WEED RISK ASSESSMENT FORM

Botanical name: *Fallopia convolvulus* (Linnaeus) Á. Löve *(Polygonum convolvulus* L.)

Common name: black bindweed

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Outcome score:

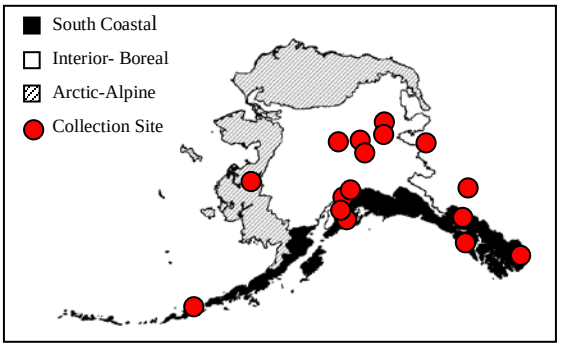
A.	**Climatic Comparison**		
	This species is present or may potentially establish in the following eco-geographic regions:		
1	South Coastal	Yes	
2	Interior-Boreal	Yes	
3	Arctic-Alpine	Yes	

B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	12
2	Biological characteristic and dispersal ability	25 (25)	16
3	Ecological amplitude and distribution	25 (25)	17
4	Feasibility of control	10 (10)	5
	Outcome score	100 (100)[b]	50 [a]
	Relative maximum score†		0.50

* 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	Yes – continue to 1.2
	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.*
Yes	South Coastal
Yes	Interior-Boreal
Yes	Arctic-Alpine



Documentation: *Fallopia convolvulus* has been documented in all ecogeographic regions of Alaska (Weeds of Alaska Database 2005, Hultén 1968, UAM 2004, Welsh 1974).
Sources of information:

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
Weeds of Alaska Database. 2005. 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/
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:
Sources of information:

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 3

Documentation:
Identify ecosystem processes impacted:
Black bindweed quickly covers bare soil (Hume et al. 1983, Rutledge and McLendon 1996). It may prevent native species from establishment.
Rational:

Sources of information:
Hume, L., J. Martinez and K. Best. 1983. The biology of Canadian weeds. 60. *Polygonum convolvulus* L. Canadian Journal of Plant Science 63: 959-971.
Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm (Version 15DEC98).

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 3

Documentation:

Identify type of impact or alteration:

Black bindweed is able to create dense canopy, covering herbaceous plants (Friesen and Shebeski 1960, Royer and Dickinson 1999). However, dense stands of black bindweed have not been observed in native communities in Alaska (J. Conn – pers. obs.).

Rational:

Sources of information:

Conn, J., Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184. – Pers. com.

Friesen, G. and L.H. Shebeski. 1960. Economic losses caused by weed competition in Manitoba grain fields. I. Weed species, their relative abundance and their effect on crop yields. Canadian Journal of Plant Science 40:457-467.

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

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 3

Documentation:

Identify type of impact or alteration:

Black bindweed is a strong competitor (Fabricius and Nalewaja 1968, Friesen and Shebeski 1960, Pavlychenko and Harrington 1934, Welbank 1963) and it likely will reduce the number of individuals in native species community.

Rational:

Sources of information:

Fabricius, L.J. and J.D. Nalewaja. 1968. Competition between wheat and wild buckwheat. Weed Science 16: 204-208.

Friesen, G. and L.H. Shebeski. 1960. Economic losses caused by weed competition in Manitoba grain fields. I. Weed species, their relative abundance and their effect on crop yields. Canadian Journal of Plant Science 40:457-467.

Pavlychenko, T.K. and J.B. Harrington. 1934. Competitive efficiency of weeds and cereal crops. Canadian Journal of Research 10:77-93.

Welbank, P.J. 1963. A comparison of competitive effects of some common weed species. Annals of Applied Biology 51:107-125.

