

WEED RISK ASSESSMENT FORM

Botanical name: *Lolium perenne ssp. multiflorum* (Lam.) Husnot

Common name: annual ryegrass, Italian ryegrass, perennial ryegrass

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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		

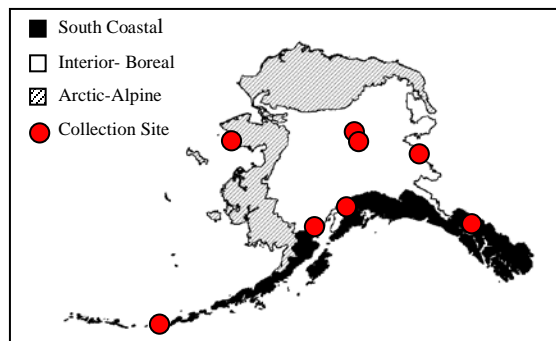
B.	Invasiveness Ranking	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	14
2	Biological characteristic and dispersal ability	25 (25)	10
3	Ecological amplitude and distribution	25 (25)	15
4	Feasibility of control	10 (10)	2
	Outcome score	100 (100) ^b	41 ^a
	Relative maximum score [†]		0.41

* 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)? <i>Proceed to Section B. Invasiveness Ranking.</i>	
Yes	South Coastal
Yes	Interior-Boreal
Yes	Arctic-Alpine



Documentation: *Lolium perenne* ssp. *multiflorum* has been collected in all ecogeographic regions of Alaska (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://hispidamuseum.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 – record locations and similarity; proceed to Section B.
Invasiveness Ranking

No

– If “No” is answered for all regions, reject species from consideration

Documentation:

Sources of information:

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes

- | | |
|--|----|
| A. No perceivable impact on ecosystem processes | 0 |
| B. Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) | 3 |
| C. Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl) | 7 |
| D. Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology; hydrology; or affects fire frequency, altering community composition; species fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species) | 10 |
| U. Unknown | |

Score

3

Documentation:

Identify ecosystem processes impacted:

Despite being widely planted for erosion control, seeding of this species may increase erosion in succeeding years. In addition, Italian ryegrass may increase the frequency and severity of fire (Carey 1995, Zedler et al. 1983). Observations in Alaska indicate that its impacts are minimal. Seedlings in Denali National Park do not persist. No reduction in native species is recorded at intermediate densities (Densmore et al. 2000).

Rational:

Sources of information:

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].

Densmore, R.V., M.E. Vander Meer, and N.G. Dunke. 2000. Native plant revegetation

manual for Denali National Park and Preserve. Information and Technology Report. March 2000. Anchorage: U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Division. Report nr USGS/BRD/ITR-2000-0006. 42 p. Available from: NTIS, Springfield, VA. Zedler, P.H., C.R. Gautier, G.S. McMaster. Vegetation change in response to extreme events: the effect of a short interval between fires in California chaparral and coastal scrub. Ecology 64(4): 809-818.

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:

Some varieties of ryegrass are capable of forming dense stands (Densmore et al. 2000, Facelli et al. 1987).

Rational:

Sources of information:

Densmore, R.V., M.E. Vander Meer, and N.G. Dunke. 2000. Native plant revegetation manual for Denali National Park and Preserve. Information and Technology Report. March 2000. Anchorage: U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Division. Report nr USGS/BRD/ITR-2000-0006. 42 p. Available from: NTIS, Springfield, VA. Facelli, J.M., E. D'Angela, R.J.C. Leon. 1987. Diversity changes during pioneer stages in subhumid pampean grassland succession. American Midland Naturalist. 117(1): 17-25.

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:

In seeded plots in burned chaparral California, there was a 40% reduction in species diversity relative to unseeded plots. Italian ryegrass can hinder woody species establishment through resource competition and increased fire potential (Carey 1995, Facelli et al. 1987). However, in numerous habitats in the West (including Alaska), it appears that this species is readily replaced by tall herbaceous and woody species (Carey 1995 and references therein, Densmore et al. 2000).

