WEED RISK ASSESSMENT FORM

Botanical name: *Trifolium pratense* L.

Common name: red clover

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Outcome score:

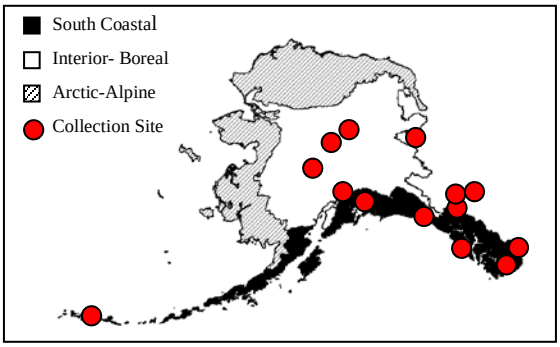
A.	**Climatic Comparison**		
	This species is present or may potentially establish in the following eco-geographic regions:		
1	South Coastal	Yes	
2	Interior-Boreal	Yes	
3	Arctic-Alpine	Yes	

B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	16
2	Biological characteristic and dispersal ability	25 (22)	12
3	Ecological amplitude and distribution	25 (25)	16
4	Feasibility of control	10 (10)	7
	Outcome score	100 (97)[b]	51 [a]
	Relative maximum score†		0.53

* 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: *Trifolium pratense* has been documented in South Coastal and Interior-Boreal 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
Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*
No
– If "No" is answered for all regions, reject species from consideration

Documentation: The CLIMEX computer matching program indicates a climatic similarity between the Arctic Alpine ecogeographic region of Alaska and areas of native range of *Trifolium pratense* are moderately high. Range of red clover includes Røros and Dombås, Norway (Markenschlager 1934, Lid and Lid 1994), which have a 76% and 63% climatic match with Nome. Thus establishment of red clover in Arctic-Alpine ecogeographic region is likely.
Sources of information: CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
Lid, J. and D. T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.
Markenschlager, F. 1934. Migration and distribution of red clover in Europe. Herbage reviews 2: 88-92.

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 5

Documentation:
Identify ecosystem processes impacted:
Red clover increases soil nitrogen levels by fixing atmospheric nitrogen (USDA, NRCS 2006). The alteration of soil conditions may delay establishment of native species (Rutledge and McLendon 1996) and facilitate colonization by other exotic plant species.
Rational:

Sources of information:
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).
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.

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:
Red clover is capable of creating very dense stands (Gettle et al. 1996a). It produces a large biomass (Gettle et al. 1996b, Hofmann and Isselstein 2004), which influences the structure of the layer.
Rational:
Density of up to 632 stems per m² was recorded in field study (Gettle et al. 1996a).
Sources of information:
Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996a. Frost-seeding legumes into established switchgrass: establishment, density, persistence, and sward composition. Agronomy Journal 88: 98-103.
Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996b. Frost-seeding legumes into established switchgrass: forage yield and botanical composition of the stratified canopy. Agronomy Journal 88: 555-560.
Hofmann, M. and J. Isselstein. 2004. Effects of drought and competition by a ryegrass sward on the seedling growth of a range of grassland species. Journal of Agronomy and Crop Science 190: 277-286.

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:
Red clover reduces the number of individuals of native species in the community (Gettle et al. 1996a).
Rational:
Density of grasses decreased as density of established red clover increased in switchgrass communities (Gettle et al. 1996a).
Sources of information:
Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996a. Frost-seeding legumes into established switchgrass: establishment, density, persistence, and sward composition. Agronomy Journal 88: 98-103.

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:

Moose and mule deer graze in red clover in California. The leaves of red clover are also eaten by beaver, woodchuck, muskrat, meadow mice, and sharp-tailed grouse. Seeds are eaten by crow, horned lark, ruffed and sharp-tailed grouse. Red clover is visited by bumblebees and sometimes by introduced honeybees (Graham 1941).

Rational:

Sources of information:

Graham, E.H. 1941. Legumes for erosion control and wildlife. U.S. Department of Agriculture. Publication No. 412. United States Government Printing Office, Washington.

