

# Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado’s Wildlands and Agriculture”

By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

**Table 1. Species and Evaluator Information**

<b>Species name</b> (Latin binomial):	Hydrilla verticillata (L.f.) Royle
<b>Synonyms:</b>	N/A
<b>Common names:</b>	Hyrilla, Waterthyme
<b>Evaluation date</b> (mm/dd/yy):	05/01/2009
<b>Evaluator #1 Name/Title:</b>	Dr. Scott Nissen, Professor
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<b>Evaluator #2 Name/Title:</b>	enter text here
<b>Affiliation:</b>	enter text here
<b>Phone numbers:</b>	enter text here
<b>Email address:</b>	enter text here
<b>Address:</b>	enter text here

Section below for list committee use—please leave blank

<b>List committee members:</b>	enter text here
<b>Committee review date:</b>	enter text here
<b>List date:</b>	enter text here
<b>Re-evaluation date(s):</b>	enter text here

**General comments on this assessment:**

There was no suitable option in the scoring matrix to give us a final rating for wildlands or agricultural plant scores. We came up with a "U" rating for the Distribution section, as hydrilla has not yet been found in Colorado. There is no option for a final score if the Distribution section was rated "U". Based on other trends in the matrix we assigned the sections what we felt would be the most appropriate rating.

**Table 2. Criteria, Section, and Overall Scores**

<a href="#">1.1</a>	Impact on abiotic ecosystem processes	<b>A</b>	<b>Other Pub. Mat'l</b>	<p><b>Impact</b></p> <p><i>Enter four characters from Q1.1-1.4 below:</i></p> <p><b>AABD</b></p> <p><i>Using matrix, determine score and enter below:</i></p> <p><b>A</b></p>	<p><b>Wildlands Plant Score</b></p> <p><i>Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:</i></p> <p><b>High</b></p> <p><b>Red Alert</b></p>
<a href="#">1.2</a>	Impact on plant community	<b>A</b>	<b>Other Pub. Mat'l</b>		
<a href="#">1.3</a>	Impact on higher trophic levels	<b>B</b>	<b>Other Pub. Mat'l</b>		
<a href="#">1.4</a>	Impact on genetic integrity	<b>D</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.1</a>	Role of anthropogenic and natural disturbance	<b>A (3 pts)</b>	<b>Other Pub. Mat'l</b>	<p><b>Invasiveness</b></p> <p><i>Enter the sum total of all points for Q2.1-2.7 below:</i></p> <p><b>17</b></p> <p><i>Use matrix to determine score and enter below:</i></p> <p><b>A</b></p>	
<a href="#">2.2</a>	Local rate of spread with no management	<b>A (3 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.3</a>	Recent trend in total area infested within state	<b>U (0 pts)</b>	<b>Anecdotal</b>		
<a href="#">2.4</a>	Innate reproductive potential <a href="#">Wksht A</a>	<b>A (3 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.5</a>	Potential for human-caused dispersal	<b>A (3 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.6</a>	Potential for natural long-distance dispersal	<b>A (3 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">2.7</a>	Other regions invaded	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>		
<a href="#">3.1</a>	Ecological amplitude/Range	<b>U</b>	<b>Anecdotal</b>	<p><b>Distribution</b></p> <p><i>Using matrix, determine score and enter below:</i></p> <p><b>U</b></p>	
<a href="#">3.2</a>	Distribution/Peak frequency <a href="#">Wrksht B</a>	<b>U</b>	<b>Anecdotal</b>		

<a href="#">4.1</a>	Poisonous to livestock	<b>U (0 pts)</b>	<b>No Information</b>
<a href="#">4.2</a>	Detrimental to economic crops	<b>D (0 pts)</b>	<b>No Information</b>
<a href="#">4.3</a>	Detrimental to management of agricultural system, rangeland and pasture	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>
<a href="#">4.4</a>	Human impacts <a href="#">Wrksht C</a>	<b>B (2 pts)</b>	<b>Other Pub. Mat'l</b>

### **Agricultural / Human Impact**

*Enter the sum total of all points for Q4.1-4.4 below:*

**4**

*Use matrix to determine score and enter below:*

**C**

### **Agricultural Plant Score**

*Using matrix, determine Overall Score and Alert Status from the second, third and fourth section scores and enter below:*

