WEED RISK ASSESSMENT FORM

Botanical name: *Vicia cracca* L.

Common name: bird vetch, cow vetch

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	
	This species is unlikely to establish in any region in Alaska		

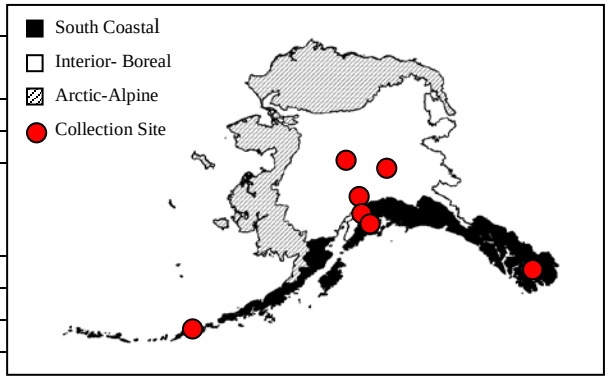
B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	27
2	Biological characteristic and dispersal ability	25 (25)	16
3	Ecological amplitude and distribution	25 (25)	21
4	Feasibility of control	10 (10)	9
	Outcome score	100 (100)[b]	73[a]
	Relative maximum score†		0.73

* 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
	Arctic-Alpine



Documentation: *Vicia cracca* has been collected in South Coastal (Seward, Ketchikan, Unalaska –UAM 2004), and Interior-Boreal (Anchorage, Wasilla, Fairbanks, Rampart, and Minto – AKNHP 2003, Hultén 1968, UAM 2004), ecoregions in Alaska.
Sources of information:
AKNHP. 2003. Non-native plants survey of Mat-Su Valleys. Report for USFS, State and Private Forestry, Anchorage, AK.
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.

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
Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*
No
– *If "No" is answered for all regions, reject species from consideration*

Documentation: Using CLIMEX matching program, climatic similarity between Nome and areas where the species is documented has a moderate match. There is a 77% similarity between Nome and city Chirka-Kem', Russia, where the species occurs (Hultén 1968). Additionally, range of bird vetch includes Røros, Norway and Arkhangel'sk, Russia (Hultén 1968), which have 76% of climatic matches with Nome respectively. This suggests that establishment of bird vetch in arctic and alpine regions of Alaska may be possible.
Sources of information:
CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 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:
Bird vetch alters edaphic conditions due to fixation of atmospheric nitrogen (USDA 2002).

Rational:

Sources of information:
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.

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:
Vicia cracca can form dense stands in Alaska. It can overgrow herbaceous vegetation and climb over shrubs, such as alder, willow, and spruce up to 2 m in height (Lapina – pers. obs.).
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 8

Documentation:
Identify type of impact or alteration:
Bird vetch quickly overtops herbaceous and low-woody species at boreal forest edges in Alaska. No data is present, but native plant species certainly suffer from its presence (M. L. Carlson pers obs.)
Rational:

Sources of information:
Carlson, M.L., Assistant Research Professor – Botany, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – 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:
Bird vetch is highly palatable to grazing and browsing animals (USDA 2002). Seeds of bird vetch are toxic (Cornel University: PPID). Flowers are visited by native bees and may alter pollination ecology of the surrounding area (Aarssen et al. 1986, Klebesadel 1980, M. L. Carlson – pers. obs.).
Rational:

Sources of information:
Aarssen, L.W., I.V. Hall, K.I.N. Jensen. 1986. The biology of Canadian weeds. 76. *Vicia angustifolia* L., *V. cracca* L., *V. sativa* L., *V. tetrasperma* (L.) Schreb. and *V. villosa* Roth. Canadian Journal of Plant Science. 66 (3):711-737.
Carlson, M. L., Assistant Research Professor – Botany, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.
Cornel University: Poisonous Plants Informational Database. http://www.ansci.cornell.edu
Klebesadel, L.J. 1980. Birdvetch. Forage crop, ground cover, ornamental, or weed? Agroborealis January/1980: 46-49.
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 40
Total 27

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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/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 2

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Bird vetch reproduces by seeds and also spreads vegetatively by growth of rhizomes (Aarssen et al. 1986, Klebesadel 1980, Nolen 2002).
Rational:

