WEED RISK ASSESSMENT FORM

Botanical name:	*Ranunculus repens* L. and *Ranunculus acris* L.
Common name:	Creeping buttercup and tall buttercup

Assessors:

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

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

Reviewers:

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

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

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

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

Chris McKee
Wildlife Biologist, USDI Geological Survey PO Box 74633 Fairbanks, AK 99707
tel: (907) 455-0636; fax (907) 455-0601

Page Spencer, Ph.D.
Ecologist, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501
tel: (907) 644-3448

Lindsey Flagstad
Alaska Natural Heritage Program, University of Alaska Anchorage
707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2786; fax (907) 257-2789

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 (23)	13
3	Ecological amplitude and distribution	25 (25)	15
4	Feasibility of control	10 (10)	9
	Outcome score	100 (98)[b]	53[a]
	Relative maximum score†		0.54

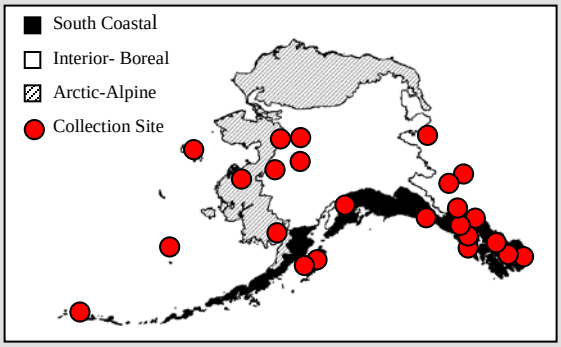
* For questions answered "unknown" do not include point value for the question in parentheses for "Total Answered Points Possible."
† Calculated as [a]/[b].

A. CLIMATIC COMPARISON:

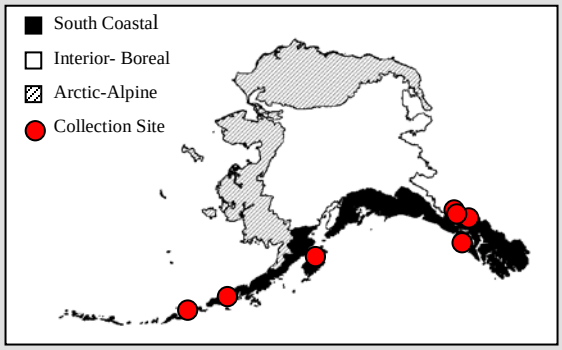
	1.1. Has this species ever been collected or documented in Alaska?
Yes	Yes – continue to 1.2
	No – continue to 2.1
	1.2. Which eco-geographic region has it been collected or documented (see inset map)? *Proceed to Section B. Invasiveness Ranking*.
Yes	South Coastal

Yes	Interior-Boreal
Yes	Arctic-Alpine

Documentation: Creeping buttercup has been reported from all ecogeographic region in Alaska (Hultén 1968).



Documentation: Tall buttercup has been collected in the South Coastal and Interior-Boreal ecogeographic regions in Alaska (Hultén 1968, University of Alaska Museum 2003).



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

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

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 the climatic similarity between Nome and areas where *Ranunculus acris* is documented is moderately high. The species range includes Røros and Dombås, Norway (Lid and Lid 1994), which have a 76% and 63% climatic match with Nome, and 55% and 52% climatic match with Fairbanks, respectively. Thus establishment of *Ranunculus acris* in Interior-Boreal and Arctic-Alpine ecogeographic regions may be possible.

Sources of information:

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

Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.

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

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	10

soil unlikely to support certain native plants or more likely to favor non-native species)

U. Unknown

Score 3

Documentation:

Identify ecosystem processes impacted:

Buttercup readily occupies open areas and may hinder colonization by native species (Harper 1957, Lovett-Doust et al. 1990).

Rational:

Sources of information:

Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.

Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

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:

Buttercup establishment may increase the density of the vegetation.

Rational:

In Lovett-Doust's study (1981) the density of creeping buttercup ramets was 264 per m² and 112 per m² in woodland and grassland, respectively. Sarukhan and Harper (1973) reported up to 385 ramets per m² in intensly grazed grassland. In Alaska creeping buttercup has been observed at cover near 100% (T. Heutte – pers. obs.).