**High**

**Red Alert**

**Table 3. Documentation**

<p><b>Question 1.1</b> Impact on abiotic ecosystem processes</p>	<p>A Other Pub. Mat'l <a href="#">back</a></p>
<p>Identify ecosystem processes impacted: Hydrilla can form large, dense mats that can restrict water flow. This can slow water flow in irrigation canals and increase sedimentation, as well as increasing the likelihood of flooding. Mats can also alter water chemistry resulting in increased pH, decreased oxygen, and increasing temperature. It also may shade out desirable and native aquatic species.</p>	
<p>Rationale: Can moderately alter water quality parameters. Is also capable of altering nutrient and mineral dynamics and light availability.</p>	
<p>Sources of information:          Aquatic Ecosystem Resoration Foundation. Aquatic Plant Management: Best Management Practices in Support of Fish and Wildlife Habitat. 2005. <a href="http://aquatics.org/bmp.htm">http://aquatics.org/bmp.htm</a>.          Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304.</p>	
<p><b>Question 1.2</b> Impact on plant community composition, structure, and interactions</p>	<p>A Other Pub. Mat'l <a href="#">back</a></p>
<p>Identify type of impact or alteration: Can form very dense mats that allow it to shade out native aquatic vegetation. Hydrilla has also adapted to growing in lower light intensities than other species and is more efficient at absorbing carbon from the water, allowing it to grow better than other species when these factors are limited.</p>	
<p>Rationale: Can severely alter the plant community, structure, and interactions where it often accounts for &gt;75% of the vegetation. These dense stands can cover the water surface, degrading layers below, resulted in greatly decreased populations of native species.</p>	
<p>Sources of information:          Aquatic Ecosystem Resoration Foundation. Aquatic Plant Management: Best Management Practices in Support of Fish and Wildlife Habitat. 2005. <a href="http://aquatics.org/bmp.htm">http://aquatics.org/bmp.htm</a>.          Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304.</p>	
<p><b>Question 1.3</b> Impact on higher trophic levels</p>	<p>B Other Pub. Mat'l <a href="#">back</a></p>
<p>Identify type of impact or alteration: The physical blockages caused by mats of hydrilla can decrease habitat for fish and other wildlife. It can provide poor fish habitat, but is also seen by some experts as an important food source for waterfowl. Monotypic stands of hydrilla can deplete oxygen resulting in fish kills, reduced fish populations, and reduced fish size. While dense mats may support large numbers of fish, it will support little or no sport fish of harvestable size. Stagnant waters formed by these dense mats also become breeding habitat for mosquitoes and may decrease the use of a water body for recreational activities.</p>	

<p>Rationale: In dense infestations will have a negative impact on fish habitat, but can provide a food source for waterfowl. This may result in a moderate alteration of higher trophic level populations, communities, or interactions.</p>	
<p>Sources of information:</p> <p>Aquatic Ecosystem Resoration Foundation. Aquatic Plant Management: Best Management Practices in Support of Fish and Wildlife Habitat. 2005. <a href="http://aquatics.org/bmp.htm">http://aquatics.org/bmp.htm</a>.</p> <p>Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". <i>Castanea</i> 61:293-304.</p> <p>Hydrilla. Technical Information about Hydrilla. <a href="http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html">http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html</a></p>	
<p><b>Question 1.4</b> Impact on genetic integrity</p>	<p>D Other Pub. Mat'l <a href="#">back</a></p>
<p>Identify impacts: There are no native hydrilla species known to exist in Colorado, so there is little threat of hybridization with native species. Also, most reproduction is asexual through turions and tubers, and sexual reproduction does not commonly occur.</p>	
<p>Rationale: There is no known hybridization of hydrilla with native species in Colorado.</p>	
<p>Sources of information:</p> <p>Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". <i>Castanea</i> 61:293-304.</p>	
<p><b>Question 2.1</b> Role of anthropogenic and natural disturbance in establishment</p>	<p>A Other Pub. Mat'l <a href="#">back</a></p>
<p>Describe role of disturbance: The ability of this species to establish does not depend on anthropogenic or natural disturbance. Fragments and tubers can easily establish and displace established native species such as the pondweeds (<i>Potamogeton</i> sp.).</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information:</p> <p>Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". <i>Castanea</i> 61:293-304.</p>	
<p><b>Question 2.2</b> Local rate of spread with no management</p>	<p>A Other Pub. Mat'l <a href="#">back</a></p>
<p>Describe rate of spread: Can spread at an extremely fast rate when not managed. Hydrilla is estimated to be present in 14 0,000 acres in Florida, and more than 50,000 acres in South Carolina. Hydrilla had become established in the Potomac River in 1981 and by 1985 covered 3,600 acres.</p>	
<p>Rationale: In many states hydrilla infestations have been known to more than double in less than 10 years.</p>	

