WEED RISK ASSESSMENT FORM

Botanical name: *Polygonum aviculare* L.

Common name: prostrate knotweed, yard knotweed

Assessors:

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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	

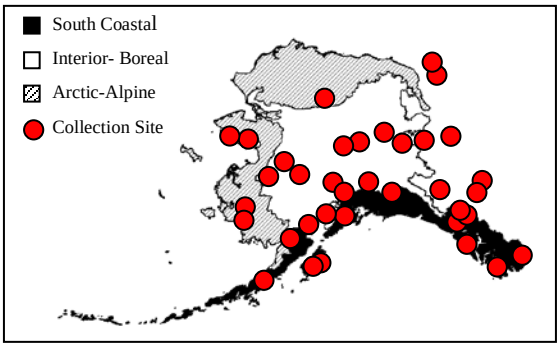
B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	7
2	Biological characteristic and dispersal ability	25 (25)	15
3	Ecological amplitude and distribution	25 (25)	16
4	Feasibility of control	10 (10)	7
	Outcome score	100 (100)[b]	45 [a]
	Relative maximum score†		0.45

* 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: *Polygonum aviculare* has been documented in all ecogeographic regions of Alaska (Weeds of Alaska Database 2005, Hultén 1968, UAM 2004).
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/

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 1

Documentation:
Identify ecosystem processes impacted:
Although toxins from the root and leaves of prostrate knotweed may prevent native species establishment (Alsaadawi and Rice 1982a, Klott and Boyce 1982), in Alaska this species is always associated with anthropogenic disturbances (M. Carlson – pers. obs., J. Conn – pers. obs.), and likely do not have a significant impact on natural ecosystem processes.
Rational:

Sources of information:
Alsaadawi, I.S. and E.L. Rice. 1982a. Allelopathic effects of *Polygonum aviculare* L. I. Vegetational patterning. Journal of Chemical Ecology 8(7): 993-1009.
Carlson, M.L., Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501 tel: (907) 257-2790; fax (907) 257-2789
Conn, J., Weed Scientist, USDA Agricultural Research Service PO Box 757200 Fairbanks, Alaska 99775 tel: (907) 474-7652; fax (907) 474-6184.
Klott, P.M. and K.G. Boyce. 1982. Allelopathic effects of wireweed (*Polygonum*

aviculare). Australian Weeds 1(3): 11-14.

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: 0

Documentation:

Identify type of impact or alteration:

Prostrate knotweed is capable of colonizing disturbed ground and changing the density of the layer (I. Lapina – pers. obs.). No impact on the natural community structure has been documented.

Rational:

Sources of information:

Lapina, I., Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.

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: 1

Documentation:

Identify type of impact or alteration:

Prostrate knotweed has not been observed in undisturbed areas in Alaska (Densmore et al. 2000, I. Lapina – pers. obs.). It is unlikely that measurable impacts on native community composition occur due to its presence.

Rational:

Sources of information:

Densmore, R.V., P.C. McKee and C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

Lapina, I., Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.

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: 5

Documentation:

Identify type of impact or alteration:
Prostrate knotweed is the food and habitat for many bird and small mammal species (Firbanks and Smart 2002, Watson et al. 2003). Sixty one species of insects have been observed feeding on prostrate knotweed (Marshall et al. 2003). Flowers are frequently visited by insects, particularly by bees and flies. Prostrate knotweed is a host for number of fungi, viruses, and nematode species (Townshend and Davidson 1962).
Rational:

Sources of information:
Firbank, L. and S. Smart. 2002. The changing status of arable plants that are important food items for farmland birds. Aspects of Applied Biology 67: 165-170.
Marshall, E.J.P., V.K. Brown, N.D. Boatman, P.J.W. Lutman, G.R. Squire and L.K. Ward. 2003. The role of weeds in supporting biological diversity within crop fields. Weed Research 43: 77-89.
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.
Watson, S.J., A.L. Mauchline, V.K. Brown and R.J. Froud-Williams. 2003. Post-dispersal losses of *Stellaria media* and *Polygonum aviculare* seeds in spring barley (*Hordeum vulgare*). Aspects of Applied Biology 69: 203-208.

Total Possible	40
Total	7

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):
Prostrate knotweed reproduces by seed (Costea and Tardif 2005). A single plant may produce from 125-200 to 6400 achenes (Stevens 1932).
Rational:

Sources of information:
Costea, M. and F.J. Tardif. 2005. The biology of Canadian weeds. 131. *Polygonum aviculare* L. Canadian Journal of Plant Science 85: 481-506.
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 3

Documentation:
Identify dispersal mechanisms:
Achenes can be dispersed by birds and animals after ingestion. The seeds float and can be dispersed by irrigation water, rain streams, and water courses (Costea and Tardif

2005).
Rational:

Sources of information:
Costea, M. and F.J. Tardif. The biology of Canadian weeds. 131. *Polygonum aviculare* L. Canadian Journal of Plant Science 85: 481-506.