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,	7

toxins)

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 3

Documentation:

Identify type of impact or alteration:

The seeds and leaves of black bindweed is important food for granivorous birds (Wilson et al. 1999). It is also an alternate host for number of fungi, viruses, and nematode species (Cooper and Harrison 1973, Royer and Dickinson 1999, Townshend and Davidson 1962)

Rational:

Sources of information:

Cooper, J.I. and B.D. Harrison. 1973. The role of weed hosts and the distribution and activity of vector nematodes in the ecology of tobacco rattle virus. Annals of Applied Biology 73: 53-66.

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

Townshend, J.L. and T.R. Davidson. 1962. Some weed hosts of the northern root-knot nematode, *Meloidogyne hapla* Chitwood, 1949, in Ontario. Canadian Journal of Botany 40: 543-548.

Wilson, J.D., A.J. Morris, B.E. Arroyo, S.C. Clark and R.B. Bradbury. 1999. A review of the abundance and diversity of invertebrate and plant foods of granivorous birds in northern Europe in relation to agricultural change. Agriculture, Ecosystems and Environment 75: 13-30.

Total Possible 40

Total 12

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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):

Black bindweed is reproducing by seed only. Single plant is capable of producing up to 11,900, and even 30,000 seeds (Stevens 1932, Forsberg and Best 1964).

Rational:

Sources of information:

Forsberg, D.E. and K.F. Best. 1964. The emergence and plant development of wild buckwheat (*Polygonum convolvulus*). Canadian Journal of Plant Science 44: 100-103.

Stevens, O.A. 1932. The number and weight of seeds produced by weeds. American Journal of Botany 19(9): 784-794.

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 1

Documentation:

Identify dispersal mechanisms:

Seeds have no adaptation for long distance dispersal, but apparently they can be transported by water (Hume et al. 1983, Rutledge and McLendon 1996).

Rational:

Sources of information:

Hume, L., J. Martinez and K. Best. 1983. The biology of Canadian weeds. 60. *Polygonum convolvulus* L. Canadian Journal of Plant Science 63: 959-971.

Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm (Version 15DEC98).

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:

Seeds of black bindweed are commonly dispersed by farm machinery. This plant is also a frequent cereal crop contaminant (Gooch 1963, Rutledge and McLendon 1996, J. Conn – pers. obs.). Black bindweed seeds remain viable after rumen digestion and therefore may be transported by animals (Blackshaw and Rode 1991).

Rational:

Sources of information:

Blackshaw, R.E. and L.M. Rode. 1991. Effect of ensiling and rumen digestion by cattle on weed seed viability. Weed Science39: 104-108.

Conn, J., Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184. – Pers. com.

Gooch, S.M.S. 1963. The occurrence of weed seeds in samples tested by the official seed testing station, 1960-1. Journal of the National Institute of Agricultural Botany 9(3): 353-371.

Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm (Version 15DEC98).

2.4. Allelopathic

A. No 0

B. Yes 2

U. Unknown

Score 0

Documentation:

Describe effect on adjacent plants:
Black bindweed is not known to be allelopathic.
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 2

Documentation:

Evidence of competitive ability:
Black bindweed is able to compete with cultivated crops and other weeds for moisture, nutrients, and light (Friesen and Shebeski 1960, Welbank 1963, Fabricius and Nalewaja 1968, Royer and Dickinson 1999).
Rational:
In experimental studies black bindweed appear to be a stronger competitor than *Chenopodium album*, *Polygonum aviculare*, *P. persicaria*, *Stellaria media*, and *Capsella bursa-pastoris* (Pavlychenko and Harrington 1934, Welbank 1963).
Sources of information:
Fabricius, L.J. and J.D. Nalewaja. 1968. Competition between wheat and wild buckwheat. Weed Science 16: 204-208.
Friesen, G. and L.H. Shebeski. 1960. Economic losses caused by weed competition in Manitoba grain fields. I. Weed species, their relative abundance and their effect on crop yields. Canadian Journal of Plant Science 40:457-467.
Pavlychenko, T.K. and J.B. Harrington. 1934. Competitive efficiency of weeds and cereal crops. Canadian Journal of Research 10:77-93.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
Welbank, P.J. 1963. A comparison of competitive effects of some common weed species. Annals of Applied Biology 51:107-125.