Rational:

Sources of information:

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].
Densmore, R.V., M.E. Vander Meer, and N.G. Dunke. 2000. Native plant revegetation manual for Denali National Park and Preserve. Information and Technology

Report. March 2000. Anchorage: U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Division. Report nr USGS/BRD/ITR-2000-0006. 42 p. Available from: NTIS, Springfield, VA.
 Facelli, J.M., E. D'Angela, R.J.C. Leon. 1987. Diversity changes during pioneer stages in subhumid pampean grassland succession. *American Midland Naturalist*. 117(1): 17-25.

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:

This species is highly palatable and nutritious for all types of livestock and most wild ruminants (Carey 1995). It is highly desirable to moose (M. Shephard – pers. com., J. Snyder – pers. com.). It hybridizes with other ryegrass species (Beddows 1973, Wilken 1993, Rutledge and McLendon 1996). Gopher populations increase in areas seeded with Italian ryegrass, possibly because of increased cover (Carey 1995). A number of animal herbivores and parasites have been recorded for Italian ryegrass (Beddows 1973).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multiflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). *The Journal of Ecology*. 61(2): 587-600.

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].

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.npwr.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).

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

Wilken, D. H. 1993. *Lolium*. in J. C. Hickman (ed.) *The Jepson manual: higher plants of California*. University of California Press, Berkeley, California. Pp. 1400.

Total Possible

40

 Total

14

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode of reproduction

- A. Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction) 0
- B. Somewhat aggressive (reproduces only by seeds (11-1,000/m²)) 1

- C. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m²) 2
- D. Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m²) 3
- U. Unknown

Score 1

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Italian ryegrass regenerates entirely by seed (Beddows 1973, Royer and Dickinson 1999). In two seasons in California fecundity ranged from 6.5 to 15 seeds per plant (Gulmon 1979).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multiflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.

Gulmon, S.L. 1979. Competition and coexistence: three annual grass species. American Midland Naturalist. 101(2): 403-416.

Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 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 1

Documentation:

Identify dispersal mechanisms:

Seeds are relatively heavy and compact, and dispersal is limited (Beddows 1973, Rutledge and McLendon 1996).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multiflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.

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.npwr.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contamination, etc.)

- A. Does not occur 0
- B. Low (human dispersal is infrequent or inefficient) 1
- C. Moderate (human dispersal occurs) 2
- D. High (there are numerous opportunities for dispersal to new areas) 3
- U. Unknown

Score 2

Documentation:

Identify dispersal mechanisms:

Ryegrass is often used for soil stabilization, a rotation crop, for range, pasture, hay and turf. Many cultivars have been developed (Carey 1995, USDA 2002). Italian ryegrass is a problematic weed in cereal crops and grass seed crops (Carey 1995).

Rational:

Sources of information:

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].

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.

2.4. Allelopathic

- A. No 0
- B. Yes 2
- U. Unknown

Score

Documentation:

Describe effect on adjacent plants:

Ryegrass releases some allelopathic chemicals that reduce the growth of other species (McKell et al. 1963).

Rational:

Sources of information:

McKell, C.M., C. Duncan, and C.H. Muller. 1969. Competitive relationships of annual ryegrass (*Lolium multiflorum* Lam.). Ecology. 50(4): 653-657.

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

Documentation:

Evidence of competitive ability:

Italian ryegrass competes well with native species (Carey 1995, McKell et al. 1969). However, this species is highly shade intolerant and is quickly replaced if overtopped by tall herbaceous or shrubby vegetation.

Rational:

Sources of information:

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].

McKell, C.M., C. Duncan, and C.H. Muller. 1969. Competitive relationships of annual ryegrass (*Lolium multiflorum* Lam.). Ecology. 50(4): 653-657.

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

Documentation:

Describe grow form:
 Some varieties of ryegrass form dense stands (Facelli et al. 1987), but it generally does not form thickets.
 Rational:

Sources of information:
 Facelli, J.M., E. D'Angela, R.J.C. Leon. 1987. Diversity changes during pioneer stages in subhumid pampean grassland succession. *American Midland Naturalist*. 117(1): 17-25.