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:
Seeds can be easily carried on footwear, motor vehicles or farm machinery. Seeds can also contaminate harvested crops, seeds, topsoil, and horticultural stock (Hill et al. 1999, Hodkinson and Thompson 1997). Some seeds are not damaged after passing through digestive tracts of domestic animals and birds (Costea and Tardif 2005).
Rational:

Sources of information:
Costea, M. and F.J. Tardif. The biology of Canadian weeds. 131. *Polygonum aviculare* L. Canadian Journal of Plant Science 85: 481-506.
Hill, K.A., R.P.C. Townsend, M.J. Hill and J.G. Hampton. 1999. Weed seeds in white clover seed lots: losses during seed cleaning. Agronomy Society of New Zealand. Proceedings annual conference 29: 27-30.
Hodkinson, D. and K. Thompson. 1997. Plant dispersal: the role of man. Journal of Applied Ecology, 34: 1484-1496.

2.4. Allelopathic

A.	No	0
B.	Yes	2
U.	Unknown	

Score 2

Documentation:
Describe effect on adjacent plants:
Several chemical compounds from living plants, and residues in soil inhibit seed germination and seedling growth of most test species in experiments (Alsaadawi and Rice 1882a, Alsaadawi and Rice 1882b, Klott and Boyce 1982). Some of the allelopathic substances have an inhibitory role over some test strains of the nitrogen-fixing bacteria, *Rhizobium* and *Azotobacter* (Alsaadawi and Rice 1982, Alsaadawi et al 1983).
Rational:

Sources of information:
Alsaadawi, I.S. and E.L. Rice. 1982a. Allelopathic effects of *Polygonum aviculare* L. I. Vegetational patterning. Journal of Chemical Ecology 8(7): 993-1009.
Alsaadawi, I.S. and E.L. Rice. 1982b. Allelopathic effects of *Polygonum aviculare* L. II. Isolation, characterization, and biological activities of phytotoxins. Journal of Chemical Ecology 8(7): 1011-1023.
Alsaadawi, I.S., E.L. Rice and T.K.B. Karns. 1983. Allelopathic effects of *Polygonum aviculare* L. III. Isolation, characterization, and biological activities of phytotoxins other than phenols. Journal of Chemical Ecology 9(6):761-774.
Klott, P.M. and K.G. Boyce. 1982. Allelopathic effects of wireweed (*Polygonum aviculare*). Australian Weeds 1(3): 11-14.

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 1

Documentation:

Evidence of competitive ability:

Prostrate knotweed is more competitive than many other weed species (Alsaadawi and Rice 1982a, Alsaadawi and Rice 1982b).

Rational:

This species possesses extreme endurance and adaptability, multiple possibilities of seed dispersal, a persistent seed bank, high genetic polymorphism, and has allelopathic properties. Prostrate knotweed inhibits germination and growth of *Chenopodium album*, *Polygonum persicaria*, *Stellaria media*, and some other weeds (Alsaadawi and Rice 1982a, Alsaadawi and Rice 1982b).

Sources of information:

Alsaadawi, I.S. and E.L. Rice. 1982a. Allelopathic effects of Polygonum aviculare L. I. Vegetational patterning. Journal of Chemical Ecology 8(7): 993-1009.

Alsaadawi, I.S. and E.L. Rice. 1982b. Allelopathic effects of *Polygonum aviculare* L. II. Isolation, characterization, and biological activities of phytotoxins. Journal of Chemical Ecology 8(7): 1011-1023.

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 0

Documentation:

Describe grow form:

Prostrate knotweed does not possess a climbing or smothering growth habit (Welsh 1974, Whitson et al. 2000).

Rational:

Sources of information:

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 and 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 0

Documentation:

Describe germination requirements:

Prostrate knotweed requires open soil and disturbance to germinate (Densmore et al. 2000).

