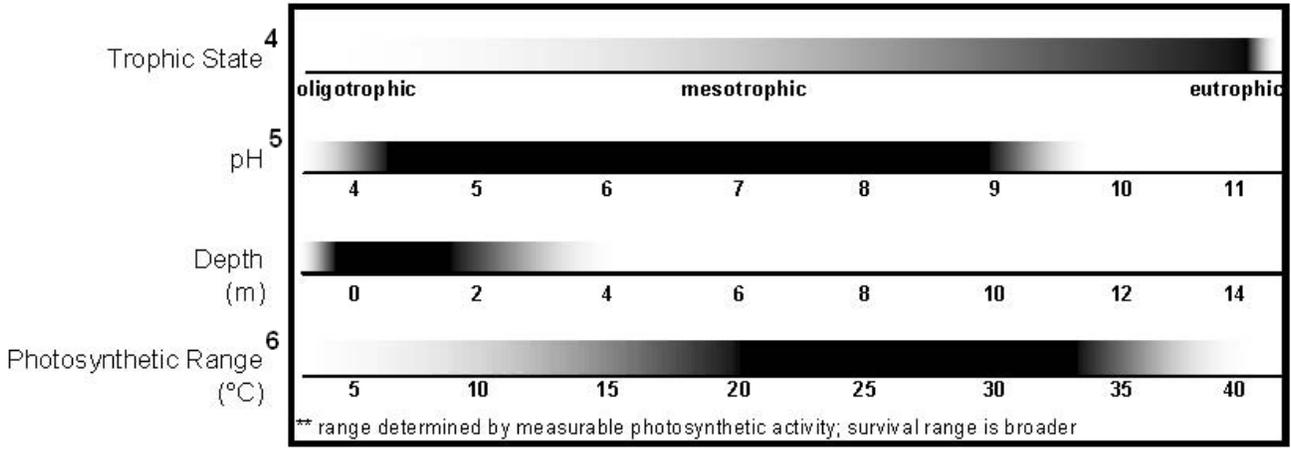


Aquatic Plant Dotted Duckweed

I. Current Status and Distribution *Landoltia punctata*
(formerly *Spirodela punctata*)¹

a. Range	Global/Continental	Wisconsin
Native Range Southeast Asia, Australia, Japan, India, Thailand, Africa, South America, New Zealand ²	 <p>Figure 1: U.S and Canada Distribution Map³</p>	Not recorded in Wisconsin
Abundance/Range Widespread: Locally Abundant: Sparse:	Southern and western United States ³ ; Europe and Asia ² Nutrient-rich, slow-moving or stagnant ponds ^{2,4} Areas with severe, cold winters ⁴	Not applicable Not applicable Not applicable
Range Expansion Date Introduced: Rate of Spread:	Missouri, 1930 ⁴ Rapid	Not applicable Not applicable
Density Risk of Monoculture: Facilitated By:	High ⁴ Undocumented	Unknown Unknown
b. Habitat	Slow-moving or stagnant ponds ^{2,4} ; lakes, wetlands, ditches, swamps, backwaters, intermittent waters ⁴	
Tolerance	Chart of tolerances: Increasingly dark color indicates increasingly optimal range	



Preferences	Small, slow-moving or stagnant, nutrient rich waters ²
c. Regulation	
Noxious/Regulated:	TX
Minnesota Regulations:	<i>Not regulated</i>
Michigan Regulations:	<i>Not regulated</i>
Washington Regulations:	<i>Not regulated</i>
II. Establishment Potential and Life History Traits	
a. Life History	Small, monocotyledonous, free-floating plant ²
Fecundity	High
Reproduction	Asexual (budding); Sexual (occasional) ⁴
Importance of Seeds:	Medium; <i>L. punctata</i> can survive drought by producing seeds ⁴
Vegetative:	Very important; through vegetative budding of daughter fronds ⁴
Hybridization	Undocumented
Overwintering	
Winter Tolerance:	Low ⁴
Phenology:	Does not form turions ^{2,4} ; absolute minimum temperature is -20°C (-4°F); seeds cannot tolerate cold temperatures ⁴
b. Establishment	
Climate	
Weather:	Warm, wet climate
Wisconsin-Adapted:	Uncertain
Climate Change:	Likely to facilitate growth and distribution
Taxonomic Similarity	
Wisconsin Natives:	Medium; family Lemnaceae
Other US Exotics:	Low
Competition	
Natural Predators:	Undocumented
Natural Pathogens:	Undocumented
Competitive Strategy:	Can grow in low oxygen, high nutrient environments ²
Known Interactions:	Regarded as a pioneer species that can distribute easily and colonize rapidly ⁴
Reproduction	
Rate of Spread:	High ²
Adaptive Strategies:	Able to reproduce quickly and disperse rapidly ²
Timeframe	Undocumented
c. Dispersal	
Intentional:	Aquarium trade ⁷ ; agricultural uses ⁸
Unintentional:	Water and wind currents; waterfowl ² ; possibly small mammals ⁴ ; aquarium trade ⁴
Propagule Pressure:	High; fragments easily accidentally introduced; source populations near Wisconsin

