

WEED RISK ASSESSMENT FORM

Botanical name: *Myriophyllum spicatum* L.
 Common name: Eurasian watermilfoil, myriophylle en epi, spike watermilfoil
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Outcome score:

A. Climatic Comparison		
This species is present or may potentially establish in the following eco-geographic regions:		
1	South Coastal	Yes
2	Interior-Boreal	Yes
3	Arctic-Alpine	Yes
This species is unlikely to establish in any region in Alaska		

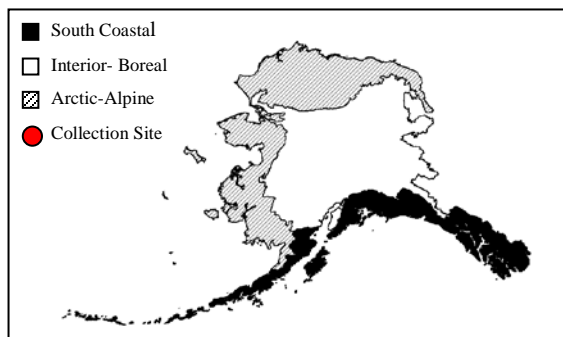
B. Invasiveness Ranking	Total (Total Answered*)	Total
	Possible	
1	Ecological impact	40 (40) 38
2	Biological characteristic and dispersal ability	25 (22) 20
3	Ecological amplitude and distribution	25 (25) 20
4	Feasibility of control	10 (10) 9
	Outcome score	100 (97) ^b 87
	Relative maximum score†	0.90

* For questions answered "unknown" do not include point value for the question in parentheses for "Total Answered Points Possible."
 † Calculated as ^a/_b.

SPECIAL NOTE: This taxonomy and identification of Eurasian watermilfoil is problematic. It is often synonymized with *M. sibiricum* Komarov, which is native to Alaska (ITIS Database 2004). Therefore based on information in Hultén (1968) and the UAM database, it is not possible to distinguish between native and introduced forms. Here, we are forced to treat Eurasian watermilfoil broadly, such that numerous native populations are likely included in the "known" distribution of the species. A concerted taxonomic effort is required to disentangle the native taxa from the introduced taxon.

A. CLIMATIC COMPARISON:

1.1 Has this species ever been collected or documented in Alaska?	
	Yes – continue to 1.2
No	No – continue to 2.1
1.2. Which eco-geographic region has it been collected or documented (see inset map)? <i>Proceed to Section B. Invasiveness Ranking.</i>	
	South Coastal
	Interior-Boreal
	Arctic-Alpine



Documentation: *Myriophyllum spicatum* has not been documented in Alaska.

Sources of information:

University of Alaska Museum. University of Alaska Fairbanks. 2003.

<http://hispidamuseum.uaf.edu:8080/home.cfm>

2.1. Is there a 40% or higher similarity (based on CLIMEX climate matching) between climates any where the species currently occurs and

a. Juneau (South Coastal Region)?

Yes – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

b. Fairbanks (Interior-Boreal)?

Yes – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

c. Nome (Arctic-Alpine)?

Yes – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

– If “No” is answered for all regions, reject species from consideration

Documentation The CLIMEX climate matching program indicates a climatic similarity between south coastal region of Alaska and areas of documented species’ occurrence is high. The native range of Eurasian watermilfoil includes Kazan, Vologda, and Kiriv, Russia (Gubanov et al. 2003), which have 72%, 72% and 69% of climate similarity with Anchorage, and 59%, 56% and 60% of climatic matches with Fairbanks, Alaska (CLIMEX 1999). The range of distribution includes also Kristiansand and Stavanger, Norway (Lid and Lid 1995), which have 60% and 52% of climate matching with Juneau, Alaska. Further, aquatic species are generally less impacted by variation in terrestrial climates. *Myriophyllum spicatum* is therefore likely to become established in the South Coastal and Interior Boreal Regions of Alaska.

Sources of information:

CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.