Total Possible 40

Total 16

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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 1

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Red clover reproduces by seeds. It can produce moderate amount of seeds (11 – 1,000) (Densomore et al. 2001).

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.

2.2. 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 U

Documentation:

Identify dispersal mechanisms:

Seeds of red clover are large and do not have a specific adaptation for long distance dispersal.

Rational:

Sources of information:

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:
Red clover escapes cultivation (Rutledge and McLendon 1996, Welsh 1974). Seeds of red clover are commercially available. It has been planted for trials in Alaska (Panciera et al. 1990, Sparrow et al. 1993).
Rational:

Sources of information:
Panciera, M.T., S.D. Sparrow, R.G. Gavlak and W.E. Larson. 1990. Evaluation of forage legume potential at Fairbanks, Point MacKenzie, and Soldotna. Alaska Agricultural and Forestry Experiment Station. Research Progress Reports 13.
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).
Sparrow, S.D., V.L. Cochran and E.B. Sparrow. 1993. Herbage yield and nitrogen accumulation by seven legume crops on acid and neutral soils in a subarctic environment. Canadian Journal of Plant Science 73: 1037-1045.
Welsh, S. L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

2.4. Allelopathic

A.	No	0
B.	Yes	2
U.	Unknown	

Score 0

Documentation:
Describe effect on adjacent plants:
Red clover is not allelopathic (USDA, NRCS 2006).
Rational:

Sources of information:
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.

2.5. 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:
Red clover is capable of outcompeting exotic and native grasses (Gettle et al. 1996a, Hofmann and Isselstein 2004). Red clover has nitrogen fixing ability (USDA, NRCS 2006).

Rational:
The high establishment success of red clover seeding in existing swards was obtained in a field experiment. Resources of large seeds apparently allow the seedlings to survive periods of establishment in deep shade of existing vegetation (Hofmann and Isselstein 2004). Once red clover has established it competes with neighboring grasses (Gettle et al. 1996a).
Sources of information:
Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996a. Frost-seeding legumes into established switchgrass: establishment, density, persistence, and sward composition. Agronomy Journal 88: 98-103.
Hofmann, M. and J. Isselstein. 2004. Effects of drought and competition by a ryegrass sward on the seedling growth of a range of grassland species. Journal of Agronomy and Crop Science 190: 277-286.
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.

2.6. 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:
In seeded fields red clover can reach a density of 632 plants per m^2 (Gettle et al. 1996a). Red clover has not been observed at high densities in non-cultivated sites in Alaska (I. Lapina – pers. obs.).
Rational:

Sources of information:
Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996a. Frost-seeding legumes into established switchgrass: establishment, density, persistence, and sward composition. Agronomy Journal 88: 98-103.
Lapina, I. Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.

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 3

Documentation:
Describe germination requirements:
Red clover can germinate and establish in existing swards (Gettle et al. 1996b, Hofmann and Isselstein 2004); however, mechanical disturbances that provide gaps in existing vegetation create favorable conditions for the establishment of red clover (Hofmann and Isselstein 2004).
Rational:

Sources of information:
Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996b. Frost-seeding legumes into established switchgrass: forage yield and botanical composition of the stratified canopy. Agronomy Journal 88: 555-560.
Hofmann, M. and J. Isselstein. 2004. Effects of drought and competition by a ryegrass sward on the seedling growth of a range of grassland species. Journal of

Agronomy and Crop Science 190: 277-286.

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 3

Documentation:
Species:
Trifolium arvense L., *T. campestre* Schreb., *T. incarnatum* L., *T. repens* L. (USDA, NRCS 2006).
Sources of information:
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:
Red clover is often planted as a forage crop, escapes and establishes on roadsides, clearcuts, lawns, gardens, and meadows (Rutledge and McLendon 1996, Welsh 1974).
Rational:

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

Total Possible 23
Total 12

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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:
Red clover is widely planted as a component of pasture and forage mixes. It is recommended for soil improvement. Several varieties have been developed (USDA, NRCS 2006). It was first cultivated in northern Europe around 1650 (Merkenschlager 1934).
Rational:

Sources of information:
Markenschlager, F. 1934. Migration and distribution of red clover in Europe. Herbage reviews 2: 88-92.