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:
Black bindweed climbs and smothers other plants and can form dense thickets (Rutledge and McLendon 1996).
Rational:
A density of 56 to 215 plants per m^2 has been observed in number of studies (Friesen and Shebeski 1960)
Sources of information:
Friesen, G. and L.H. Shebeski. 1960. Economic losses caused by weed competition in Manitoba grain fields. I. Weed species, their relative abundance and their effect on crop yields. Canadian Journal of Plant Science 40:457-467.
Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm (Version 15DEC98).

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 2

Documentation:

Describe germination requirements:

The germination of black bindweed seeds is greater on disturbed sites. The disturbance of soils apparently reactivated the dormant seeds (Milton et al. 1997). However, germination in undisturbed soil was also recorded (Roberts and Feast 1973).

Rational:

Sources of information:

Milton, S.J., W.R.J. Dean and S. Klotz. 1997. Effects of small-scale animal disturbances on plant assemblages of set-aside land in Central Germany. Journal of Vegetation Science 8: 45-54.

Robert, H.A. and P.M. Feast. 1973. Emergence and longevity of seeds of annual weeds in cultivated and undisturbed soil. The Journal of Applied Ecology 10(1): 133-143.

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 3

Documentation:

Species:

Polygonum cuspidatum Sieb. & Zucc., *P. perfoliatum* L., *P. polystachyum* Wallich ex Meisn., *P. sachalinense* F. Schmidt ex Maxim. are declared noxious weeds in number of American states (USDA, NRSC 2006). Also *Polygonum arenastrum* Jord. ex Boreau, *P. caespitosum* Blume, *P. aviculare* L., *P. orientale* L., *P. persicaria* L., and *P. lapathifolium* L. are listed as a weeds in PLANTS Database (USDA, NRSC 2006). A number of *Polygonum* species native to North America have a weedy habit and are listed as noxious weeds in some of the American states. Although the latest taxonomy considers these species as a species of three different genera: *Polygonum*, *Fallopia* and *Persicaria* (FNA 1993+), they are closely related taxa and can be considered as congeneric weeds.

Sources of information:

Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 7+ vols. New York and Oxford.

USDA, NRCS. 2006. *The PLANTS Database*, Version 3.5 (http://plants.usda.gov). Data compiled from various sources by Mark W. Skinner. 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 1

Documentation:

Describe type of habitat:

Black bindweed is a common weed in cultivated fields, gardens, roadsides, and waste grounds. It may be occasionally found on river gravel bars (Hume et al. 1983).

Rational:

Sources of information:

Hume, L., J. Martinez and K. Best. 1983. The biology of Canadian weeds. 60.

Polygonum convolvulus L. Canadian Journal of Plant Science 63: 959-971.

Total Possible	25
Total	16

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 4

Documentation:

Identify reason for selection, or evidence of weedy history:

Black bindweed is a serious weed in crops (Friesen and Shabeski 1960, Forsberg and Best 1964).

Rational:

Sources of information:

Forsberg, D.E. and K.F. Best. 1964. The emergence and plant development of wild buckwheat (*Polygonum convolvulus*). Canadian Journal of Plant Science 44: 100-103.

Friesen, G. and L.H. Shebeski. 1960. Economic losses caused by weed competition in Manitoba grain fields. I. Weed species, their relative abundance and their effect on crop yields. Canadian Journal of Plant Science 40:457-467.

3.2. Known level of ecological 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:

Black bindweed has invaded natural communities in Rocky Mountain National Park (J. Conn – pers. obs.).

Sources of information:

Conn, J., Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184. – Pers. com.

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 2

Documentation:

Identify type of disturbance:

Black bindweed readily established on cultivated fields and disturbed grounds (Royer and Dickinson 1999, Welsh 1974). However, it is recorded to establish in grasslands with small-scale animal disturbances in Germany (Milton et al. 1997).