Gubanov IA, Kiseleva KV, Novikov VS, Tihomirov VN. An Illustrated identification book of the plants of Middle Russia, Vol. 2: Angiosperms (dicots: archichlamydeans). Moscow: Institute of Technological Researches; 2003. 666 p.

Lid, J. and D. T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes

- | | | |
|----|---|----|
| A. | No perceivable impact on ecosystem processes | 0 |
| B. | Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) | 3 |
| C. | Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl) | 7 |
| D. | Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology; hydrology; or affects fire frequency, altering community composition; species fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species) | 10 |
| U. | Unknown | |

Score

8

Documentation:

Identify ecosystem processes impacted:

Dense Eurasian watermilfoil mats alter water quality by raising pH, decreasing dissolved oxygen under the mats, and increasing temperature. The dense mats of vegetation can increase the sedimentation rate by trapping sediments (Jacono and

Richerson 2003, Washington State Department of Ecology 2003).

Rational:

Sources of information:

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Washington State Department of Ecology: Water Quality Home. 2003. Non-Native Freshwater Plants. Eurasian Watermilfoil. <http://www.ecy.wa.gov/programs/wq/plants/weeds>.

1.2. Impact on Natural Community Structure

- A. No perceived impact; establishes in an existing layer without influencing its structure 0
- B. Influences structure in one layer (e.g., changes the density of one layer) 3
- C. Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer) 7
- D. Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) 10
- U. Unknown

Score

10

Documentation:

Identify type of impact or alteration:

Eurasian watermilfoil forms dense floating mats of vegetation, preventing light penetration for native aquatic plants (Jacono and Richerson 2003, Remaley 1998, Washington State Department of Ecology 2003).

Rational:

Sources of information:

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

Washington State Department of Ecology: Water Quality Home. 2003. Non-Native Freshwater Plants. Eurasian Watermilfoil. <http://www.ecy.wa.gov/programs/wq/plants/weeds>

1.3. Impact on Natural Community Composition

- A. No perceived impact; causes no apparent change in native populations 0
- B. Influences community composition (e.g., reduces the number of individuals in one or more native species in the community) 3
- C. Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) 7
- D. Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community) 10
- U. Unknown

Score

10

Documentation:

Identify type of impact or alteration:

This aquatic plant is able to displace and reduce natural diversity (Bossard 2004, Jacono and Richerson 2003, Washington State Department of Ecology 2003).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.
Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants.

Myriophyllum spicatum L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.
 Washington State Department of Ecology: Water Quality Home. 2003. Non-Native Freshwater Plants. Eurasian Watermilfoil. <http://www.ecy.wa.gov/programs/wq/plants/weeds>.

1.4. Impact on higher trophic levels (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades)

- A. Negligible perceived impact 0
- B. Minor alteration 3
- C. Moderate alteration (minor reduction in nesting/foraging sites, reduction in habitat connectivity, interference with native pollinators, injurious components such as spines, toxins) 7
- D. Severe alteration of higher trophic populations (extirpation or endangerment of an existing native species/population, or significant reduction in nesting or foraging sites) 10
- U. Unknown

Score

10

Documentation:

Identify type of impact or alteration:

Monospecific stands of Eurasian watermilfoil provide poor habitat for waterfowl, fish, and other wildlife (Jacono and Richerson 2003). Loss of nutrient-rich native plants reduces food sources for waterfowl; it impacts fish spawning; and it disrupts predator-prey relationships by fencing out larger fish. Stagnant water created by Eurasian watermilfoil mats provides good breeding grounds for mosquitoes (Bossard 2004).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Total Possible

40

Total

38

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode of reproduction

- A. Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction) 0
- B. Somewhat aggressive (reproduces only by seeds (11-1,000/m²)) 1
- C. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m²) 2
- D. Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m²) 3
- U. Unknown

Score

3

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Reproduction is by seeds, rhizomes, fragmentation, and winter buds. Young population of Eurasian watermilfoil averaged a seed set of 112 seeds per stalk. Despite the high seed production, it is propagated predominantly by vegetative fragments (Aiken 1981, Bossard 2004, Remaley 1998, Washington State Department of Ecology 2003).

