ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Elymus sibiricus* L.
Common name: Siberian wild rye
Assessors:

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Date: 12/1/2010
Date of previous ranking, if any: 4T

OUTCOME SCORE:

CLIMATIC COMPARISON
This species is present or may potentially establish in the following eco-geographic regions:

Pacific Maritime	Yes
Interior-Boreal	Yes
Arctic-Alpine	Yes

INVASIVENESS RANKING	**Total** (total answered points possible[1])	**Total**
Ecological impact	40 (40)	20
Biological characteristics and dispersal ability	25 (25)	13
Ecological amplitude and distribution	25 (19)	12
Feasibility of control	10 (3)	1
Outcome score	100 (87)[b]	46[a]
Relative maximum score[2]		**53**

[1] For questions answered "unknown" do not include point value for the question in parentheses for "total answered points possible."
[2] Calculated as a/b × 100

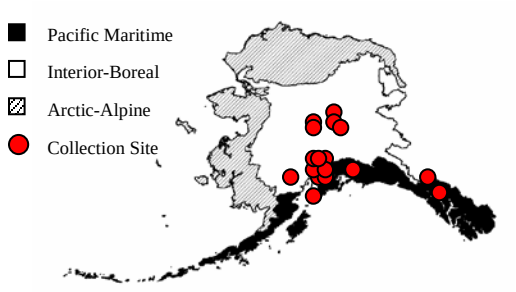
A. CLIMATIC COMPARISON

1.1. Has this species ever been collected or documented in Alaska?

☒ Yes - continue to 1.2
☐ No - continue to 2.1

1.2. From which eco-geographic region has it been collected or documented (see inset map)?
Proceed to Section B. INVASIVNESS RANKING

☒ Pacific Maritime
☒ Interior-Boreal
☐ Arctic-Alpine



Documentation: *Elymus sibiricus* has been documented from the Pacific Maritime and Interior-Boreal ecogeographic regions of Alaska (Hultén 1968, AKEPIC 2010, UAM 2010).

Note on Native Status: Multiple authors have considered at least some populations of Siberian wild rye to be native to North America, and this species has been recommended as a native, winterhardy, high yield forage crop in Alaska (Bowden and Cody 1961, Klebesadel 1993, Bennett 2006). However, North American populations show no genetic variation and are located in areas historically associated with human travel, agricultural experimentation, and revegetation after fire. Therefore, Siberian wild rye is most likely a non-native grass that was recently introduced to Alaska and northwestern Canada from Russia or central Asia (Bennett 2006, Barkworth et al. 2007).

2.1. Is there a 40 percent or higher similarity (based on CLIMEX climate matching, see references) between climates where this species currently occurs and:

a. Juneau (Pacific Maritime region)?
☐ Yes – record locations and percent similarity; proceed to Section B.
☐ No

b. Fairbanks (Interior-Boreal region)?
☐ Yes – record locations and percent similarity; proceed to Section B.
☐ No

c. Nome (Arctic-Alpine region)?
☒ Yes – record locations and percent similarity; proceed to Section B.
☐ No

If "No" is answered for all regions; reject species from consideration

Documentation: *Elymus sibiricus* has been documented from several locations in Russia that have a 40% or greater climatic similarity with Nome (CLIMEX 1999, Dzyubenko et al. 2005). Established populations have been recorded from above the Arctic Circle in western and central Russia (Dzyubenko et al. 2005).

B. INVASIVENESS RANKING

1. Ecological Impact

1.1. Impact on Natural Ecosystem Processes

a.	No perceivable impact on ecosystem processes	0
b.	Has the potential to influence ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
c.	Has the potential to cause significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, degrades habitat important to waterfowl)	7
d.	Has the potential to cause major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology, hydrology, or affects fire frequency thereby 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
e.	Unknown	U

Score **5**

Documentation: Populations of *Elymus sibiricus* reduce soil erosion and improve soil fertilization (Dzyubenko and Dzyubenko 2009).