Rational:

Sources of information:
Milton, S.J., W.R.J. Dean and S. Klotz. 1997. Effects of small-scale animal disturbances on plant assemblages of set-aside land in Central Germany. Journal of Vegetation Science 8: 45-54.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

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:
Black bindweed originated from Eurasia. It has now been introduced into Africa, South America, Australia, New Zealand, and Oceania (Hultén 1968, USDA, ARS 2003). It has been collected from arctic regions in Alaska (Hultén 1068, UAM 2006).
Rational:

Sources of information:
Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.
University of Alaska Museum. University of Alaska Fairbanks. 2003. http://hispida.museum.uaf.edu:8080/home.cfm
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/var/apache/cgi-bin/npgs/html/taxon.pl?300618 [December 13, 2004].

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:
Black bindweed is found throughout Canada and the United States. It is declared noxious in Alaska, Alberta, Manitoba, Minnesota, Oklahoma, Quebec, and Saskatchewan (Alaska Administrative Code 1987, Rice 2006, Royer and Dickinson 1999).
Rational:

Sources of information:
Alaska Administrative Code. Title 11, Chapter 34. 1987. Alaska Department of Natural Resources. Division of Agriculture.
Rice, P.M. INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

Total Possible 25

Total 17

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 3

Documentation:
Identify longevity of seed bank:
Most seeds of black bindweed germinate in their first year (Chepil 1946). However seeds remain viable in the soil for up to 40 years (Chippendale and Milton 1934). Viability of seeds was 5% after 4.7 years, and <1% after 9.7 years in seed viability experiment conducted in Fairbanks, Alaska (Conn and Deck 1995).
Rational:

Sources of information:
Chepil, W.S. 1946. Germination of weed seeds. I. Longevity, periodicity of germination, and vitality of seeds in cultivated soil. Scientific Agriculture 26: 307-346.
Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pasture. The Journal of Ecology 22(2): 508-531.
Conn, J.S. and R.E. Deck. 1995. Seed viability and dormancy of 17 weed species after 9.7 years of burial in Alaska. Weed Science 43: 583-585.

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 0

Documentation:
Describe vegetative response:
Black bindweed does not regenerate vegetatively (Hume et al. 1983).
Rational:

Sources of information:
Hume, L., J. Martinez and K. Best. 1983. The biology of Canadian weeds. 60. *Polygonum convolvulus* L. Canadian Journal of Plant Science 63: 959-971.

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 2

Documentation:
Identify types of control methods and time-term required:
Mechanical methods have only limited success in controlling black bindweed. A number of chemicals are recommended for control of this weed. Several pathogenic fungi have been studied as a potential biocontrol agent for this weed (Dal-Bello and Carranza 1995, Mortensen and Molloy 1993).

Rational:

Sources of information:
Dal-Bello, G.M. and M.R. Carranza. 1995. Weed diseases in La Plata area II. Identification of pathogens with potential for weed biocontrol programmes. Revista de la Facultad de Agronomia, La Plata 71(1): 7-14.
Mortensen, K. and M.M. Molloy. 1993. Survey for seed-borne diseases on weed species from screening samples obtained from seed cleaning plants across Canada in 1987/88. Canadian Plant Disease Survey 73: 129-136.

Total Possible	10
Total	5

Total for 4 sections Possible	100
Total for 4 sections	50

References:

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

Blackshaw, R.E. and L.M. Rode. 1991. Effect of ensiling and rumen digestion by cattle on weed seed viability. Weed Science39: 104-108.

Chepil, W.S. 1946. Germination of weed seeds. I. Longevity, periodicity of germination, and vitality of seeds in cultivated soil. Scientific Agriculture 26: 307-346.

Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pasture. The Journal of Ecology 22(2): 508-531.

Conn, J.S. and R.E. Deck. 1995. Seed viability and dormancy of 17 weed species after 9.7 years of burial in Alaska. Weed Science 43: 583-585.

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