Sources of information:

Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection Alaska Region, New Mexico Field Office 4331 The Lane @25NE (907) 723-1338. Pers. obs.

Lovett-Doust, L. 1981. Population dynamics and local specialization in a clonal perennial (*Ranunculus repens*): I. The dynamic of ramets in contrasting habitats. The Journal of Ecology 69(3): 743-755.

Sarukhan, J. and J.L. Harper. 1973. Studies on plant demography: *Ranunculus repens* L., *R. bulbosus* L. and *R. acris* L.: population flux and survivorship. The Journal of Ecology 61(3): 675-716.

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:

Buttercup reduces a number of individuals of native plants in invaded communities (J. Heys – pers. obs., C. McKee – pers. obs.).

Rational:

Sources of information:
Heys, J. Exotic Plant Management Program Coordinator, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501 tel: (907)644-3451, fax: 644-3809.
McKee, C. Wildlife Biologist, USDI Geological Survey PO Box 74633 Fairbanks, AK 99707 tel: (907) 455-0636; fax (907) 455-0601.

1.4. Impact on higher trophic levels (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades)

A.	Negligible perceived impact	0
B.	Minor alteration	3
C.	Moderate alteration (minor reduction in nesting/foraging sites, reduction in habitat connectivity, interference with native pollinators, injurious components such as spines, toxins)	7
D.	Severe alteration of higher trophic populations (extirpation or endangerment of an existing native species/population, or significant reduction in nesting or foraging sites)	10
U.	Unknown	

Score 7

Documentation:
Identify type of impact or alteration:
The protoanemonin released in the sap of creeping and tall buttercups is poisonous and can cause death to grazing animals if consumed. Geese and other birds readily eat leaves and seeds of buttercup (Lovett-Doust et al. 1990). The flowers are visited by honey bees, butterflies, moths, bugs, and beetles for pollen or nectar (Steinbach and Gottsberger 1994). Buttercups host microorganisms and viruses, insects, and nematodes (Harper 1957, Lovett-Doust et al. 1990, Royer and Dickinson 1999). Apparently *Ranunculus acris* and *R. uncinatus* hybridize in Alaska (Welsh 1974). However, no hybrids have been recorded in Britain and Canada and experimental crosses between *Ranunculus* species have been unsuccessful (Harper 1957, Lovett-Doust et al. 1990).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
Steinbach, K. and G. Gottsberger. 1994. Phynology and pollination biology of five *Ranunculus* species in Giessen, Central Germany. Phyton 34(2): 203-218.
Welsh, S. L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

Total Possible 30
Total 16

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):

Creeping and tall buttercups are capable of producing up to 80 and 240 seeds per plant, respectively (Sarukhan 1974). Production of daughter ramets is the major mechanism of population increase for creeping buttercup (Lovett-Doust et al. 1990).
Rational:

Sources of information:
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.
Sarukhan, J. 1974. Studies on plant demography: *Ranunculus repens* L., *R. bulbosus* L. and *R. acris* L.: II. Reproductive strategies and seed population dynamics. The Journal of Ecology 62(1): 151-177.

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:
Although most seeds are dropped near the parent plant, some seeds are dispersed farther by wind, or in the dung of birds, farm animals, and small rodents (Harper 1957, Lovett-Doust et al. 1990).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

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 dispersed by attachment to clothes and tires. Creeping buttercup may have been introduced as an ornamental plant into North America (Lovett-Doust et al. 1990). Garden varieties have been grown and escaped from gardens in Alaska (J. Riley – pers. obs.).
Rational:

Sources of information:
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.
Riley, J. Horticulture Agent, UAF Cooperative Extension Service 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143 tel: (907) 786-6306.

2.4. Allelopathic

A. No 0
B. Yes 2
U. Unknown

Score U

Documentation:
Describe effect on adjacent plants:
There is an unconfirmed hypothesis that buttercups' toxic root secretions are detrimental to neighboring plants (Lovett-Doust et al. 1990).
Rational:

Sources of information:
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

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:
Creeping buttercup is capable of withstanding competition from tall-growing grasses (Harper 1957).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.