Sources of information:
Aarssen, L.W., I.V. Hall, K.I.N. Jensen. 1986. The biology of Canadian weeds. 76. *Vicia angustifolia* L., *V. cracca* L., *V. sativa* L., *V. tetrasperma* (L.) Schreb. and *V. villosa* Roth. Canadian Journal of Plant Science. 66 (3):711-737.
Klebesadel, L.J. 1980. Birdvetch. Forage crop, ground cover, ornamental, or weed? Agroborealis January/1980: 46-49.
Nolen, A. 2002. Vetch infestation in Alaska. Alaska Plant Material Center, Division of Agriculture, Department of Natural Resources. 35 pp.

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:

Seeds of bird vetch are large and not easily dispersed. The pods explosively split open when it dry. Plant can spread when tendrils and vine branches with seed pods cling to vectors, are broken off the plant, and carried to a new location (Densmore et al. 2001).

Rational:

Sources of information:

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

2.3. 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:

Bird vetch was first planted in Alaska in 1909. Later it was planted at the Fairbanks and Matanuska experiment stations where it was evaluated for forage (Klebesadel 1980). It can be introduced with topsoil (Densmore et al. 2001). Additionally, it can spread along roads on cars and heavy equipments (J. Conn – pers. com., M. Shephard – pers. com.).

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.

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

Klebesadel, L.J. 1980. Birdvetch. Forage crop, ground cover, ornamental, or weed? Agroborealis. January/1980: 46-49.

Shephard, M., Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. com.

2.4. Allelopathic

A. No 0

B. Yes 2

U. Unknown

Score 0

Documentation:

Describe effect on adjacent plants:

None (USDA 2002).

Rational:

Sources of information:

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.

2.5. 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:
The species has nitrogen fixing ability (USDA 2002) and competes for resources with other species.
Rational:

Sources of information:
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.

2.6. 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:
Bird vetch overgros herbaceous vegetation and climbs "kudzu-style" up and over shrubs such as alder and willow as well as small spruce trees (Densmore et al. 2001).
Rational:

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

2.7. 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:
Vicia cracca usually establishes in disturbed areas, including those with well-developed vegetation (Densmore et al. 2001). Seeds can easy germinate in wide range of conditions without scarification (J. Snyder – unpubl. data).
Rational:

Sources of information:
Densmore, R.V., P.C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.
Snyder, J.M. UAF Cooperative Extension Service, 2221 E. Northern Lights Blvd. #118, Anchorage, AK 99508-4143. Tel: (907) 786-6310 alt.tel: (907) 743-9448.

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 3

Documentation:

Species:

Vicia benghalensis L. *V. disperma* DC., *V. hirsuta* (l.) S.F. Gray, *V. lathyroides* L., *V. pannonica* Crantz, *V. sativa* L., *V. tetrasperma* (L.) Schreber, *V. villosa* Roth.

Sources of information:

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

Isely, D. 1993. *Vicia*, Vetch. *In* J. C. Hickman (ed.) The Jepson Manual of Higher Plants of California. pp. 654-657.

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

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 0

Documentation:

Describe type of habitat:

Bird vetch is a weed of roadsides and disturbed areas.

Rational:

Sources of information:

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

Klebesadel, L.J. 1980. Birdvetch. Forage crop, ground cover, ornamental, or weed? Agroborealis January/1980: 46-49.

Total Possible 25

Total 16

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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:

In Alaska, *Vicia cracca* was introduced as a forage crop in Fairbanks and Palmer (Densmore et al. 2001, Klebesadel 1980).

Rational:

Sources of information:

Densmore, R.V., P.C. McKee, C. Roland. 2001. Exotic plants in Alaskan National

Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.
Klebesadel, L.J. 1980. Birdvetch. Forage crop, ground cover, ornamental, or weed? Agroborealis January/1980: 46-49.

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 4

Documentation:

Bird vetch has ability to invade natural areas. The species has been observed growing in open mature deciduous forest near Fairbanks (Densmore et al. 2001), and it penetrates well beyond boreal forest edges in the Susitna Valley (I. Lapina, M. L. Carlson pers. obs.). It is a significant component of grassland in Northern Ontario and Quebec (Aarssen et al. 1986).

