

Part IV. Plant Assessment Form

For use with “Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands”
by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association

Electronic version, February 28, 2003

Table 1. Species and Evaluator Information

Species name (Latin binomial):	Hydrilla verticillata (L. f.)
Synonyms:	Hottonia serrata, Hydrilla angustifolia, Hydrilla dentata, Hydrilla lithuanica, Hydrilla ovalifolia, Hydrilla wightii, Leptanthes verticillatus, Serpicula verticillata, Vallisneria verticillata, Elodea verticillata
Common names:	hydrilla, water thyme, Florida elodea
Evaluation date (mm/dd/yy):	2/15/2005
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Section below for list committee use—please leave blank

List committee members:	Joe DiTomaso, Alison Stanton, Joanna Clines, Cynthia Roye, Doug Johnson
Committee review date:	7/8/05
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

enter text here

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	A	Rev'd, Sci. Pub'n
1.2	Impact on plant community	A	Other Pub. Mat'l
1.3	Impact on higher trophic levels	B	Other Pub. Mat'l
1.4	Impact on genetic integrity	D	Other Pub. Mat'l

Impact

Enter four characters from Q1.1-1.4 below:

AABD

Using matrix, determine score and enter below:

A

2.1	Role of anthropogenic and natural disturbance	A (3 pts)	Other Pub. Mat'l
2.2	Local rate of spread with no management	A (3 pts)	Other Pub. Mat'l
2.3	Recent trend in total area infested within state	D (0 pts)	Other Pub. Mat'l
2.4	Innate reproductive potential Wksht A	B (2 pts)	Rev'd, Sci. Pub'n
2.5	Potential for human-caused dispersal	A (3 pts)	Other Pub. Mat'l
2.6	Potential for natural long-distance dispersal	A (3 pts)	Other Pub. Mat'l
2.7	Other regions invaded	C (1 pt)	Other Pub. Mat'l

Invasiveness

Enter the sum total of all points for Q2.1-2.7 below:

15

Use matrix to determine score and enter below:

B

Plant Score

Using matrix, determine Overall Score and Alert Status from the three section scores and enter below:

**High
Red Alert**

3.1	Ecological amplitude/Range	C	Other Pub. Mat'l
3.2	Distribution/Peak frequency Wksht C	D	Other Pub. Mat'l

Distribution

Using matrix, determine score and enter below:

C

Table 3. Documentation

<p>Question 1.1 Impact on abiotic ecosystem processes</p>	<p>A Rev'd, Sci. Pub'n back</p>
<p>Identify ecosystem processes impacted: Hydrilla forms large mats that fill the water column and can block or severely restrict water flow. Physical blockage degrades water quality, and slows water flow in canals, thereby increasing sedimentation rates, decreased dissolved oxygen, impairing irrigation and drainage, and clogging pipes, dam trash rakes and machinery. Dense mats alter water quality by raising pH, decreasing oxygen under the mats, and increasing temperature. Also significantly block light penetration into water column.</p>	
<p>Rationale: Moderate alteration of ecosystem processes, not irreversibly altering nutrient and mineral dynamics and light availability.</p>	
<p>Sources of information:</p> <p>Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221.</p> <p>Hydrilla. Technical Information about Hydrilla. 1999. http://www.wa.gov/ecology/wq/plants/weeds/aqua001.html.</p> <p>Langeland, K.A. 1996. Hydrilla verticillata (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed." <i>Castanea</i> 61:293-304.</p>	
<p>Question 1.2 Impact on plant community composition, structure, and interactions</p>	<p>A Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: Physical blockage displaces native aquatic vegetation by forming dense stands or large subsurface mats. Dense canopies can often shade out native vegetation. Hydrilla can grow at lower light intensities than many other plants, absorb carbon from water more efficiently than other plants and can continue to thrive during the summer when carbon can become limiting, store extra P, tolerant of a wide range of water conditions, will thrive in flowing and still water, and tolerate salinity of up to 10 ppt, encroaching upon outer limits of estuaries.</p>	
<p>Rationale: Severe alteration of plant community composition, structure and interactions when forms dense stands >75% cover dominated by the species, covering water surface and eliminating or degrading layers below, and significantly reducing or extirpating populations of native species.</p>	
<p>Sources of information:</p> <p>Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221.</p> <p>DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla.</p> <p>Hydrilla. Technical Information about Hydrilla. 1999. http://www.wa.gov/ecology/wq/plants/weeds/aqua001.html.</p> <p>Langeland, K.A. 1996. Hydrilla verticillata (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed." <i>Castanea</i> 61:293-304.</p>	
<p>Question 1.3 Impact on higher trophic levels</p>	<p>B Other Pub. Mat'l back</p>
<p>Identify type of impact or alteration: Physical blockage decreases habitat for fish and other wildlife. Reduces use of lakes and waterways for fishing, swimming, boating, water skiing and other recreational activities. Extensive monospecific stands of hydrilla can provide poor habitat for fish and other wildlife, although hydrilla is eaten by waterfowl and it is considered an important food source by biologists. While dense vegetation may</p>	