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:
Buttercups do not form dense thickets nor are they characterized by climbing growth habit.
Rational:

Sources of information:

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:
Buttercup populations in established grasslands and woodlands are more likely to increase by vegetative spread than by germination and establishment of seedlings (Lovett-Douts 1981, Lovett-Doust et al. 1990).

Rational:

Sources of information:
Lovett-Doust, L. 1981. Population dynamics and local specialization in a clonal perennial (*Ranunculus repens*): I. The dynamic of ramets in contrasting habitats. The Journal of Ecology 69(3): 743-755.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 3

Documentation:
Species:
Ranunculus abortivus L., *R. arvensis* L., *R. bulbosus* L., *R. sardous* Crantz are invasive in other areas of the United States (USDA 2002).
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.

2.9. 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 2

Documentation:
Describe type of habitat:
Buttercups occur on disturbed soils including gardens and croplands, grasslands, woodlands, and semi-aquatic communities, such as swamps, margins of ponds, rivers, and ditches. Plants are able to tolerate some salinity and are therefore found on beaches, in salt marshes, and on the margins of tidal estuaries (Harper 1957, Lovett-Doust et al. 1990). In Southeast Alaska it is a weed of wet, but not flooded sites along the road (T. Heutte – pers. obs.).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection Alaska Region, New Mexico Field Office 4331 The Lane @25NE (907) 723-1338. Pers. obs.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

Total Possible 23
Total 13

---

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:
Creeping buttercup is a serious agricultural weed, especially in strawberry cultivation (Harper 1957, Lovett-Doust et al. 1990). It is considered a weed in 40 countries (NAPPO 2003).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.
NAPPO – North American Plant Protection Organization. 2003. Pest fact sheet: *Ranunculus repens* L. Available: http://nappo.org/PRA-sheets/PestFactsheets.htm via the INTERNET. Accessed 2005 Feb 26.

3.2. Known level of impact in natural areas

A.	Not known to cause impact in any other natural area	0
B.	Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska	1
C.	Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska	3
D.	Known to cause moderate impact in natural areas in similar habitat and climate zones	4
E.	Known to cause high impact in natural areas in similar habitat and climate zones	6
U.	Unknown	

Score 1

Documentation:
Identify type of habitat and states or provinces where it occurs:
Creeping and tall buttercup have become widespread in marshes, meadows, and woodlands of Montana, Ohio, and Minnesota (Ohio perennial and biennial weed guide 2005).
Sources of information:
Ohio perennial and biennial weed guide [Internet]. Ohio: Ohio State University. 2005 Feb 21. Available: http://www.oardc.ohio-state.edu/weedguide/

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 0

Documentation:
Identify type of disturbance:
Seedlings establish readily in open ground and rapidly colonize bare areas in the year following germination (Harper 1957). It is favored by regular mowing and thrives on lawn (T. Heutte – pers. com.).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection Alaska Region, New Mexico Field Office 4331 The Lane @25NE (907) 723-1338. Pers. obs.

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	5

subarctic regions

U. Unknown

Score 5

Documentation:

Describe distribution:

Creeping buttercup originates in Europe and extends northward to 72° N in Norway. It is now naturalized in many temperate regions of the globe including North, Central, and South America, Asia, Africa, Australia, and New Zealand (Harper 1975, Hultén 1968, NAPPO 2003). Tall buttercup is generally distributed over Europe with its natural northern limit at 71° N in Norway. It has established in North America, South Africa, Asia, and New Zealand (Harper 1957, Hultén 1968).

Rational:

Sources of information:

Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.

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

NAPPO – North American Plant Protection Organization. 2003. Pest fact sheet: *Ranunculus repens* L. Available: http://nappo.org/PRA-sheets/PestFactsheets.htm via the INTERNET. Accessed 2005 Feb 26.

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:

Ranunculus repens and *R. acris* are very common throughout the United States (USDA 2002). Both species are considered weeds in the western United States (Whitson et al. 2000). *Ranunculus acris* is also designated as a weed in Manitoba and Quebec (Royer and Dickinson 1999).

