragments can easily grow."; "Hygrophila polysperma clogs irrigation and flood-control canals; in south Florida, large mats of fragments collect at culverts and interfere with essential water control pumping stations; it interferes with navigation; and it's even able to compete with another aggressive non-native invasive plant, hydrilla, and is replacing hydrilla in some Florida locations." 3. Hygrophila polysperma is classified as an environmental weed 4. "Dense mats of <i>H. polysperma</i> also have the ability to change water hydrology and quality, negatively affecting the ecosystem in which it occurs"; "In the locales in which it has been introduced, it has often become the dominant plant species, outcompeting both native and previously established exotic species"; "Decomposing mats of <i>H. polysperma</i> also have the ability to cause fish kills by creating low oxygen levels in the water" 5. <u>Classified as a Federal Noxious Weed by USDA-APHIS</u></p>
3.05	<p>1. HEAR Global Compendium of Weeds. <a href="http://www.hear.org/gcw/scientificnames/scinameh.htm">http://www.hear.org/gcw/scientificnames/scinameh.htm</a> (Accessed: 6 September 2016) 2. Queensland Government. <a href="https://www.business.qld.gov.au/industry/agriculture/species/invasive-plants/restricted/hygrophila">https://www.business.qld.gov.au/industry/agriculture/species/invasive-plants/restricted/hygrophila</a> (Accessed: 6 September 2016) 3. New South Wales Government. <a href="http://weeds.dpi.nsw.gov.au/Weeds/Details/73">http://weeds.dpi.nsw.gov.au/Weeds/Details/73</a> (Accessed: 6 September 2016)</p>	<p>1. Hygrophila costata is classified as an environmental weed, Hygrophila difformis is classified as an environmental weed, Hygrophila erecta is classified as an environmental weed, and 15 other Hygrophila (Acanthaceae) species are listed and all classified as weeds. 2. "Hygrophila [costata] has now naturalised in New South Wales, and is an emerging problem for Queensland's waterways. The main danger is that aggressive hygrophila growth will pose a competitive threat to native water plants. Hygrophila [costata] is a restricted invasive plant under the Biosecurity Act 2014." 3. "Hygrophila [costata] is a highly invasive aquatic weed."; "In New South Wales (NSW), hygrophila has become invasive in the far north coast, central coast and greater Sydney regions. Infestations are also occurring in southeast Queensland."</p>
4.01	<p>1. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016) 2. Les, D. H., and R. B. Wunderlin. 1981. Hygrophila polysperma (Acanthaceae) in Florida. Florida Science 44(3):189-192. (Accessed: 2 September 2016) 3. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 2 September 2016)</p>	<p>No evidence of these characteristics found in the description of this plant</p>
4.02		No evidence
4.03		No evidence

4.04	1. Cuda, J. P., and D. L. Sutton. 2000. Is the aquatic weed <i>Hygrophila</i> , <i>Hygrophila polysperma</i> (Polemoniales: Acanthaceae), a suitable target for classical biological control? Pages 337-348 in N. R. Spencer, (ed.). Proceedings of the X International Symposium on Biological Control of Weeds, Montana State University, Bozeman, Montana. July 4-14, 1999. (Accessed: 9 September 2016)	1. unpalatable to fish (Grass Carp)
4.05	1. Cuda, J. P., and D. L. Sutton. 2000. Is the aquatic weed <i>Hygrophila</i> , <i>Hygrophila polysperma</i> (Polemoniales: Acanthaceae), a suitable target for classical biological control? Pages 337-348 in N. R. Spencer, (ed.). Proceedings of the X International Symposium on Biological Control of Weeds, Montana State University, Bozeman, Montana. July 4-14, 1999. (Accessed: 9 September 2016)	1. non-toxic
4.06		no evidence
4.07	1. van der Pijl, L. 1982. Principles of Dispersal in Higher Plants (3 ed.). SpringerVerlag, Berlin. 214 pp. (Accessed: 9 September 2016)	1. Seed masses eaten by people in Asia
4.08		No evidence
4.09	1. Dave's Garden. <a href="http://davesgarden.com/guides/pf/showimage/319293/">http://davesgarden.com/guides/pf/showimage/319293/</a> (Accessed: 6 September 2016) 2. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016)	1. "Sun to Partial Shade, Light Shade" 2. "East Indian hygrophila is mostly submersed, with a few inches sometimes emersed above the water"
4.10	1. Florida Natural Areas Inventory. <a href="http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf">http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf</a> (Accessed: 31 August 2016) 2. Campbell, Higman, Slaughter, and Schools. A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf</a> (Accessed: 31 August 2016) 3. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 31 August 2016) 4. California Invasive Species Advisory Committee. UC Davis. Invasive Species List and Scorecards for California. <a href="http://ice.ucdavis.edu/invasives/scorecard/hygrophila-polysperma-scorecard">http://ice.ucdavis.edu/invasives/scorecard/hygrophila-polysperma-scorecard</a> (Accessed: 5 September 2016)	1. "Description: Perennial aquatic, mostly submersed, rooted."; "Habitat: Streams, springs, lakes, and ruderal sites; prefers flowing streams" 2. "Description: Herbaceous perennial, rooted, primarily aquatic. Rare terrestrial form in moist soils." 3. "This species was first collected in Australia in August 2005 in the Caboolture River north of Brisbane. It was growing along the riverbank and in the water, both as a submerged aquatic and terrestrial plant." 4. "Once established it is expected to spread rapidly, but only in aquatic systems."