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.

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:

Red clover does not appear to have a perceivable impact on habitats within Rocky Mountain National Park (Rutledge and McLendon 1996).

Sources of information:

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).

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:

If seeded, red clover can successfully establish in pastures (Gettle et al. 1996a, b). Soil disturbances, cutting or grazing of competitive vegetation increases the rate of establishment (Guretzky et al. 2004, Hofmann and Isselstein 2004). It has been found in sites disturbed in the last 11-50 years in Rocky Mountain National Park (Rutledge and McLendon 1996). It found in Wrangell-St. Elias National Park in sites disturbed within the last 10 years (Densmore et al. 2001).

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.

Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996a. Frost-seeding legumes into established switchgrass: establishment, density, persistence, and sward composition. Agronomy Journal 88: 98-103.

Gettle, R.M., J.R. George, K.M. Blanchet, D.R. Buxton and K.J. Moore. 1996b. Frost-seeding legumes into established switchgrass: forage yield and botanical composition of the stratified canopy. Agronomy Journal 88: 555-560.

Guretzky, J.A., K.J. Moore, A.D. Knapp and E.C. Brummer. 2004. Emergence and survival of legumes seeded into pasture varying in landscape position. Crop Science 44: 227-233.

Hofmann, M. and J. Isselstein. 2004. Effects of drought and competition by a ryegrass sward on the seedling growth of a range of grassland species. Journal of Agronomy and Crop Science 190: 277-286.

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).

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:

Red clover is native to southeastern Europe and Asia Minor. Today its distribution includes Europe, southwest Asia, Africa, and North America (Hultén 1968). Red clover has not been documented in the arctic (Markenschlager 1934, Lid and Lid 1994, Gubanov et al. 2003).

Rational:

Sources of information:

Gubanov, I.A., K.V. Kiseleva, V.S. Novikov and V.N. Tihomirov. 2003. An illustrated identification book of the plants of Middle Russia. Vol. 2. Angiosperms (dicots: archichlamydeans). Moscow: Institute of Technological Researches, 666 p.

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

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

Markenschlager, F. 1934. Migration and distribution of red clover in Europe. Herbage reviews 2: 88-92.

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:

Red clover can be found throughout the United States and Canada (USDA, NRCS 2006). This species is not considered invasive in North America (Rice 2006).

Rational:

Sources of information:

Rice, P.M. 2006. 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

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:
Seeds of red clover remain viable in soil for three to five years (Duvel 1904, Dorph-Petersen 1925). A low survival rate was recorded for seeds stored in undisturbed soil for a period of 20 (Lewis 1973) and even 30 years (Toole 1946).
Rational:

Sources of information:
Dorph-Petersen, K. 1925. Examination of the occurrence and vitality of various weed seed species under different conditions, made at the Danish State Seed Testing Station during the years 1896-1923. 4th International Seed Testing Congress, 1924, Cambridge, England. pp. 128-138.
Duvel, J.W.T. 1904. Preservation of seeds buried in the soil. Botanical Gazette 37: 146-147.
Lewis, J. 1973. Longevity of crop and weed seeds: survival after 20 years in soil. Weed Research 13: 179-191.
Toole, E.H. 1946. Final results of the Duvel buried seed experiment. Journal of Agricultural Research 72: 201-210.

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:
Varieties of red clover are adapted to be grazed or cut for hay and able to resprout (Densmore et al. 2001, USDA, NRCS 2006).
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.

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:
Red clover can be controlled by mechanical methods (Densmore et al. 2001). It appears to be resistant to some chemicals (Rutledge and McLendon 1996).
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.

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).

Total Possible	10
Total	7

Total for 4 sections Possible	97
Total for 4 sections	51

References:

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