Rational:

Sources of information:

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

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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

Total Possible	25
Total	15

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:
Harper (1957) reports that creeping buttercup seeds remain viable for at least three years. Lewis (1973) documents a 16 year seed viability period. Viable seeds of creeping buttercup were also extracted from 68-year old soil samples (Chippindale and Milton 1934). A depression of germination rate was not observed for tall buttercup seeds stored for 4 years under laboratory conditions (Harper 1957).
Rational:

Sources of information:
Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pastures. The Journal of Ecology 22(2): 508-531.
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Lewis, J. 1973. Longevity of crop and weed seeds: survival after 20 years in soil. Weed Research 13: 179-191.

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 3

Documentation:
Describe vegetative response:
Buttercups are able to regrow after cutting or heavy grazing (Harper 1957). Creeping buttercup readily regenerates from root fragments (Lovett-Doust et al. 1990).
Rational:

Sources of information:
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

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 3

Documentation:
Identify types of control methods and time-term required:
Herbicides are generally recommended to control buttercups. Plants may be weakened by cultivation, but parts of stolon may regenerate and cause population increase. Plowing provides ideal conditions for germination of seed and is therefore not recommended as an eradication technique (Harper 1957, Lovett-Doust et al. 1990). Experience of control of creeping buttercup in Southeast Alaska shown that this weed is very resistant to herbicides (T. Heutte – pers. com.).
Rational:

Sources of information:

Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection Alaska Region, New Mexico Field Office 4331 The Lane @25NE (907) 723-1338. Pers. obs.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens.* Canadian Journal of Plant Science 70: 1132-1141.

Total Possible	10
Total	9

Total for 4 sections Possible	98
Total for 4 sections	53

References:

Chippindale, H.G. and W.E.J. Milton. 1934. On the viable seeds present in the soil beneath pastures. The Journal of Ecology 22(2): 508-531.
CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
Harper, J.L. 1957. *Ranunculus acris* L. The Journal of Ecology 45(1): 289-342.
Heutte, Thomas. USDA Forest Service State & Private Forestry. Forest Health Protection Alaska Region, New Mexico Field Office 4331 The Lane @25NE (907) 723-1338. Pers. obs.
Heys, J. Exotic Plant Management Program Coordinator, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501 tel: (907)644-3451, fax: 644-3809.
Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 pp.
Lewis, J. 1973. Longevity of crop and weed seeds: survival after 20 years in soil. Weed Research 13: 179-191.
Lid, J. and D. T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.
Lovett-Doust, L. 1981. Population dynamics and local specialization in a clonal perennial (*Ranunculus repens*): I. The dynamic of ramets in contrasting habitats. The Journal of Ecology 69(3): 743-755.
Lovett-Doust, J., L. Lovett-Doust, and A.T. Groth. 1990. The biology of Canadian weeds. 95. *Ranunculus repens*. Canadian Journal of Plant Science 70: 1132-1141.
McKee, C. Wildlife Biologist, USDI Geological Survey PO Box 74633 Fairbanks, AK 99707 tel: (907) 455-0636; fax (907) 455-0601.
NAPPO – North American Plant Protection Organization. 2003. Pest fact sheet: *Ranunculus repens* L. Available: http://nappo.org/PRA-sheets/PestFactsheets.htm via the INTERNET. Accessed 2005 Feb 26.
Ohio perennial and biennial weed guide [Internet]. Ohio: Ohio State University. 2005 Feb 21. Available: http://www.oardc.ohio-state.edu/weedguide/
Riley, J. Horticulture Agent, UAF Cooperative Extension Service 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143 tel: (907) 786-6306.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
Sarukhan, J. 1974. Studies on plant demography: *Ranunculus repens* L., *R. bulbosus* L. and *R. acris* L.: II. Reproductive strategies and seed population dynamics. The Journal of Ecology 62(1): 151-177.
Sarukhan, J. and J.L. Harper. 1973. Studies on plant demography: Ranunculus repens L., R. bulbosus L. and R. acris L.: population flux and survivorship. The Journal of Ecology 61(3): 675-716.

Steinbach, K. and G. Gottsberger. 1994. Phynology and pollination biology of five *Ranunculus* species in Giessen, Central Germany. Phyton 34(2): 203-218.

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

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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

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