Rational:

Sources of information:

Aiken, S.B. 1981. A conspectus of *Myriophyllum* (Haloragaceae) in North America. *Brittonia* 33 (1):57-69.

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

Washington State Department of Ecology: Water Quality Home. 2003. Non-Native Freshwater Plants. Eurasian Watermilfoil. <http://www.ecy.wa.gov/programs/wq/plants/weeds>

2.2. Innate potential for long-distance dispersal (bird dispersal, sticks to animal hair, buoyant fruits, wind-dispersal)

- A. Does not occur (no long-distance dispersal mechanisms) 0
- B. Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations) 2
- C. Numerous opportunities for long-distance dispersal (species has adaptations such as pappus, hooked fruit-coats, etc.) 3
- U. Unknown

Score

3

Documentation:

Identify dispersal mechanisms:

Fragments can be spread by floating downstream, waterfowl and other wildlife. Fruits are buoyant for short period and can be dispersed by water (Bossard 2004).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contamination, etc.)

- A. Does not occur 0
- B. Low (human dispersal is infrequent or inefficient) 1
- C. Moderate (human dispersal occurs) 2
- D. High (there are numerous opportunities for dispersal to new areas) 3
- U. Unknown

Score

3

Documentation:

Identify dispersal mechanisms:

It is spread from lake to lake on boat trailers or fishing gear. A number of populations found in Oklahoma were introduced by earthworm farmers who packed their product in Eurasian watermilfoil (Jacono and Richerson 2003, Washington State Department of Ecology 2003). It is very likely to be moved by float planes and small boat used in Alaska.

Rational:

Sources of information:

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Washington State Department of Ecology: Water Quality Home. 2003. Non-Native Freshwater Plants. Eurasian Watermilfoil. <http://www.ecy.wa.gov/programs/wq/plants/weeds>

2.4. Allelopathic

- A. No 0
- B. Yes 2

U. Unknown

Score 0

Documentation:

Describe effect on adjacent plants:

None.

Rational:

Sources of information:

No records about allelopathy potential.

2.5. Competitive ability

- A. Poor competitor for limiting factors 0
- B. Moderately competitive for limiting factors 1
- C. Highly competitive for limiting factors and/or nitrogen fixing ability 3
- U. Unknown

Score 3

Documentation:

Evidence of competitive ability:

Eurasian water-milfoil competes aggressively with native aquatic plants (Bossard 2004, Jacono and Richerson 2003).

Rational:

Eurasian watermilfoil is an extremely adaptable plant, able to tolerate and even thrive in a variety of environmental conditions. It grows in still to flowing waters, survives under ice, tolerates pH from 5.4 to 11, and can grow over a broad temperature range. This plant begins spring growth earlier than other aquatic plants, quickly grows to the surface and forming dense canopies (Jacono and Richerson 2003).

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation

- A. No 0
- B. Forms dense thickets 1
- C. Has climbing or smothering growth habit, or otherwise taller than the surrounding vegetation 2
- U. Unknown

Score 2

Documentation:

Describe grow form:

This aquatic plant forms large, dense canopy of vegetation (Jacono and Richerson 2003, Remaley 1998).

Rational:

Sources of information:

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

2.7. Germination requirements

- A. Requires open soil and disturbance to germinate 0
- B. Can germinate in vegetated areas but in a narrow range or in special conditions 2

- C. Can germinate in existing vegetation in a wide range of conditions 3
- U. Unknown

Score

N/A

Documentation:

Describe germination requirements:

Germination of seed is not a significant factor in reproduction. (Remaley 1998, Washington State Department of Ecology 2003).

Rational:

Sources of information:

Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

Washington State Department of Ecology: Water Quality Home. 2003. Non-Native Freshwater Plants. Eurasian Watermilfoil. <http://www.ecy.wa.gov/programs/wq/plants/weeds>

2.8. Other species in the genus invasive in Alaska or elsewhere

- A. No 0
- B. Yes 3
- U. Unknown

Score

3

Documentation:

Species:

Myriophyllum aquaticum (Vell.) Verdc. (Anderson and Spencer 1999, Royer and Dickinson 1999, USDA 2002).