1.2. Impact on Natural Community Structure

a.	No perceived impact; establishes in an existing layer without influencing its structure	0
b.	Has the potential to influence structure in one layer (e.g., changes the density of one layer)	3
c.	Has the potential to cause significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
d.	Likely to cause major alteration of structure (e.g., covers canopy, eliminating most or all lower layers)	10
e.	Unknown	U

Score **5**

Documentation: *Elymus sibiricus* can form sods or tufts (Dzyubenko and Dzyubenko 2009, Klinkenberg 2010) and may therefore increase the density of graminoid layers in disturbed areas. Because it grows along sandy or gravelly river bars (Barkworth et al. 2007, eFloras 2008, Klinkenberg 2010), it has the potential to create a new layer on mineral substrates in riparian areas.

1.3. Impact on Natural Community Composition

a.	No perceived impact; causes no apparent change in native populations	0
b.	Has the potential to influence community composition (e.g., reduces the population size of one or more native species in the community)	3
c.	Has the potential to significantly alter community composition (e.g., significantly reduces the population size of one or more native species in the community)	7
d.	Likely to cause major alteration in community composition (e.g., results in the extirpation of one or more native species, thereby reducing local biodiversity and/or shifting the community composition towards exotic species)	10
e.	Unknown	U

Score **3**

Documentation: *Elymus sibiricus* may reduce the sizes of native plant populations in disturbed areas. It generally invades anthropogenically disturbed habitats, but it is also known from early to mid-successional floodplain habitats in Interior Alaska, where it is likely having moderate impacts on native species (Carlson and Gotthardt 2009, AKEPIC 2010).

1.4. Impact on associated 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.	Has the potential to cause minor alteration (e.g., causes a minor reduction in nesting or foraging sites)	3
c.	Has the potential to cause moderate alteration (e.g., causes a moderate reduction in habitat connectivity, interferes with native pollinators, or introduces injurious components such as spines, toxins)	7
d.	Likely to cause severe alteration of associated trophic populations (e.g., extirpation or endangerment of an existing native species or population, or significant reduction in nesting or foraging sites)	10
e.	Unknown	U

Score **7**

Documentation: When dried, the awns are rough, sharp, and brittle and may be hazardous to grazing livestock (Klebesadel 1993) and possibly wild animals as well. *Elymus sibiricus* is palatable to livestock (Dzyubenko and Dzyubenko 2009) and is likely palatable to wild, grazing herbivores. It is known to form sterile hybrids with *E. macrourus* at high frequencies in south-central Alaska (Mitchell and Hodgson 1965, Hultén 1968, Dewey 1974). It also hybridizes with *Hordeum jubatum* (Dewey 1974).

Total Possible 40
Total **20**

2. Biological Characteristics and Dispersal Ability

2.1. Mode of reproduction

a.	Not aggressive (produces few seeds per plant [0-10/m^2] and not able to reproduce vegetatively).	0
b.	Somewhat aggressive (reproduces by seed only [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 (extensive vegetative spread and/or many seeded [>1,000/m^2])	3
e.	Unknown	U

Score **2**

Documentation: *Elymus sibiricus* reproduces by seeds, and it sometimes forms short rhizomes (Barkworth et al. 2007, Klinkenberg 2010). Each plant produces many inflorescences with 50 to 100 seeds per inflorescence (Terekhina 2009).

2.2. Innate potential for long-distance dispersal (wind-, water- or animal-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
d.	Unknown	U
	Score	**2**

Documentation: No information has been recorded on the dispersal mechanisms of *Elymus sibiricus*; however, the seeds of a similar species, *Leymus arenarius*, are wind dispersed (Bond 1952). It is likely that the seeds of *Elymus sibiricus* are also dispersed by wind because they are light, weighing approximately 5 mg each (Terekhina 2009).

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sale of species, use as forage or for revegetation, dispersal along highways, transport on boats, common contaminant of landscape materials, etc.).

a.	Does not occur	0
b.	Low (human dispersal is infrequent or inefficient)	1
c.	Moderate (human dispersal occurs regularly)	2
d.	High (there are numerous opportunities for dispersal to new areas)	3
e.	Unknown	U
	Score	**2**

Documentation: *Elymus sibiricus* has primarily established along road systems in Alaska, suggesting that it is dispersed by human activities (AKEPIC 2010). This species has been cultivated experimentally in the Matanuska Valley to determine its suitability as a forage crop in subarctic regions (Klebesadel 1993).