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

Documentation:
 Describe germination requirements:
 Italian ryegrass is a shade intolerant species. Seedling survival was poor under the oak canopy in experiments in California (Maranon and Bartolome 1993).
 Rational:

Sources of information:
 Maranon, T. and J.W. Bartolome. 1993. Reciprocal transplants of herbaceous communities between *Quercus agrifolia* woodland and adjacent grassland. *The Journal of Ecology* 81(4): 673-682.

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

- A. No 0
- B. Yes 3
- U. Unknown

Score

Documentation:
 Species:
Lolium perenne ssp. *perenne* L., *Lolium persicum* Boiss. & Hohen., *L. temulentum* L. (Hultén 1968, USDA 2002).
 Sources of information:
 Hultén, E. 1968. *Flora of Alaska and Neighboring Territories*. Stanford University Press, Stanford, CA. 1008 p.
 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

Documentation:
 Describe type of habitat:
 Italian ryegrass is cultivated in pastures, hay fields, and lawns. It escapes from cultivation and becomes naturalized on disturbed sites such as waste places and roadsides (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.

Total Possible	25
Total	10

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:

Ryegrass is widely planted as an agricultural crop and for lawns in North America. Numerous cultivars have been developed (Carey 1995, USDA 2002).

Rational:

Sources of information:

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].
 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.

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:

Italian ryegrass causes reduction of plant diversity in California's chaparral (Zedler et al. 1983). It does not appear to invade intact communities.

Sources of information:

Zedler, P.H., C.R. Gautier and McMaster. Vegetation change in response to extreme events: the effect of a short interval between fires in California chaparral and coastal scrub. *Ecology* 64(4): 809-818.

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:

Italian ryegrass readily colonizes disturbed areas and adjacent border habitats (Beddows 1973).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multiflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.

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:

Italian ryegrass is native to central and southern Europe, north-west Africa and south-west Asia. It now occurs in nearly all states of the United States. It has been introduced into South America, New Zealand, Tasmania, central and southern Africa (Beddows 1973, Hultén 1968, USDA 2002).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multiflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.

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

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.

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:

Italian ryegrass now occurs in nearly all of the United States (USDA 2002). This species is not considered noxious in North America (Invaders Database System 2003).

Rational:

Sources of information:

Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agricultural. <http://invader.dbs.umt.edu/>

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

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 0

Documentation:

Identify longevity of seed bank:

Seedbank of ryegrass are limited and transient (Thompson and Grime 1979). Percent germination rapidly dropped off after 4 years for stored seeds (Beddows 1973, Rutledge and McLendon 1996).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multuflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.

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).

Thompson, K. and J.P. Grime, 1979. Seasonal variation in the seed banks of herbaceous species in ten contrasting habitats, Journal of Ecology. 67: 893-921.

4.2. Vegetative regeneration

- A. No resprouting following removal of aboveground growth 0
- B. Resprouting from ground-level meristems 1
- C. Resprouting from extensive underground system 2
- D. Any plant part is a viable propagule 3
- U. Unknown

Score 0

Documentation:

Describe vegetative response:

Italian ryegrass does not spread by vegetative means (Beddows 1973, USDA 2002).

Rational:

Sources of information:

Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multuflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.

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.

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:

In crops herbicides have been used to control established plants and prevent seed

production, but species is gaining resistance to several herbicides (Carey 1995). In Alaska, this species does not appear to persist in sites where it was planted.

Rational:

Sources of information:

Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].

Total Possible	10
Total	2

Total for 4 sections Possible	100
Total for 4 sections	41

References:

- Beddows, A.R. 1973. Biological flora of the British Isles: *Lolium multuflorum* Lam. (*L. perenne* L. ssp. *multiflorum* (Lam.) Husnot, *L. italicum* A. Braun). The Journal of Ecology. 61(2): 587-600.
- Carey, J.H. 1995. *Lolium multiflorum*. In: Fire Effects Information System, (Online). U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/ [2004, December 22].
- Densmore, R.V., M.E. Vander Meer, and N.G. Dunke. 2000. Native plant revegetation manual for Denali National Park and Preserve. Information and Technology Report. March 2000. Anchorage: U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Division. Report nr USGS/BRD/ITR-2000-0006. 42 p. Available from: NTIS, Springfield, VA.
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