Sources of information:

DiTomaso, J.M. and E.A. Healy. 2003. Aquatic and riparian weeds of the West. California: University of California, Agriculture and Natural Resources; pp. 314-328.

Royer, F. and R., Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

2.9. Aquatic, wetland, or riparian species

- A. Not invasive in wetland communities 0
- B. Invasive in riparian communities 1
- C. Invasive in wetland communities 3
- U. Unknown

Score

3

Documentation:

Describe type of habitat:

Typical habitat for Eurasian watermilfoil includes fresh to brackish water of fish ponds, lakes, slow-moving streams, reservoirs, estuaries, and canals (Bossard 2004, Jacono and Richerson 2003).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>

Total Possible

22

Total

20

3. DISTRIBUTION

3.1. Is the species highly domesticated or a weed of agriculture

- A. No 0
- B. Is occasionally an agricultural pest 2
- C. Has been grown deliberately, bred, or is known as a significant agricultural pest 4
- U. Unknown

Score 1

Documentation:

Identify reason for selection, or evidence of weedy history:

Myriophyllum spicatum is not an agricultural weed. It likely has been used in aquatic gardens and aquariums (Bossard 2004).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

3.2. Known level of impact in natural areas

- A. Not known to cause impact in any other natural area 0
- B. Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska 1
- C. Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska 3
- D. Known to cause moderate impact in natural areas in similar habitat and climate zones 4
- E. Known to cause high impact in natural areas in similar habitat and climate zones 6
- U. Unknown

Score 6

Documentation:

Identify type of habitat and states or provinces where it occurs:

Myriophyllum spicatum is abundant, aggressive, and causing high impacts in streams, ponds, and lakes of Massachusetts, Connecticut, California, Minnesota, Virginia, Washington, and many other states (Anderson and Spenser 1999, Bossard 2004, Jacono and Richerson 2003, Remaley 1998, Welling 2004).

Sources of information:

Anderson, L.W.J. and D.F. Spencer. 1999. Foiling watermilfoil. *Agricultural Research*, 47 (3): 16-17.

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants.

Myriophyllum spicatum L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

Welling, C. 2004. Eurasian watermilfoil management program. Minnesota Department of Natural Resources. Available: <http://www.dnr.state.mn.us/index.html> [Feb 18, 2004].

3.3. Role of anthropogenic and natural disturbance in establishment

- A. Requires anthropogenic disturbances to establish 0
- B. May occasionally establish in undisturbed areas but can readily establish in areas with natural disturbances 3
- C. Can establish independent of any known natural or anthropogenic disturbances 5
- U. Unknown

Score 3

Documentation:

Identify type of disturbance:

The plant thrives in areas that have been subjected to various kinds of natural and manmade disturbance (Jacono and Richerson 2003, Remaley 1998, Welling 2004). It is particularly troublesome in waterbodies with nutrient loading, intense plant management, and abundant motorboat use. Motorboat traffic contributes to natural seasonal fragmentation and the distribution of fragments throughout lakes (Jacono and Richerson 2003).

Rational:

Sources of information:

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.
Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

3.4. Current global distribution

- | | | |
|----|--|---|
| A. | Occurs in one or two continents or regions (e.g., Mediterranean region) | 0 |
| B. | Extends over three or more continents | 3 |
| C. | Extends over three or more continents, including successful introductions in arctic or subarctic regions | 5 |
| U. | Unknown | |

Score

5

Documentation:

Describe distribution:

Eurasian watermilfoil is native to Europe, Asia, and northern Africa. It occurs naturalized now in North and South America, South Africa, and Greenland (USDA, ARS 2006).

Rational:

Sources of information:

Aiken, S.G., Newroth, P.R. and I. Wile. 1979. The biology of Canadian weeds. 34. *Myriophyllum spicatum* L. Canadian Journal of Plant Science 59: 201-215.
Reed, C.F. 1977. History and distribution of Eurasian watermilfoil in United States and Canada. Phytologia 36: 417-436.
USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?400094> (07 November 2006).