Rational:

Sources of information:
Densmore, R.V., P.C. McKee and C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

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 in a number of American states (USDA, NRSC 2006). Also *Polygonum arenastrum* Jord. ex Boreau, *P. caespitosum* Blume, *P. convolvulus* L., *P. orientale* L., *P. persicaria* L., and *P. lapathifolium* L. are listed as a weeds in the PLANTS Database (USDA, NRSC 2006). A number of native to North America *Polygonum* species have a weedy habit and are listed as noxious weeds in some of the American States. Although the latest taxonomy considers these species as members of three different genus: *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 0

Documentation:
Describe type of habitat:
Prostrate knotweed is one of the most common weeds along roadsides, sidewalks and paved areas. It also occurs in gardens and cultivated fields (Alex and Switzer 1976, Welsh 1974).
Rational:

Sources of information:
Alex, J.F. and C.M. Switzer. 1976. Ontario weeds. Guelph, Ontario: Ontario Agricultural College, University of Guelph; 200p.
Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

Total Possible 25
Total 15

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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:
Prostrate knotweed is a weed of roadsides, and waste areas. It also occurs in gardens and cultivated fields (Alex and Switzer 1976).
Rational:

Sources of information:
Alex, J.F. and C.M. Switzer. 1976. Ontario weeds. Guelph, Ontario: Ontario Agricultural College, University of Guelph; 200p.

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 0

Documentation:

Identify type of habitat and states or provinces where it occurs:
Prostrate knotweed is a plant of disturbed areas. No records on the ecological impact of prostrate knotweed in natural areas were found.
Sources of information:

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:
Prostrate knotweed colonizes disturbed ground. Plants may appear on sites that have been redisturbed several decades after the last human disturbance (Densmore et al. 2000). Prostrate knotweed was dominant on patches of soil disturbed by animals in a study in Germany (Milton et al. 1997).
Rational:

Sources of information:
Densmore, R.V., P.C. McKee and C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.
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.

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:
Prostrate knotweed is one of the most widespread weeds in Europe and Asia. It has been introduced into Central and South Africa, South and North America, Australia

and New Zealand. It has been recorded in Alaska, including arctic regions (Gubanov et al. 2003, Hultén 1968).
Rational:

Sources of information:
Gubanov I.A., Kiseleva K.V., Novikov V.S., Tihomirov V.N. An Illustrated identification book of the plants of Middle Russia, Vol. 2: Angiosperms (dicots: archichlamydeans). Moscow: Institute of Technological Researches; 2003. 666 p.
Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 p.

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:
Prostrate knotweed is found in nearly all American states and Canadian provinces (USDA, NRCS 2006). *Polygonum aviculare* is listed as a noxious weed in Quebec (Rice 2006).
Rational:

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

Total Possible 25
Total 16

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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:
Chepil (1946) found that although a significant proportion of prostrate knotweed seeds germinate in the year after they were produced, a smaller number of seedlings emerged 3 to 5 years after sowing. Two out of 1000 seeds sown, emerged after 5 years.
Viability of seeds was 7% after 4.7 years, and <1% after 9.7 years in seed viability experiment conducted in Fairbanks, Alaska (Conn and Deck 1995). The number of years of seed viability was estimated to be 9 on a site with loam soil, and 20 on a site with clay soil (Lutman et al. 2002).
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.
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.
Lutman, P.J.W., G.W. Cussans, K.J. Wright, B.J. Wilson, G. McN. Wright and H.M. Lawson. 2001. The persistence of seeds of 16 weed species over six years in two arable fields. Weed Research 42: 231-241.

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:
Plants have the capacity to regenerate from axillary buds if the apex is removed (Costea and Tardif 2005).
Rational:

Sources of information:
Costea, M. and F.J. Tardif. 2005. The biology of Canadian weeds. 131. *Polygonum aviculare* L. Canadian Journal of Plant Science 85: 481-506.

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 used for the control of prostrate knotweed are usually not efficient alone and are more effective in combination with chemical treatments. Several insect species have been suggested as a potential biocontrol agent for this weed (Costea and Tardif 2005).
Rational:

Sources of information:
Costea, M. and F.J. Tardif. 2005. The biology of Canadian weeds. 131. *Polygonum aviculare* L. Canadian Journal of Plant Science 85: 481-506.

Total Possible	10
Total	7

Total for 4 sections Possible	100
Total for 4 sections	45

References:

Alex, J.F. and C.M. Switzer. 1976. Ontario weeds. Guelph, Ontario: Ontario Agricultural College, University of Guelph; 200p.

Alsaadawi, I.S. and E.L. Rice. 1982a. Allelopathic effects of *Polygonum aviculare* L. I. Vegetational patterning. Journal of Chemical Ecology 8(7): 993-1009.

Alsaadawi, I.S. and E.L. Rice. 1982b. Allelopathic effects of *Polygonum aviculare* L. II. Isolation, characterization, and biological activities of phytotoxins. Journal of Chemical Ecology 8(7): 1011-1023.

Alsaadawi, I.S., E.L. Rice and T.K.B. Karns. 1983. Allelopathic effects of *Polygonum aviculare* L. III. Isolation, characterization, and biological activities of phytotoxins other than phenols. Journal of Chemical Ecology 9(6):761-774.

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