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

Species name (Latin binomial)**:**	Myriophyllum spicatum L.
Synonyms:	N/A
Common names:	Eurasian watermilfoil
Evaluation date (mm/dd/yy)**:**	05/01/2009
Evaluator #1 Name/Title:	Dr. Scott Nissen, Professor
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Evaluator #2 Name/Title:	enter text here
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Address:	enter text here

Section below for list committee use—please leave blank

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

General comments on this assessment:

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	A	Other Pub. Mat'l	**Impact** *Enter four characters from Q1.1-1.4 below:* **AAAB** *Using matrix, determine score and enter below:* **A**		
1.2	Impact on plant community	A	Other Pub. Mat'l			
1.3	Impact on higher trophic levels	A	Other Pub. Mat'l			
1.4	Impact on genetic integrity	B	Rev'd, Sci. Pub'n			
2.1	Role of anthropogenic and natural disturbance	A (3 pts)	Observational	**Invasiveness** *Enter the sum total of all points for Q2.1-2.7 below:* **18** *Use matrix to determine score and enter below:* **A**		**Wildlands Plant Score** *Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:* **High** **Red Alert**
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	B (2 pts)	Observational			
2.4	Innate reproductive potential Wksht A	A (3 pts)	Other Pub. Mat'l			
2.5	Potential for human-caused dispersal	A (3 pts)	Other Pub. Mat'l			
2.6	Potential for natural long-distance dispersal	B (2 pts)	Other Pub. Mat'l			
2.7	Other regions invaded	B (2 pts)	Observational			
3.1	Ecological amplitude/Range	C	Observational	**Distribution** *Using matrix, determine score and enter below:* **C**		
3.2	Distribution/Peak frequency Wrksht B	D	Observational			

4.1	Poisonous to livestock	U (0 pts)	No Information
4.2	Detrimental to economic crops	U (0 pts)	No Information
4.3	Detrimental to management of agricultural system, rangeland and pasture	B (2 pts)	Other Pub. Mat'l
4.4	Human impacts Wrksht C	B (2 pts)	Other Pub. Mat'l

Agriculture/ Human Impact sum of all points: 4
Matrix Score for Section 4: C

Agricultural Plant Score: High
Alert Status: Red Alert

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes A Other Pub. Mat'l back
Identify ecosystem processes impacted: Capable of forming large surface or subsurface mats. These dense canopies can result in increased pH, decreased oxygen, and increasing temperature. Decomposing mats can also increase phosphorous and nitrogen loading in the water column. Dense growth can also shade out desirable native species.
Rationale: Can cause severe alteration of ecosystem processes in water bodies.
Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Eurasian watermilfoil. Aquatic Ecosystem Restoration Foundation. Aquatic Plant Management - Best Management Practices in Support of Fish and Wildlife Habitat. 2005 http://aquatics.org/bmp.htm State of Washington Dept. of Ecology. Non-native Invasive Freshwater Plants - Myriophyllum Spicatum (Eurasian watermilfoil). http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua004.html.
Question 1.2 Impact on plant community composition, structure, and interactions A Other Pub. Mat'l back
Identify type of impact or alteration: Possesses a rapid growth rate that will allow it to displace native vegetation and form monoculture stands in only a few growing seasons. Since it elongates from shoots initiated in the fall and can suvive overwintering, it begins growth earlier than other native species and will quickly grow to the surface. This will form the large mats that can shade out the later growing native vegetation.
Rationale: Will severely alter the plant community composition be displacing native vegetation by shading it out.
Sources of information: Aquatic Ecosystem Restoration Foundation. Aquatic Plant Management - Best Management Practices in Support of Fish and Wildlife Habitat. 2005 http://aquatics.org/bmp.htm
Question 1.3 Impact on higher trophic levels A Other Pub. Mat'l back
Identify type of impact or alteration: By reducing light, decreasing waterflow, and altering water quality, Eurasian watermilfoil can affect fish, wildlife, and aquatic organism habitat. It is rarely used as a food source by wildlife and can replace vegetation that is used as food for waterfowl, fish, and insects. Dense stands may also cause stagnant water that can proide breeding ground for mosquitoes. Dense mats can affect larger fish and their food sources, resulting in only smaller sized fish. Growth and decomposition of dense stands can also lower levels of oxygen which may result in fish kills.
Rationale: Reduced plant diversity and dense stands of Eurasian watermilfoil can result in reduced water quality and food needed by higher trophic levels, resulting in decreased habitat and increasing the chances of a fish kill.