Sources of information: Hydrilla. Technical Information about Hydrilla. <a href="http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html">http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html</a> Florida Department of Environmental Protection. Weed Alert: Hydrilla (Hydrilla verticillata). <a href="http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/pdfs/hydrilla.pdf">http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/pdfs/hydrilla.pdf</a>	
<b>Question 2.3</b> Recent trend in total area infested within state	U Anecdotal <a href="#">back</a>
Describe trend: Hydrilla is not currently known to exist in Colorado.	
Rationale: enter text here	
Sources of information: enter text here	
<b>Question 2.4</b> Innate reproductive potential	A Other Pub. Mat'l <a href="#">back</a>
Describe key reproductive characteristics: Spread of hydrilla is mainly by stem fragmentation and sprouting from tubers and tubers and turions. Monecious hydrill can produce viable seed, but seedlings appear to be rare and may be a minor means of reproduction. Once established tubers and turions in the soil may survive for 3-5 years. The main method of reproduction is vegetative. It can reproduce by fragmentation of stems, rhizomes, and root crowns. A single node is capable of forming a new plant. Tubers and turions are able to tolerate ice cover, drying, ingestion and regurgitation by waterfowl, and some herbicide treatments. In warmer climates hydrilla exists as a perennial, but in cooler regions will die back and regrow from tubers the following growing season.	
Rationale: High reproductive potential. (6 or more points)	
Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla. Hydrilla. Technical Information about Hydrilla. <a href="http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html">http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html</a> Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304. University of Florida, IFAS. Hydrilla. <a href="http://plants.ifas.ufl.edu/node/183">http://plants.ifas.ufl.edu/node/183</a>	
<b>Question 2.5</b> Potential for human-caused dispersal	A Other Pub. Mat'l <a href="#">back</a>
Identify dispersal mechanisms: Thought to have been introduced into North America through the aquarium trade. Vegetative reproduction allows hydrilla to be easily spread by plant fragments on boating and fishing equipment. Other members of this family have also been introduced into the aquarium and nursery trade because they are hardy, tolerant plants and can be accidentally introduced into waterways. At least one hydrilla infestation in California have also been traced back to being a contaminant in a water lily shipment.	

Rationale: High- there are many opportunities for dispersal to new areas.	
Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla. Hydrilla. Technical Information about Hydrilla. <a href="http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html">http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html</a> Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304.	
<b>Question 2.6</b> Potential for natural long-distance dispersal	A Other Pub. Mat'l <a href="#">back</a>
Identify dispersal mechanisms: Vegetative parts can disperse with flooding or flowing waters and can survive ingestion and regurgitation by waterflow. Likely common since hydrilla can be considered a good food source for waterfowl.	
Rationale: Frequent long-distance dispersal by animals and water flow regimes	
Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla. Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304.	
<b>Question 2.7</b> Other regions invaded	B Other Pub. Mat'l <a href="#">back</a>
Identify other regions: Hydrilla can occur in temperat and tropical climates. It is widspread in the Southeastern US, the East Coast, California, and Washington. Although hydrilla is not yet present in Colorado, it has recently been found in the Bruneau River in Idaho and Olathe, KS. In Russia it occurs as far as 50 N latitude (approximately the U.S. -Canada border). From its current distribution it seems likely that hydrilla could infest water bodies across Colorado.	
Rationale: Although little is known about hydrilla growth at high altitudes, current infestations suggest that hydrilla may be capable of infesting the Front Range and Eastern Plains of Colorado including lakes, ponds, rivers, canals and other water bodies.	
Sources of information: University of Florida, IFAS. Hydrilla. <a href="http://plants.ifas.ufl.edu/node/183">http://plants.ifas.ufl.edu/node/183</a> Hydrilla. Technical Information about Hydrilla. <a href="http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html">http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua001.html</a> USGS. Nonindigenous Aquatic Species Database - Hydrilla verticillata. <a href="http://nas.er.usgs.gov/queries/collectioninfo.asp?SpeciesID=6">http://nas.er.usgs.gov/queries/collectioninfo.asp?SpeciesID=6</a> .	

