WEED RISK ASSESSMENT FORM

Botanical name: *Lepidium latifolium* L.

Common name: perennial pepperweed, tall whitetop

Assessors:

Irina Lapina
Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2710; fax (907) 257-2789

Matthew L. Carlson, Ph.D.
Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2790; fax (907) 257-2789

Reviewers:

Michael Shephard
Vegetation Ecologist Forest Health Protection State & Private Forestry 3301 C Street, Suite 202, Anchorage, AK 99503 (907) 743-9454; fax 907 743-9479

Jeff Conn, Ph.D.
Weed Scientist, USDA Agricultural Research Service
PO Box 757200 Fairbanks, Alaska 99775
tel: (907) 474-7652; fax (907) 474-6184

Roseann Densmore, Ph.D.
Research Ecologist, US Geological Survey, Alaska Biological Science Center, 1101 East Tudor Road Anchorage, AK 99503
tel: (907) 786-3916, fax (907) 786-3636

Julie Riley
Horticulture Agent, UAF Cooperative Extension Service
2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143
tel: (907) 786-6306

Jamie M. Snyder
UAF Cooperative Extension Service
2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143
tel: (907) 786-6310 alt.tel: (907) 743-9448

Jeff Heys
Exotic Plant Management Program Coordinator, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501 tel: (907)644-3451, fax: 644-3809

Outcome score:

A.	**Climatic Comparison**		
	This species is present or may potentially establish in the following eco-geographic regions:		
1	South Coastal		No
2	Interior-Boreal	Yes	
3	Arctic-Alpine	Yes	

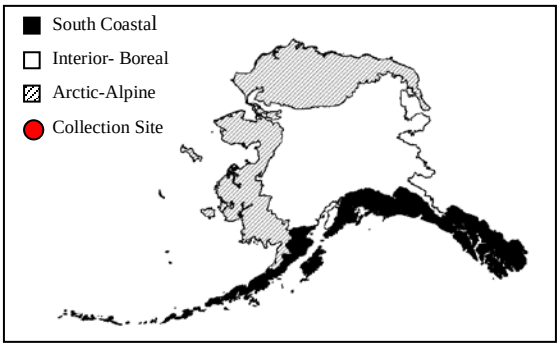
B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	28
2	Biological characteristic and dispersal ability	25 (22)	17
3	Ecological amplitude and distribution	25 (25)	16
4	Feasibility of control	10 (7)	6
	Outcome score	100 (93)[b]	67 [a]
	Relative maximum score†		0.72

* For questions answered "unknown" do not include point value for the question in parentheses for "Total Answered Points Possible."

† Calculated as $^{a}/_{b}$.

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)? *Proceed to Section B. Invasiveness Ranking.*
	South Coastal
	Interior-Boreal
	Arctic-Alpine



Documentation: *Lepidium latifolium* has not been documented in Alaska (AK Weed Database 2004, Hultén 1968, UAM 2004, Welsh 1974).
Sources of information:
AK Weeds Database. 2004. Database of exotic vegetation collected in Alaska. University of Alaska, Alaska Natural Heritage Program – US Forest Service – National Park Service Database. Available: http://akweeds.uaa.alaska.edu/
Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.
University of Alaska Museum. University of Alaska Fairbanks. 2004. http://hispida.museum.uaf.edu:8080/home.cfm
Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

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: Native range of *Lepidium latifolium* includes south western Russia and western Siberia (Gubanov et al 2003). The CLIMEX matching program shows that climatic similarity between Alaska and areas where the species is documented is high. Kazan, Penza, and Gorkiy, Russia have 72%, 68%, and 67% overlap of climate similarity with Anchorage, and 59%, 53%, and 53% with Fairbanks, respectively. Nome has 58%, 56%, and 57% climatic similarity with Kazan, Penza, and Gorkiy, respectively. Climatic similarity between Juneau and areas where the species is documented is low. This suggests that establishment of perennial pepperweed may be possible in the Interior-Boreal and Arctic-Alpine ecogeographic region 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.

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 7

Documentation:

Identify ecosystem processes impacted:
Perennial pepperweed may retard natural succession on previously disturbed areas. Perennial pepperweed roots fragment easily, allowing soil erosion to occur more frequently in infested areas (Renz 2000). This plant also takes salt ions from deep in the soil profile, and transports them near the soil surface, drastically increasing soil salinity (Blank and Young 2002, Blank and Young 2004).
Rational:

Sources of information:
Blank, R.R. and J.A. Young. 2002. Influence of the exotic invasive crucifer, *Lepidium latifolium*, on soil properties and elemental cycling. Soil Science 167(12): 821-829.
Blank, R.R. and J.A. Young. 2004. Influence of three weed species on soil nutrient dynamics. Soil Science 169(5): 385-397.
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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 7