3.5. Extent of the species U.S. range and/or occurrence of formal state or provincial listing

- | | | |
|----|--|---|
| A. | 0-5% of the states | 0 |
| B. | 6-20% of the states | 2 |
| C. | 21-50%, and/or state listed as a problem weed (e.g., "Noxious," or "Invasive") in 1 state or Canadian province | 4 |
| D. | Greater than 50%, and/or identified as "Noxious" in 2 or more states or Canadian provinces | 5 |
| U. | Unknown | |

Score

5

Documentation:

Identify states invaded:

It had been found in 33 states of the United States, and the Canadian provinces of British Columbia, Ontario, and Quebec (Jacono and Richerson 2004, USDA 2002). *Myriophyllum spicatum* is declared noxious in 12 states of the United States and 1 Canadian province (Invaders Database System 2003).

Rational:

Sources of information:

Jacono, C.C. and M.M. Richerson. 2003. Nonindigenous Aquatic Plants. *Myriophyllum spicatum* L. U.S. Department of the Interior. Geological Survey. Biological Resources Division. Center for Aquatic Resource Studies. <http://nas.er.usgs.gov>.

Rice, P.M. 2006. INVADERS Database System (<http://invader.dbs.umt.edu>). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Total Possible	25
Total	20

4. FEASIBILITY OF CONTROL

4.1. Seed banks

- A. Seeds remain viable in the soil for less than 3 years 0
- B. Seeds remain viable in the soil for between 3 and 5 years 2
- C. Seeds remain viable in the soil for 5 years and more 3
- U. Unknown

Score

2

Documentation:

Identify longevity of seed bank:

Eurasian watermilfoil produces long-viable, often dormant seeds. Despite the high seed production, it is thought that germination of seed is not a significant factor in reproduction (Bossard 2004, Remaley 1998).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Remaley, T. 1998. Eurasian watermilfoil *Myriophyllum spicatum* L. Plant Conservation Alliance, Bureau of Land Management. Available: <http://www.nps.gov/plants/index.htm> [Feb 18, 2004].

4.2. Vegetative regeneration

- A. No resprouting following removal of aboveground growth 0
- B. Resprouting from ground-level meristems 1
- C. Resprouting from extensive underground system 2
- D. Any plant part is a viable propagule 3
- U. Unknown

Score

3

Documentation:

Describe vegetative response:

New plants develop from fragments former plants (Bossard 2004).

Rational:

Sources of information:

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

4.3. Level of effort required

- A. Management is not required (e.g., species does not persist without repeated anthropogenic disturbance) 0
- B. Management is relatively easy and inexpensive; requires a minor investment in human and financial resources 2
- C. Management requires a major short-term investment of human and financial resources, or a moderate long-term investment 3

- D. Management requires a major, long-term investment of human and financial resources 4
 U. Unknown

Score

4

Documentation:

Identify types of control methods and time-term required:

Once milfoil becomes well-established within a waterbody, it is difficult or impossible to remove. In smaller waterbodies, there is some limited success using an aquatic herbicide. Other control methods include: harvesting, rotovation, installation of bottom barriers, diver hand pulling (Anderson and Spenser 1999, Bossard 2004, Welling 2004).

Rational:

Sources of information:

Anderson, L.W.J. and D.F. Spenser. 1999. Foiling watermilfoil. *Agricultural Research*, 47 (3): 16-17.

Bossard, C. 2004. *Myriophyllum spicatum*. In: Cal-IPC - California Invasive Plant Council. Available: <http://groups.ucanr.org/ceppc/> Berkeley, California.

Welling, C. 2004. Eurasian watermilfoil management program. Minnesota Department of Natural Resources. Available: <http://www.dnr.state.mn.us/index.html> [Feb 18, 2004].

Total Possible

10

Total

9

Total for 4 sections Possible

97

Total for 4 sections

87

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