Sources of information:

Aarssen, L.W., I.V. Hall, K.I.N. Jensen. 1986. The biology of Canadian weeds. 76. *Vicia angustifolia* L., *V. cracca* L., *V. sativa* L., *V. tetrasperma* (L.) Schreb. and *V. villosa* Roth. Canadian Journal of Plant Science. 66 (3):711-737.
Carlson, M.L., Assistant Research Professor – Botany, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.
Densmore, R.V., P.C. McKee, 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) 257-2790 – Pers. obs.

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:

It establishes in disturbed grassy areas and along roadsides (Nolen 2002). From these areas of disturbance bird vetch can invade habitats with moderate amounts of light penetration (M. L. Carlson pers. obs.).

Rational:

Sources of information:

Carlson, M.L., Assistant Research Professor – Botany, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.
Nolen, A. 2002. Vetch infestation in Alaska. Alaska Plant Material Center, Division of Agriculture, Department of Natural Resources. 35 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:
Originally native to Europe, it now occurs in North America, South Africa, temperate Asia, and New Zealand (Hultén 1968).
Rational:

Sources of information:
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:
Bird vetch now ranges from Alaska and British Columbia south and east across Canada to Newfoundland, south to Georgia and Alabama: a total of 36 states (USDA 2002). *Vicia cracca* listed as noxious-weed seed in Alaska (Group B) (Alaska Administrative Code).
Rational:

Sources of information:
Alaska Administrative Code. Title 11, Chapter 34. Alaska Department of Natural Resources. Division of Agriculture.
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 21

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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:
At least some of the seeds remain hard and contribute to the development of a seed bank. The seeds do not germinate until the seed coat is sufficiently broken down (by decay or abrasion) to admit water (Densmore et al. 2001). Most hard-seeded legumes have seed dormancy lasting 5 years or more (M. L. Carlson – pers. com.). J. Shyder (unpubl. data) observed vetch seeds germinating without period of dormancy.
Rational:

Sources of information:

Carlson, M.L., Assistant Research Professor – Botany, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.
Densmore, R.V., P.C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.
Snyder, J.M., UAF Cooperative Extension Service, 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143, tel: (907) 786-6310 alt. tel: (907) 743-9448. Unpubl. data.

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:
There is strong vegetative growth from dormant buds of belowground roots (Aarssen et al. 1986).
Rational:

Sources of information:
Aarssen, L.W., I.V. Hall, K.I.N. Jensen. 1986. The biology of Canadian weeds. 76. *Vicia angustifolia* L., *V. cracca* L., *V. sativa* L., *V. tetrasperma* (L.) Schreb. and *V. villosa* Roth. Canadian Journal of Plant Science. 66 (3):711-737.
Klebesadel, L.J. 1980. Birdvetch. Forage crop, ground cover, ornamental, or weed? Agroborealis January/1980: 46-49.

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:
This species is very difficult to eradicate once established
Rational:

Sources of information:
Aarssen, L.W., I.V. Hall, K.I.N. Jensen. 1986. The biology of Canadian weeds. 76. *Vicia angustifolia* L., *V. cracca* L., *V. sativa* L., *V. tetrasperma* (L.) Schreb. and *V. villosa* Roth. Canadian Journal of Plant Science. 66 (3):711-737.
Densmore, R.V., P.C. McKee, C. Roland. 2001. Exotic plants in Alaskan National Park Units. Report on file with the National Park Service – Alaska Region, Anchorage, Alaska. 143 pp.

Total Possible	10
Total	9

Total for 4 sections Possible	100
Total for 4 sections	73

References:

Aarssen, L.W., I.V. Hall, K.I.N. Jensen. 1986. The biology of Canadian weeds. 76. *Vicia angustifolia* L., *V. cracca* L., *V. sativa* L., *V. tetrasperma* (L.) Schreb. and *V. villosa* Roth. Canadian Journal of Plant Science. 66 (3):711-737.

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

AKNHP. 2003. Non-native plants survey of Mat-Su Valleys. Report for USFS, State and Private Forestry, Anchorage, AK.

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

Carlson, M.L., Assistant Research Professor – Botany, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2790 – Pers. obs.

Cornel University: Poisonous Plants Informational Database. http://www.ansci.cornell.edu

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

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

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