Sources of information:

Aquatic Ecosystem Restoration Foundation. Aquatic Plant Management - Best Management Practices in Support of Fish and Wildlife Habitat. 2005 http://aquatics.org/bmp.htm

Question 1.4 Impact on genetic integrity B Rev'd, Sci. Pub'n back

Identify impacts: There are two other Myriophyllum species that are native to Colorado: Myriophyllum sibiricum Kom. and Myriophyllum vertilillatum L.. Although the main method of reproduction for Eurasian watermilfoil is vegetative fragments, reproduction by seed does occur. There hare been confirmed hybrides between Eurasian watermilfoil and Myriophyllum sibiricum Kom.. Although they do occur, there has been no evidence that hybrids act in a more invasive manner than the native species for these Myriophyllum hybrids.

Rationale: Hybrids are possible and may only be a moderate threat at this time since there is no confirmed evidence that hybrid Myriophyllum species exhibit hybrid vigor.

Sources of information:

Moody, M.L., Les, D.H.. 2007. Geographic distribution and genotypic composition of invasive hybrid waterilfoil (Myriophyllum spicatum x M. sibiricum) populations in North America. Biological Invasions. 9:559-570.

USDA Plant Database. Myriophyllum L.. http://plants.usda.gov.

Question 2.1 Role of anthropogenic and natural disturbance in establishment A Observational back

Describe role of disturbance: Can grow in areas with disturbance, but the ability of this speceis to establish does not depend on disturbance and can become established in areas with healthy native populations.

Rationale: enter text here

Sources of information:

DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Eurasian watermilfoil.

Vassios, J.. Personal Communication.

Question 2.2 Local rate of spread with no management A Other Pub. Mat'l back

Describe rate of spread: Eurasian watermilfoil can spread very quickly and is able to displace native vegetation in only a few growing seasons. The rate of spread will be even faster in a flowing water situation such as an irrigation canal.

Rationale: Can spread at an extremely fast rate easily doubling in <10 if no management strategies are implemented.

Sources of information:

Aquatic Ecosystem Restoration Foundation. Aquatic Plant Management - Best Management Practices in Support of Fish and Wildlife Habitat. 2005 http://aquatics.org/bmp.htm

Vassios, J.. Personal Communication.

Question 2.3 Recent trend in total area infested within state B Observational back

Describe trend: At this point infestations are not too widespread across Colorado. Has been spreading across Colorado's Front Range infesting ponds, reservoirs and irrigation canals. In addition to the Front Range it can also be found in the San Luis Valley. Presence in flowing waters such as irrigation canals could lead to rapid spread across the state.

Rationale: Infestations are spreading, but no evidence that it is at a rate that will double the range statewide in less than 10 years.

Sources of information:

USGS. Nonindigenous Aquatic Species Database - Myiophyllum spicatum L.. http://nas.er.usgs.gov/taxgroup/plants/docs/my_spica.html

Vassios, J.. Personal Communication.

Question 2.4 Innate reproductive potential A Other Pub. Mat'l back

Describe key reproductive characteristics: Main method of reproduction is through rhizomes, stem fragments, and axillary buds. Fragments can easily be dispersed and fragments with as little as 1 node can form adventitious roots and form a new plant. Seeds are formed by some but not all populations and can survive for at least 7 years under dry conditions. Seeds may be dispersed over long distances when consumed by migrating birds. Although reproduction by seed is possible, seedlings are rarely seen.

Rationale: This species has a high reproductive potential. (8 points)

Sources of information:

DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Eurasian watermilfoil.

Question 2.5 Potential for human-caused dispersal A Other Pub. Mat'l back

Identify dispersal mechanisms: One possible route of introduction into the United States was near Maryland around 1942 for the aquarium trade. Myriophyllum species are still sold in many areas for use in aquariums and as ornamentals. Use of boats and other watercraft can increase fragmenting and can contribute to long-distance transport. Fragments can easily be moved attached to boating equipment and can be a source for long distance dispersal.

Rationale: Easy reproduction through fragments and commercial availability contribute to the high potential for human-caused dispersal.

Sources of information:

DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Eurasian watermilfoil.

Aquatic Ecosystem Restoration Foundation. Aquatic Plant Management - Best Management Practices in Support of Fish and Wildlife Habitat. 2005 http://aquatics.org/bmp.htm

Vassios, J.. Personal Communication.