4.11	1. California Invasive Species Advisory Committee. UC Davis. Invasive Species List and Scorecards for California. <a href="http://ice.ucdavis.edu/invasives/scorecard/hygrophila-polysperma-scorecard">http://ice.ucdavis.edu/invasives/scorecard/hygrophila-polysperma-scorecard</a> (Accessed: 5 September 2016)	1. "Fast-growing and fast-spreading invasive that can out shade other submersed plants."; However, this is not necessarily due to a climbing growth habit because the plant is aquatic. <i>Hygrophila polysperma</i> is not a vine.
4.12	1. Doyle RD, Francis MD, Smart RM, 2003. Interference competition between <i>Ludwigia repens</i> and <i>Hygrophila polysperma</i> : two morphologically similar aquatic plant species. <i>Aquatic Botany</i> , 77:223-234. 2. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 31 August 2016) 3. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016) 4. Doyle, R. D., M. D. Francis, and R. M. Smart. 2003. Interference competition between <i>Ludwigia repens</i> and <i>Hygrophila polysperma</i> : two morphologically similar aquatic plant species. <i>Aquatic Botany</i> 77(3):223-234. (Accessed: 6 September 2016)	1. Can form dense stands and floating mats, which displace native plants and reduce biodiversity. 2. "It forms dense stands and floating mats of vegetation in waterways, canals and drainage ditches, which obstruct water flow and displace native vegetation. Its ability to form a dense canopy at the water-air interface is of particular concern, because this enables it to shade out all other submerged plants." 3. " <i>Hygrophila polysperma</i> clogs irrigation and flood-control canals; in south Florida, large mats of fragments collect at culverts and interfere with essential water control pumping stations; it interferes with navigation; and it's even able to compete with another aggressive non-native invasive plant, hydrilla, and is replacing hydrilla in some Florida locations." 4. Creates a dense canopy on the surface of the water

5.01	1. Florida Natural Areas Inventory. <a href="http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf">http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf</a> (Accessed: 31 August 2016) 2. Campbell, Higman, Slaughter, and Schools. A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf</a> (Accessed: 31 August 2016) 3. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 31 August 2016)	1. "Description: Perennial aquatic, mostly submersed, rooted."; "Habitat: Streams, springs, lakes, and ruderal sites; prefers flowing streams" 2. "Description: Herbaceous perennial, rooted, primarily aquatic. Rare terrestrial form in moist soils." 3. "This species was first collected in Australia in August 2005 in the Caboolture River north of Brisbane. It was growing along the riverbank and in the water, both as a submerged aquatic and terrestrial plant."