<p>contain large numbers of fish, density levels obtained by hydrilla may support few or no harvestable-sized sport fishes. Stagnant water created by hydrilla mats provides good breeding grounds for mosquitoes.</p>	
<p>Rationale: In dense populations, moderate reduction in habitat quality for native speices, and provides food for waterfowl. Moderate alteration of higher trophic level populations, communities or interactions.</p>	
<p>Sources of information:</p> <p>Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221.</p> <p>DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla.</p> <p>Hydrilla. Technical Information about Hydrilla. 1999. http://www.wa.gov/ecology/wq/plants/weeds/aqua001.html.</p> <p>Langeland, K.A. 1996. Hydrilla verticillata (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed." Castanea 61:293-304.</p> <p>Hench, J.E., R. Gibbs, and J.S. Hench. Some Observations on Hydrilla and Wintering Waterfowl in Montgomery County, Maryland. The Maryland Naturalist 38(1-2): 3-9.</p>	
<p>Question 1.4 Impact on genetic integrity</p>	<p>D Other Pub. Mat'l back</p>
<p>Identify impacts: No native hydrilla in California and and rarely does it reproduce sexually.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information: Hickman. 1993. The Jepson Manual.</p>	
<p>Question 2.1 Role of anthropogenic and natural disturbance in establishment</p>	<p>A Other Pub. Mat'l back</p>
<p>Describe role of disturbance: Can readily establish in undisturbed aquatic systems.</p>	
<p>Rationale: enter text here</p>	
<p>Sources of information:</p> <p>Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221.</p> <p>DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla.</p>	
<p>Question 2.2 Local rate of spread with no management</p>	<p>A Other Pub. Mat'l back</p>
<p>Describe rate of spread: Introduced in 1976, by 1986 hydrilla had infested over 600 miles of canals, drians, and laterals in the Imperial Irrigation District. The monoecious biotype of hydrilla became established in the Potomac River in 1981 and covered 3600 acres by 1985.</p>	
<p>Rationale: Increases rapidly, doubling in less than 10 years.</p>	

Sources of information: Leavitt, J.R., P. Akers, F. Hrusa, and C. Albrecht, CDFA. Target: Hydrilla. Noxious Times, Fall 2001 Pg. 4-6.	
Information about hydrilla. http://www.nwcb.wa.gov/weed_info/hydrilla.html . Accessed 1/10/2005.	
Question 2.3 Recent trend in total area infested within state	D Other Pub. Mat'l back
Describe trend: As of 2000, active populations found in 7 counties. Many populations have been eradicated through activity of CDFA.	
Rationale: enter text here	
Sources of information: CDFA Hydrilla Program Annual Progress Report for 1999 and 2000.	
Question 2.4 Innate reproductive potential	B Rev'd, Sci. Pub'n back
Describe key reproductive characteristics: Hydrilla spreads mainly by stem fragmentation and sprouting from tubers and turions that break free of parent plants. Monoecious hydrilla can produce viable seed. However, presence of seedlings appears to be rare, so seed production may be a minor means of reproduction. Once established, it produces a bank of tubers and turions in the soil that may remain viable for three to five years. It reproduces primarily by vegetative means. It can reproduce by fragmentation of stems, rhizomes, and root crowns, and by production of tubers and turions. A single viable node can produce stems and rhizomes, leading to production of an independent plant. The tubers and turions can withstand ice cover, drying, ingestion and regurgitation by waterfowl, and herbicides.	
Rationale: High reproductive potential, 6+ points	
Sources of information: . Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221. DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla. Netherland, M.D. 1997. Turion Ecology of Hydrilla. J. Aquat. Plant Manage. 35: 1-10. Hydrilla. Technical Information about Hydrilla. 1999. http://www.wa.gov/ecology/wq/plants/weeds/aqua001.html . Langeland, K.A. 1996. Hydrilla verticillata (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed." Castanea 61:293-304.	
Question 2.5 Potential for human-caused dispersal	A Other Pub. Mat'l back
Identify dispersal mechanisms: Introduced into North America by the aquarium trade. Hydrilla's vegetative parts disperse with human activities, such as boating and fishing. Several members of the family are popular with the aquarium and nursery industry because they are hardy, tolerant plants and consequently are introduced into water ways. Monoecious hydrilla came in to CA as a contaminant in waterlily shipments.	
Rationale: High - there are numerous opportunities for dispersal to new areas, including commercial sales, presence as a contaminant, spread along transportation corridors, and transport on boats.	

Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla. Hydrilla. Technical Information about Hydrilla. 1999. http://www.wa.gov/ecology/wq/plants/weeds/aqua001.html . Langeland, K.A. 1996. Hydrilla verticillata (L.F.) Royle (Hydrocharitaceae), "The Perfect Aquatic Weed." Castanea 61:293-304.	
Question 2.6 Potential for natural long-distance dispersal	A Other Pub. Mat'l back
Identify dispersal mechanisms: Vegetative parts disperse with flooding and can survive ingestion and regurgitation by waterfowl.	
Rationale: Frequent long-distance dispersal by animals or abiotic mechanisms.	
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.	
Question 2.7 Other regions invaded	C Other Pub. Mat'l back
Identify other regions: Similar sites occupied in other parts of US and around world.	
Rationale: enter text here	
Sources of information: Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221. DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla.	
Question 3.1 Ecological amplitude/Range	C Other Pub. Mat'l back
Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Hydrilla is capable of infesting any freshwater aquatic system in California. It has been observed in the Mojave and Colorado deserts, south and central coasts, San Francisco Bay Area, and Central VALley. Currently(2000), isolated infestations of hydrilla are found in Shasta, Yuba, Lake, Calaveras, Madera, Mariposa, and Imperial counties. First found in Yuba County in fall 1976.	
Rationale:	
Sources of information: Bossard, C.C., J.M. Randall and M.C. Hoshovsky. 2000. Invasive Plants of California's Wildlands. Pgs 218-221. CDFA Hydrilla Program: Annual Progress Report for 1999 and 2000.	

Question 3.2 Distribution/Peak frequency	D Other Pub. Mat'l back
Describe distribution: California in the eastern North Coast Ranges (Clear Lake area, Lake Co.), Cascade Range (Shasta Lake area, Shasta Co.), north and central Sierra Nevada foothills (northwestern Yuba, central and northwestern Calaveras, southwestern Amador, north eastern San Joaquin, and central and northwestern Tulare Cos.), and Sonoran Desert (Imperial Valley, Imperial Co.), to 200m.	
Rationale: enter text here	
Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Hydrilla.	

Worksheet A[back](#)

Reaches reproductive maturity in 2 years or less	Yes: 1 pt
Dense infestations produce >1,000 viable seed per square meter	No: 0 pts
Populations of this species produce seeds every year.	No: 0 pt
Seed production sustained over 3 or more months within a population annually	No: 0 pt
Seeds remain viable in soil for three or more years	No: 0 pts
Viable seed produced with <i>both</i> self-pollination and cross-pollination	No: 0 pt
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes	Yes: 1 pt
Fragments easily and fragments can become established elsewhere	Yes: 2 pts
Resprouts readily when cut, grazed, or burned	Yes: 1 pt
	5 pts
	Total Unknowns
	B (4-5 pts)
Note any related traits: enter text here	

Worksheet C - California Ecological Types

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(*sensu* Holland 1986)

Major Ecological Types	Minor Ecological Types	Code*
Marine Systems	marine systems	score
Freshwater and Estuarine Aquatic Systems	lakes, ponds, reservoirs	D. present
	rivers, streams, canals	D. present
	estuaries	score
Dunes	coastal	score
	desert	score
	interior	score
Scrub and Chaparral	coastal bluff scrub	score
	coastal scrub	score
	Sonoran desert scrub	score
	Mojavean desert scrub (incl. Joshua tree woodland)	score
	Great Basin scrub	score
	chenopod scrub	score
	montane dwarf scrub	score
	Upper Sonoran subshrub scrub	score
	chaparral	score
Grasslands, Vernal Pools, Meadows, and other Herb Communities	coastal prairie	score
	valley and foothill grassland	score
	Great Basin grassland	score
	vernal pool	score
	meadow and seep	score
	alkali playa	score
	pebble plain	score
Bog and Marsh	bog and fen	score
	marsh and swamp	score
Riparian and Bottomland	riparian forest	score
	riparian woodland	score
	riparian scrub (incl. desert washes)	score
Woodland	cismontane woodland	score
	piñon and juniper woodland	score
	Sonoran thorn woodland	score
Forest	broadleaved upland forest	score
	North Coast coniferous forest	score
	closed cone coniferous forest	score
	lower montane coniferous forest	score
	upper montane coniferous forest	score
	subalpine coniferous forest	score
Alpine Habitats	alpine boulder and rock field	score
	alpine dwarf scrub	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).