<b>Question 3.1</b> Ecological amplitude/Range	U Anecdotal <a href="#">back</a>
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Not yet known to exist in Colorado.	
Rationale: enter text here	
Sources of information: enter text here	
<b>Question 3.2</b> Distribution/Peak frequency	U Anecdotal <a href="#">back</a>
Describe distribution: Not yet known to exist in Colorado.	
Rationale: enter text here	
Sources of information: enter text here	
<b>Question 4.1</b> Poisonous to Livestock	U No Information <a href="#">back</a>
Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: enter text here	
Rationale: enter text here	
Sources of information: enter text here	
<b>Question 4.2</b> Detrimental to Economic Crops	D No Information <a href="#">back</a>
Describe impacts to all aspects of cropping systems (see guidelines): enter text here	
Rationale: enter text here	
Sources of information: enter text here	
<b>Question 4.3</b> Detrimental to Mgmt of Agricultural System, Rangeland and Pasture	B Other Pub. Mat'l <a href="#">back</a>
Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Hydrilla infestations can impede water flow in irrigation canals and clog pumps used for irrigation.	
Rationale: Can have a moderate impact on the management of agricultural systems by effecting ability to efficiently deliver water.	

Sources of information: Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304.	
<b>Question 4.4</b> Human Health Impacts	B Other Pub. Mat'l <a href="#">back</a>
Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: Can severely impact property values and recreational value of water bodies when dense infestations are present.	
Rationale: Can Decrease property values as well as recreational value when moderate to dense infestations are present. Moderate impact - 3 points.	
Sources of information: Langeland, K.A. 1996. Hydrilla verticillata (L.f.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed". Castanea 61:293-304.	

**Worksheet A**

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Reaches reproductive maturity in 2 years or less	<b>Yes: 1 pt</b>
Dense infestations produce >1,000 viable seed per square meter	<b>Unknown: 0 pts</b>
Populations of this species produce seeds every year.	<b>Unknown: 0 pts</b>
Seed production sustained over 3 or more months within a population annually	<b>Unknown: 0 pts</b>
Seeds remain viable in soil for three or more years	<b>Unknown: 0 pts</b>
Viable seed produced with <i>both</i> self-pollination and cross-pollination	<b>Yes: 1 pt</b>
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	<b>Yes: 1 pt</b>
Fragments easily and fragments can become established elsewhere	<b>Yes: 2 pts</b>
Resprouts readily when cut, grazed, or burned	<b>Yes: 1 pt</b>
	<b>6 pts      4 unknowns</b>
	<b>A (6+ pts)</b>
<b>Note any related traits:</b> enter text here	

## Worksheet B - Colorado Ecological Types and Land Use

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Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
<b>Freshwater and Aquatic Systems</b>	lakes, ponds, reservoirs	score
	rivers, streams, canals	score
<b>Riparian and wetlands</b>	Riparian forest	score
	Riparian shrublands	score
	Wet meadows	score
<b>Grasslands</b>	Shortgrass prairie	score
	Tallgrass prairie	score
	Sandsage prairie	score
	Montane meadows	score
<b>Irrigated Agriculture</b>	Hay meadows	score
	Irrigated crops (alfalfa, corn, sugar beets)	score
<b>Dryland Agriculture</b>	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	score
<b>Developed Lands</b>	Urban, exurban, industrial	score
<b>Arid Shrublands</b>	Sagebrush shrublands	score
	Foothills shrublands	score
	Gambel oak shrublands	score
<b>Woodlands</b>	Pinyon - juniper	score
	Ponderosa pine	score
	Limber pine	score
<b>Forest</b>	Lodgepole pine	score
	Spruce-fir	score
<b>Alpine</b>	Boulder and rock fields	score
	Dwarf shrublands	score
	Tundra	score
<b>Barrens (lower elevation)</b>	Dunes	score
	Rock outcrops	score
	Canyonlands	score

\* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).

## Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	<b>No: 0 pt</b>
Property values are decreased due to increased risk of fire	<b>No: 0 pts</b>
Decreased property value due to moderate to heavy infestations	<b>Yes: 2 pts</b>
Decreased land value for recreational use; boating, fishing, camping, etc.	<b>Yes: 1 pt</b>
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	<b>No: 0 pt</b>

<b>3 pts</b>	<b>Total Unknowns</b>
<b>B (3 pts)</b>	

**Note any related traits:** enter text here