5.02	1. USDA Plants Database. <a href="http://plants.usda.gov/core/profile?symbol=HYPO3">http://plants.usda.gov/core/profile?symbol=HYPO3</a> (Accessed: 31 August 2016)	1. "Growth Habit: Forb/herb"
5.03	1. Campbell, Higman, Slaughter, and Schools. A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf</a> (Accessed: 31 August 2016) 2. Bailey, L. H., and E. Z. Bailey. 1976. Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada. Macmillan, London, United Kingdom. 1290 pp. (Accessed: 6 September 2016) 3. Martin, P. G., and J. M. Dowd. 1990. A protein sequence study of the dicotyledons and its relevance to the evolution of the legumes and nitrogen fixation. Australian Systematic Botany 3:91-100. (Accessed: 6 September 2016)	1. "Description: Herbaceous perennial, rooted, primarily aquatic." 2. Herbaceous 3. Acanthaceae not known to have nitrogen fixing properties
5.04	1. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016) 2. Les, D. H., and R. B. Wunderlin. 1981. Hygrophila polysperma (Acanthaceae) in Florida. Florida Science 44(3):189-192. (Accessed: 2 September 2016) 3. Queensland Government. <a href="http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm">http://keyserver.lucidcentral.org/weeds/data/media/Html/hygrophila_polysperma.htm</a> (Accessed: 2 September 2016)	No evidence of these structures found in the description of this plant
6.01		No evidence
6.02	1. Florida Natural Areas Inventory. <a href="http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf">http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf</a> (Accessed: 31 August 2016) 2. Campbell, Higman, Slaughter, and Schools. A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf</a> (Accessed: 31 August 2016) 3. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016) 4. Spencer, W., and G. Bowes. 1985. Limnophila and Hygrophila: A review and physiological assessment of their weed potential in Florida. Journal of Aquatic Plant Management 23:7-16. (Accessed: 6 September 2016) 4. Sutton, D. L. 1995. Hygrophila is replacing Hydrilla in south Florida. Aquatics 14(3):4-10 (Accessed: 6 September 2016)	1. "Fruit a narrow capsule with tiny round seeds." 2. "Mode of spread: Introduced through aquarium trade; reproduces vegetatively, by small stem and leaf fragments, possibly by seed; spread by me- chanical harvesters, boats and water currents." 3. "fruit a narrow capsule 6-7 mm long; 20-30 tiny flattened-round seeds" 3&4. Unknown if seeds contribute majorly to spread in Florida
6.03		No evidence
6.04	1. Les, D. H., and R. B. Wunderlin. 1981. Hygrophila polysperma (Acanthaceae) in Florida. Florida Science 44(3):189-192. (Accessed: 7 September 2016) 2. Sutton, D. L. 1995. Hygrophila is replacing Hydrilla in south Florida. Aquatics 14(3):4-10. (Accessed: 7 September 2016)	LIKELY but not enough evidence for a Y, chose ? Instead of unknown to not increase or decrease the score without adequate data. 1. "There is a high percentage of seed set in the Florida populations indicating that the species is probably autogamous" 2. "The flowers are probably self-pollinating because most set seed"
6.05	1. Sutton, D. L. 1995. Hygrophila is replacing Hydrilla in south Florida. Aquatics 14(3):4-10. (Accessed: 7 September 2016)	1. "The flowers are probably self-pollinating because most set seed"
6.06	1. Campbell, Higman, Slaughter, and Schools. A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticfieldguide.pdf</a> (Accessed: 31 August 2016) 2. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016)	1. "Mode of spread: Introduced through aquarium trade; reproduces vegetatively, by small stem and leaf fragments, possibly by seed; spread by me- chanical harvesters, boats and water currents." 2. "stems fragment easily and are able to develop new plants from small fragments; reportedly even a free-floating leaf can form a new plant"

6.07	<p>1. Vandiver, V.V. Jr. 1980. <i>Hygrophila</i>. <i>Aquatics</i> 2(4):4-11. (Accessed: 2 September 2016)</p> <p>2. Cuda, J. P., and D. L. Sutton. 2000. Is the aquatic weed <i>Hygrophila</i>, <i>Hygrophila polysperma</i> (Polemoniales: Acanthaceae), a suitable target for classical biological control? Pages 337-348 in N. R. Spencer, (ed.). <i>Proceedings of the X International Symposium on Biological Control of Weeds</i>, Montana State University, Bozeman, Montana. July 4-14, 1999. (Accessed: 2 September 2016)</p> <p>3. Langeland, K. A., and K. C. Burks. 1998. Identification and biology of nonnative plants in Florida's natural areas. University of Florida, Gainesville, Florida. (Accessed: 2 September 2016)</p>	<p>1. Spread on Lake Tohopekaliga in Florida from 0.1 acre in 1979 to 10 acres in 1980. 2. "<i>Hygrophila</i> has a high growth rate and is capable of rapidly expanding a population ten-fold in one year" 3. "The brittle stems fragment easily and readily root to form new stands of plants (Sutton, 1995; Langeland and Burks, 1998). "[A]ble to expand a population rapidly, in one case from 0.04 ha (0.1 acre) to over 0.41 ha (10 acres) in 1 year"</p>