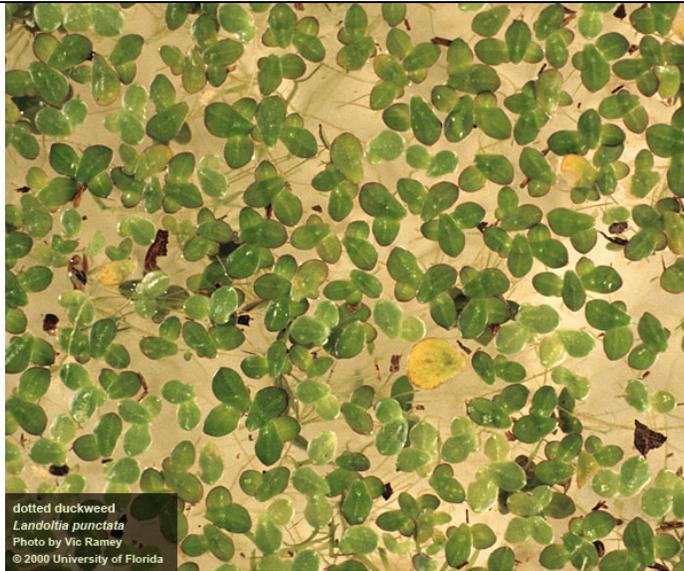


Figure 2: Courtesy of Vic Ramey, University of Florida⁹
Figure 3: Courtesy of Ann Murray, University of Florida¹⁰

III. Damage Potential

a. Ecosystem Impacts

Composition	Dense mats can decrease light available to native species ²
Structure	Dense mats can form in stagnant water ⁷
Function	Decreased light penetration
Allelopathic Effects	Undocumented
Keystone Species	Undocumented
Ecosystem Engineer	Yes; dense mats can decrease light penetration
Sustainability	Undocumented
Biodiversity	Undocumented
Biotic Effects	Undocumented
Abiotic Effects	Decrease in light penetration; removal of nutrients from system
Benefits	Undocumented

b. Socio-Economic Effects

Benefits	Used in waste water remediation to remove high levels of nutrients ^{2,11} ; harvested as a substitute for alfalfa in livestock diets ² ; potential for use as a fertilizer due to high nitrogen content ⁸
Caveats	Risk of release and population expansion outweighs benefits of use
Impacts of Restriction	Increase in monitoring, education, and research costs
Negatives	Undocumented
Expectations	More negative impacts can be expected in nutrient rich, slow-moving 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:	High; confused with native <i>Spirodela polyrhiza</i> and <i>Lemna</i> spp.
Benefits of Early Response:	Undocumented

b. Control	
Management Goal 1	Eradication
Tool:	Chemical - diquat ^{2,12} ; glyphosate, trifluralin ¹³
Caveat:	<i>L. punctata</i> developed resistance to herbicide within 20-30 years ¹¹
Cost:	Expensive
Efficacy, Time Frame:	Limited efficacy; resistant <i>L. punctata</i> may be very difficult to control

¹ Les, D.H. and D.J. Crawford. 1999. *Landoltia* (Lemnaceae), a New Genus of Duckweeds. *Novon* 9:530-533.

² Global Invasive Species Database. 2006. *Landoltia punctata*. Retrieved December 23, 2010 from: <http://www.issg.org/database/species/ecology.asp?si=1018&fr=1&sts=>

³ United States Department of Agriculture, Natural Resource Conservation Service. 2010. The PLANTS Database. National Plant Data Center, Baton Rouge, LA, USA. Retrieved December 23, 2010 from: <http://plants.usda.gov/java/profile?symbol=LAPU12>

⁴ Jacono, C.C. 2002. United States Geological Survey Nonindigenous Aquatic Species: *Landoltia punctata* = *Spirodela punctata*. Retrieved December 23, 2010 from: http://nas.er.usgs.gov/taxgroup/plants/docs/la_punct.html

⁵ Aziz, A. and M.N. Kochi. 1999. Growth and morphology of *Spirodela polyrhiza* and *S. punctata* (Lemnaceae) as affected by some environmental factors. *Bangladesh Journal of Botany* 28(2):133-138.

⁶ Wedge, R.M. and J.E. Burris. 1982. Effects of light and temperature on duckweed photosynthesis. *Aquatic Botany* 13(2):133-140.

⁷ University of Florida Center for Aquatic and Invasive Plants. Dotted duckweed. *Landoltia punctata* (syn. *S. punctata*). Retrieved December 23, 2010 from: <http://plants.ifas.ufl.edu/node/222>

⁸ Chaiprapat, S., J.J. Cheng, J.J. Classen and S.K. Liehr. 2005. Role of internal nutrient storage in duckweed growth for swine wastewater treatment. *Transactions of the ASAE* 48(6):2247-2258.

⁹ Ramey, V. 2000. University of Florida. Retrieved December 23, 2010 from: <http://plants.ifas.ufl.edu/images/lanpun/spipun.jpg>

¹⁰ Murray, A. 2000. University of Florida. Retrieved December 23, 2010 from: <http://plants.ifas.ufl.edu/images/lanpun/spipun5.jpg>

¹¹ Fang, Y.Y., O. Babourina, Z. Rengel, X.E. Yang and P.M. Pu. 2007. Ammonium and nitrate uptake by the floating plant *Landoltia punctata*. *Annals of Botany* 99(2):365-370.

¹² Koschnick, T.J., W.T. Haller and L. Glasgow. 2006. Documentation of *landoltia* (*Landoltia punctata*) resistance to diquat. *Weed Science* 54(4):615-619.

¹³ Santos, D.M.M. and D.A. Banzatto. 2000. Efeitos de herbicidas nas plantas aquáticas *Spirodela punctata* (G.F.W. Meyer) Thompson e *Salvinia minima* Baker. *Ecossistema (Brazil)* 25(1):69-75.