Documentation:
Identify type of impact or alteration:
Perennial pepperweed creates a large monospecific layer and displaces native plants (Corliss 1993, Renz 2000).
Rational:

Sources of information:
Corliss, J. 1993. Tall whitetop's crowding out the natives. Agricultural Research 41: 5.
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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 7

Documentation:
Identify type of impact or alteration:
Perennial pepperweed can displace native plant and animal species. It particularly interferes with regeneration of riparian plant species such as willows and cottonwoods (Young et al. 1995). Stands of perennial pepperweed increase soil salinity; this favors halophytes and reduces other species, thereby shifting plant composition and diversity (Renz 2000).
Rational:
Perennial pepperweed creates a litter layer that prevents the emergence and establishment of annual native plants (Renz 2000).
Sources of information:

Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].
Young, J.A., C.E. Turner, and L.F. James. 1995. Perennial pepperweed. Rangelands 17: 121-123.

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 7

Documentation:
Identify type of impact or alteration:
Perennial pepperweed degrades nesting and foraging sites for waterfowl by outcompeting grasses. It also prevents willow and cottonwood regeneration, altering riparian species' habitats (Howald 2000).
Rational:

Sources of information:
Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.

Total Possible 40
Total 28

---

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/m^2)	1
C.	Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m^2)	2
D.	Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m^2)	3
U.	Unknown	

Score 3

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Perennial pepperweed reproduces by seed or vegetatively from an intact root system or from pieces of the underground stems. The plant is capable of producing thousands of seeds annually (Howald 2000, Renz 2000).
Rational:

Sources of information:
Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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 2

Documentation:
Identify dispersal mechanisms:
The seeds have no adaptations for long-distance dispersal; however, they are capable of being transported by wind, water, and possibly by waterfowl (Howald 2000). Root fragments can be transported in streams and establish new populations (Renz 2000).
Rational:

Sources of information:
Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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 2

Documentation:
Identify dispersal mechanisms:
It was likely introduced to North America as a contaminant of sugar beet seed. Recent infestations in California are due to seed or plant fragments contaminating rice straw bales (Howald 2000).
Rational:

Sources of information:
Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.

2.4. Allelopathic

A. No 0
B. Yes 2
U. Unknown

Score 0

Documentation:
Describe effect on adjacent plants:
Allelopathic potential has not been recorded.
Rational:

Sources of information:

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:
Infestations of perennial pepperweed are extremely competitive and very few plant species can establish within these stands (Renz 2000).
Rational:
Extensive creeping root system enhances the competitiveness of perennial pepperweed for water and nutrients. Allocation of carbohydrate reserves to below-ground organs is important for rapid shoot development in the spring (Renz 2000).
Sources of information:
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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 1

Documentation:
Describe grow form:
Perennial pepperweed creates large monospecific stands that can grow to over 3 feet in height (Corliss 1993, Douglas et al. 1998, Renz 2000, Whitson et al. 2000).
Rational:

Sources of information:
Corliss, J. 1993. Tall whitetop's crowding out the natives. Agricultural Research 41: 5.
Douglas, G.W., G.B. Straley, D. Meidinger, and J. Pojar. 1998. Illustrated flora of British Columbia. Volume 2. Dicotyledons (Balsaminaceae through Cuscutaceae). British Columbia: Ministry of Environment, Lands and Parks, Ministry of Forests. p. 336-342.
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].
Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 2000. Weeds of the West. The Western Society of Weed Science in cooperation with the Western United States Land Grant Universities, Cooperative Extension Services. University of Wyoming. Laramie, Wyoming. 630 pp.

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 U

Documentation:
Describe germination requirements:
The seeds rapidly germinate in laboratory conditions, but few seedlings are observed in the field. Reasons for this are unknown. Population is mostly maintained by vegetative growth from root segments (Renz 2000).
Rational:

Sources of information:

Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 3

Documentation:

Species:

Lepidium campestre (L.) Ait.f., *L. densiflorum* Schrad., *L. perfoliatum* L., *L. ruderale* L. (Royer and Dickinson 1999, USDA 2002).

Sources of information:

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:

This species can invade a wide range of habitats including riparian areas, wetlands, marshes, estuaries, irrigation channels, and floodplains, as well as meadows, crop fields, roadsides, and rangelands (Renz 2000).

Rational:

Sources of information:

Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

Total Possible 22

Total 17

---

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 2

Documentation:

Identify reason for selection, or evidence of weedy history:

Perennial pepperweed is primarily a weed of rangeland, pastures, and hay meadows. It can occasionally invade cropland (Whitson et al. 2000).

Rational:

Sources of information:

Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 2000. Weeds of the West. The Western Society of Weed Science in cooperation with the Western United States Land Grant Universities,

Cooperative Extension Services. University of Wyoming. Laramie, Wyoming. 630 pp.