7.01	<p>1. Campbell, Higman, Slaughter, and Schools. <i>A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan</i>. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf</a> (Accessed: 31 August 2016)</p> <p>2. University of Florida Institute of Food and Agriculture CAIP. <a href="http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/">http://plants.ifas.ufl.edu/plant-directory/hygrophila-polysperma/</a> (Accessed: 2 September 2016)</p> <p>3. Angerstein, M. B., and D. E. Lemke. 1994. First records of the aquatic weed <i>Hygrophila polysperma</i> (Acanthaceae) from Texas. <i>Sida</i> 16(2):365-371. (Accessed: 2 September 2016)</p>	<p>1. "Mode of spread: Introduced through aquarium trade; reproduces vegetatively, by small stem and leaf fragments, possibly by seed; spread by mechanical harvesters, boats and water currents." 2. "stems fragment easily and are able to develop new plants from small fragments; reportedly even a free-floating leaf can form a new plant"; "the action of mechanical harvestors and chopping machines fragment the <i>hygrophila</i> plants and increase their distribution"; "Transporting plant fragments on boats, trailers, and in livewells is the main introduction route to new lakes and rivers." 3. Introduced to Texas "indirectly through careless dumping by aquarists."</p>
7.02	<p>1. Campbell, Higman, Slaughter, and Schools. <i>A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan</i>. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf</a> (Accessed: 31 August 2016)</p> <p>2. Angerstein, M. B., and D. E. Lemke. 1994. First records of the aquatic weed <i>Hygrophila polysperma</i> (Acanthaceae) from Texas. <i>Sida</i> 16(2):365-371. (Accessed: 2 September 2016)</p>	<p>1. "Mode of spread: Introduced through aquarium trade; reproduces vegetatively, by small stem and leaf fragments, possibly by seed; spread by mechanical harvesters, boats and water currents." 2. Introduced to Texas "directly through cultivation by local aquatic plant nurseries"</p>
7.03	<p>1. Nault, M. E., and A. Mikulyuk. 2009. East Indian <i>Hygrophila</i> (<i>Hygrophila polysperma</i>). A technical review of distribution, ecology, impacts, and management. PUB-SS-1049. Wisconsin Department of Natural Resources Bureau of Science Services, Madison, Wisconsin. (Accessed: 6 September 2016)</p> <p>2. GRIN US National Plant Germplasm System. <a href="https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380">https://npgsweb.ars-grin.gov/gringlobal/taxonomydetail.aspx?316380</a> (Accessed: 6 September 2016)</p>	<p>1. "It is also possible for <i>H. polysperma</i> to be a 'hitchhiker' plant with other species ordered through water garden catalogs" 2. "potential seed contaminant"</p>
7.04	<p>1. Federal Noxious Weed Disseminules. <a href="http://keys.lucidcentral.org/keys/FNW/FNW%20seeds/html/large%20image%20pages/Hygrophila%20polysperma%20li.htm">http://keys.lucidcentral.org/keys/FNW/FNW%20seeds/html/large%20image%20pages/Hygrophila%20polysperma%20li.htm</a> (Accessed: 9 September 2016)</p>	<p>1. No evidence of adaptation of seeds for wind dispersal, however, since this plant reproduces vegetatively, it is unknown whether wind aids in dispersal across the surface of the water.</p>
7.05	<p>1. Florida Natural Areas Inventory. <a href="http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf">http://fnai.org/Invasives/Hygrophila_polysperma_FNAI.pdf</a> (Accessed: 31 August 2016)</p> <p>2. Campbell, Higman, Slaughter, and Schools. <i>A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan</i>. <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf</a> (Accessed: 31 August 2016)</p> <p>3. van der Pijl, L. 1982. <i>Principles of Dispersal in Higher Plants</i> (3 ed.). SpringerVerlag, Berlin. 214 pp. (Accessed: 31 August 2016)</p> <p>4. Sutton, D. L. 1995. <i>Hygrophila</i> is replacing <i>Hydrilla</i> in south Florida. <i>Aquatics</i> 14(3):4-10. (Accessed: 31 August 2016)</p>	<p>1. "Description: Perennial aquatic, mostly submersed, rooted."; "Habitat: Streams, springs, lakes, and ruderal sites; prefers flowing streams" 2. "Mode of spread: Introduced through aquarium trade; reproduces vegetatively, by small stem and leaf fragments, possibly by seed; spread by mechanical harvesters, boats and water currents." 3. Seeds float on water surface 4. Spread vegetatively when stem fragments are carried to new locations by water currents</p>