Question 2.6 Potential for natural long-distance dispersal B Other Pub. Mat'l back

Identify dispersal mechanisms: Can be consumed and transported long distance by migrating birds. Flowing water and fragments attached to wildlife may also aid in long-distance dispersal of plant fragments.

Rationale: May be transported by wildlife or waterflow. Since seed production does not always occur, the risk of dispersal by migrating birds is likely less common.

Sources of information:

DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Eurasian watermilfoil.

Question 2.7 Other regions invaded B Observational back

Identify other regions: Eurasian watermilfoil is known to exist in 45 states and several provinces in Canada. It has a widespread distribution in North America and can adapt to a wide range of environmental conditions. It is capable of infesting lakes, ponds, canals, rivers, streams and most other freshwater systems.

Rationale: Currently invades ponds, lakes, reservoirs, and canals. (2 Ecological types)

Sources of information:

Vassios, J.. Personal Communication.

Question 3.1 Ecological amplitude/Range C Observational back

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Can infest aquatic environments including lakes, ponds, reservoirs, rivers, streams and canals. Has been present in the state for at least 25 years, with early infestations starting in the San Luis Valley.

Rationale: Distribution limited to one major type and 2 minor types.

Sources of information:

Vassios, J.. Personal Communication.

Beck, K.G.. Personal Communication.

Question 3.2 Distribution/Peak frequency D Observational back

Describe distribution: Present but estimated to be less than 5% of aquatic environments.

Rationale: Present but <5%.
Sources of information: Vassios, J.. Personal Communication.
Question 4.1 Poisonous to Livestock U No Information back
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
Question 4.2 Detrimental to Economic Crops U No Information back
Describe impacts to all aspects of cropping systems (see guidelines): enter text here
Rationale: enter text here
Sources of information: enter text here
Question 4.3 Detrimental to Mgmt of Agricultural System, Rangeland and Pasture B Other Pub. Mat'l back
Describe impacts to water diversion systems, increased water use, reduced forage for livestock: Can cause blockages that can impact irrigation water delivery and clog irrigation equipment.
Rationale: enter text here
Sources of information: State of Washington Dept. of Ecology. Non-native Invasive Freshwater Plants - Myriophyllum Spicatum (Eurasian watermilfoil). http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua004.html.
Question 4.4 Human Health Impacts B Other Pub. Mat'l back
Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: Can interfere with recreational activities, create mosquito habitat, and displace native vegetation, which in turn may impact the value of property.
Rationale: Moderate impact - 3 points.

Sources of information: DiTomaso, J. and E. Healy. Aquatic and Riparian Weeds of the West. Eurasian watermilfoil.

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.	**Yes: 1 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	**Yes: 2 pts**
Viable seed produced with *both* 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**
	8 pts **Total Unknowns**
	A (6+ pts)

Note any related traits: enter text here

Worksheet B - Colorado Ecological Types and Land Use

back

Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
Freshwater and Aquatic Systems	lakes, ponds, reservoirs	**D. present**
	rivers, streams, canals	**D. present**
Riparian and wetlands	Riparian forest	**score**
	Riparian shrublands	**score**
	Wet meadows	**score**
Grasslands	Shortgrass prairie	**score**
	Tallgrass prairie	**score**
	Sandsage prairie	**score**
	Montane meadows	**score**
Irrigated Agriculture	Hay meadows	**score**
	Irrigated crops (alfalfa, corn, sugar beets)	**score**
Dryland Agriculture	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	**score**
Developed Lands	Urban, exurban, industrial	**score**
Arid Shrublands	Sagebrush shrublands	**score**
	Foothills shrublands	**score**
	Gambel oak shrublands	**score**
Woodlands	Pinyon - juniper	**score**
	Ponderosa pine	**score**
	Limber pine	**score**
Forest	Lodgepole pine	**score**
	Spruce-fir	**score**
Alpine	Boulder and rock fields	**score**
	Dwarf shrublands	**score**
	Tundra	**score**
Barrens (lower elevation)	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	**No: 0 pt**
Property values are decreased due to increased risk of fire	**No: 0 pts**
Decreased property value due to moderate to heavy infestations	**Yes: 2 pts**
Decreased land value for recreational use; boating, fishing, camping, etc.	**Yes: 1 pt**
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	**Unknown: 0 pts**
3 pts	**1 unknown**
B (3 pts)	

Note any related traits: enter text here