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 1

Documentation:

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

Perennial pepperweed invades brackish to saline wetlands and native hay meadows throughout California. It is well established in marshes of the San Francisco Bay (Howald 2000).

Sources of information:

Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.

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 5

Documentation:

Identify type of disturbance:

Perennial pepperweed can established on disturbed areas and may disperse into minimally managed or undisturbed habitats. This plant is known to establish in areas with no natural or anthropogenic disturbances (Howald 2000).

Rational:

Sources of information:

Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.

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 3

Documentation:

Describe distribution:

Perennial pepperweed is native to southeastern Europe and southwestern Asia. It is naturalized throughout Europe, North America, and Australia (Renz 2000).

Rational:

Sources of information:

Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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:
Perennial pepperweed is found in all western states. It is reported from three Canadian provinces. *Lepidium latifolium* is declared a noxious weed in 13 American states, including Alaska (Alaska Administrative Code 1987, Invaders Database System 2003, USDA 2002).
Rational:

Sources of information:
Alaska Administrative Code. Title 11, Chapter 34. 1987. Alaska Department of Natural Resources. Division of Agriculture.
Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/
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 16

---

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 U

Documentation:
Identify longevity of seed bank:
Seeds lack a hard coat and do not seem to be capable of surviving long periods in the soil, thus seed viability is likely to be short (Renz 2000).
Rational:

Sources of information:
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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 2

Documentation:
Describe vegetative response:

Perennial roots can remain dormant in the soil for several years. New plants readily grow from pieces of rootstock less than one inch long (Wotring et al. 1997 cited in Howald 2000).
Rational:

Sources of information:
Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.

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 established, perennial pepperweed can be very difficult to remove. Mechanical methods are unlikely to control perennial pepperweed because new plants quickly regenerate from pieces of rootstock. Chemical methods have been used successfully; however, most effective herbicides cannot be applied near or over water. No biological control agents have been introduced to control perennial pepperweed due to several important cultivated crops within this family (canola, mustard, cabbage, and kale), and several threatened and endangered native species of *Lepidium* in the United States. Old stems and litter take several years to degrade, and it may be necessary to remove the litter, which prevents germination and establishment of desirable plant species. If soil salinities are dramatically increased, an intensive soil remediation program may be necessary before native species can reestablish. Areas must be monitored since it can recover from dormant root fragments (Howald 2000, Renz 2000).
Rational:

Sources of information:
Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.
Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

Total Possible 7
Total 6

Total for 4 sections Possible 93
Total for 4 sections 67

References:

AK Weeds Database. 2004. Database of exotic vegetation collected in Alaska. University of Alaska, Alaska Natural Heritage Program – US Forest Service – National Park Service Database. Available: http://akweeds.uaa.alaska.edu/

Alaska Administrative Code. Title 11, Chapter 34. 1987. Alaska Department of Natural Resources. Division of Agriculture.

Blank, R.R. and J.A. Young. 2002. Influence of the exotic invasive crucifer, *Lepidium latifolium*,0 on soil properties and elemental cycling. Soil Science 167(12): 821-829.

Blank, R.R. and J.A. Young. 2004. Influence of three weed species on soil nutrient dynamics. Soil Science 169(5): 385-397.

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

Corliss, J. 1993. Tall whitetop's crowding out the natives. Agricultural Research 41: 5.

Douglas, G.W., G.B. Straley, D. Meidinger, and J. Pojar. 1998. Illustrated flora of British Columbia. Volume 2. Dicotyledons (Balsaminaceae through Cuscutaceae). British Columbia: Ministry of Environment, Lands and Parks, Ministry of Forests. p. 336-342.

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.

Howald, A. 2000. *Lepidium latifolium* L. In: Bossard, C.C., J.M. Randall, M.C. Hoshovsky, editors. Invasive plants of California's wildlands. Berkeley, CA: University of California Press: 222-227.

Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 pp.

Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/

Renz, M.J. 2000. Element stewardship abstract for *Lepidium latifolium* L. perennial pepperweed, tall whitetop. The Nature Conservancy. Arlington, Virginia. Available: http://tncweeds.ucdavis.edu/esadocs/lepilati.html [2005, May 2].

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

University of Alaska Museum. University of Alaska Fairbanks. 2003. http://hispida.museum.uaf.edu:8080/home.cfm

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.

Welsh, S. L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee, R. Parker. 2000. Weeds of the West. The Western Society of Weed Science in cooperation with the Western United States Land Grant Universities, Cooperative Extension Services. University of Wyoming. Laramie, Wyoming. 630 pp.

Young, J.A., C.E. Turner, and L.F. James. 1995. Perennial pepperweed. Rangelands 17: 121-123.