7.06		No evidence
7.07	<p>1. Nault, M. E., and A. Mikulyuk. 2009. East Indian <i>Hygrophila</i> (<i>Hygrophila polysperma</i>). A technical review of distribution, ecology, impacts, and management. PUB-SS-1049. Wisconsin Department of Natural Resources Bureau of Science Services, Madison, Wisconsin. (Accessed: 6 September 2016)</p>	<p>1. transported "by wildlife moving between water bodies"</p>
7.08		No evidence



8.01	1. Sutton, D. L. 1995. Hygrophila is replacing Hydrilla in south Florida. <i>Aquatics</i> 14(3):4-10. (Accessed: 6 September 2016)	1. "Each flower may produce 20 to 30 seeds, but it is unknown whether the seeds are a major factor in the reproduction and spread of [the] species"; insufficient evidence
8.02		No evidence
8.03	1. Cuda, J. P., and D. L. Sutton. 2000. Is the aquatic weed Hygrophila, <i>Hygrophila polysperma</i> (Polemoniales: Acanthaceae), a suitable target for classical biological control? Pages 337-348 in N. R. Spencer, (ed.). <i>Proceedings of the X International Symposium on Biological Control of Weeds</i> , Montana State University, Bozeman, Montana. July 4-14, 1999. (Accessed: 5 September 2016) 2. California Invasive Species Advisory Committee. UC Davis. Invasive Species List and Scorecards for California. <a href="http://ice.ucdavis.edu/invasives/scorecard/hygrophila-polysperma-scorecard">http://ice.ucdavis.edu/invasives/scorecard/hygrophila-polysperma-scorecard</a> (Accessed: 5 September 2016)	1. Difficult to control with herbicides 2. "Registered aquatic herbicides provide only marginal control of <i>H. polysperma</i> . Other non-chemical approaches are less effective."
8.04	1. Spencer, W., and G. Bowes. 1985. <i>Limnophila</i> and <i>Hygrophila</i> : A review and physiological assessment of their weed potential in Florida. <i>Journal of Aquatic Plant Management</i> 23:7-16. (Accessed: 7 September 2016) 2. Campbell, Higman, Slaughter, and Schools. <i>A Field Guide to Invasive Plants of Aquatic and Wetlands Habitats for Michigan</i> . <a href="http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf">http://mnfi.anr.msu.edu/invasive-species/aquaticsfieldguide.pdf</a> (Accessed: 7 September 2016)	1. "Hygrophila showed a substantial capacity for regrowth....management practices should be selected to minimize Hygrophila dispersion by fragmentation" 2. "reproduces vegetatively, by small stem and leaf fragments, possibly by seed; spread by mechanical harvesters, boats and water currents."
8.05	1. Mukherjee, A., Ellison, C.A., Cuda, J.P., and Overholt, W.A. 2011. Biological Control of <i>Hygrophila</i> : Foreign Exploration for Candidate Natural Enemies. Pages 142-152 in XIII International Symposium on Biological Control of Weeds. (Accessed: 9 September 2016)	1."A previous study confirmed that <i>hygrophila</i> is a good candidate for classical biological control. However, little information was available on natural enemies affecting <i>hygrophila</i> in its native range. Exploratory field surveys were conducted in a range of habitats in India and Bangladesh during 2008 and 2009. In total, 41 sites were surveyed, including 28 sites in the states of West Bengal and Assam, India and 13 sites in Mymensingh, Bangladesh. The geoposition and altitude of each survey site were recorded. Several collection techniques, e.g. hand picking, Berlese funnel extraction, as well as sweep and clip vegetation sampling, were used to collect natural enemies. A number of insects, including two caterpillars ( <i>Precis alamana</i> L., Nymphalidae and an unidentified noctuid moth, Lepidoptera) that defoliate emerged plants, an aquatic caterpillar ( <i>Parapoynx bilinealis</i> Snellen, Crambidae, Lepidoptera) feeding an submerged <i>hygrophila</i> , and a leaf mining beetle ( <i>Trachys</i> sp., Buprestidae, Coleoptera) were collected during these surveys. In addition, a very damaging aecial rust fungus was collected."; No evidence that these species can be found in Florida and the evidence is insufficient to support a 'yes' answer