2.4. Allelopathic

a.	No	0
b.	Yes	2
c.	Unknown	U
	Score	**0**

Documentation: No evidence suggests that *Elymus sibiricus* is allelopathic (USDA 2010).

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 able to fix nitrogen	3
d.	Unknown	U
	Score	**2**

Documentation: *Elymus sibiricus* dominated severely degraded grassland on the Tibetan Plateau among 23 other plant species after being seeded (Wang et al. 2005), showing that it is competes well with forbs and other grasses in mesic, disturbed areas. This species is well-suited to climates similar to that of the Matanuska Valley (Dewey 1974, Klebesadel 1993).

2.6. Forms dense thickets, has a climbing or smothering growth habit, or is otherwise taller than the surrounding vegetation.

a.	Does not grow densely or above surrounding vegetation	0
b.	Forms dense thickets	1

c.	Has a climbing or smothering growth habit, or is otherwise taller than the surrounding vegetation	2
d.	Unknown	U
	Score	**1**

Documentation: *Elymus sibiricus* has an extensive root system and forms sods or tufts (Klebesadel 1993, Dzyubenko and Dzyubenko 2009). Plants do not grow taller than 150 cm (Barkworth et al. 2007).

2.7. Germination requirements

a.	Requires sparsely vegetated soil and disturbance to germinate	0
b.	Can germinate in vegetated areas, but in a narrow range of or in special conditions	2
c.	Can germinate in existing vegetation in a wide range of conditions	3
d.	Unknown	U
	Score	**0**

Documentation: In Russia, *Elymus sibiricus* germinates in sparsely vegetated habitats, such as dry meadows, stony slopes, bushlands, forests, and sandy river banks (Dzyubenko and Dzyubenko 2009). All recorded infestations in Alaska are associated with soil disturbances or open mineral soils (AKEPIC 2010).

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

a.	No	0
b.	Yes	3
c.	Unknown	U
	Score	**3**

Documentation: *Elymus repens* and *E. canadensis* are non-native species known or expected to occur in Alaska (AKEPIC 2010). *E. repens* has an invasiveness rank of 59 and is considered noxious in 18 states of the U.S. and five provinces of Canada (AKEPIC 2010, Invaders 2010, USDA 2010).

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
d.	Unknown	U
	Score	**1**

Documentation: *Elymus sibiricus* grows on sandy or gravelly river bars and floodplains in British Columbia (Klinkenberg 2010). It has been documented growing on an open, grassy bank along the Mackenzie River in British Columbia (Bowden and Cody 1961) and in areas naturally disturbed by river action along the Nenana River in Alaska (Carlson and Gotthardt 2009, AKEPIC 2010).

Total Possible	25
Total	**13**

3. Ecological Amplitude and Distribution

3.1. Is the species highly domesticated or a weed of agriculture?

a.	Is not associated with agriculture	0
b.	Is occasionally an agricultural pest	2
c.	Has been grown deliberately, bred, or is known as a significant agricultural pest	4
d.	Unknown	U

Score **4**

Documentation: In much of Russia, *Elymus sibiricus* is grown for hay and silage and is used as a forage crop in areas with severe winters. It is planted on sand or in ravines for erosion control (Dzyubenko and Dzyubenko 2009, Terekhina 2009). This species has been cultivated experimentally in the Matanuska Valley to determine its suitability as a forage crop in subarctic regions (Klebesadel 1993).

3.2. Known level of ecological impact in natural areas

a.	Not known to impact other natural areas	0
b.	Known to impact other natural areas, but in habitats and climate zones dissimilar to those in Alaska	1
c.	Known to cause low impact in natural areas in habitats and climate zones similar to those in Alaska	3
d.	Known to cause moderate impact in natural areas in habitat and climate zones similar to those in Alaska	4
e.	Known to cause high impact in natural areas in habitat and climate zones similar to those in Alaska	6
f.	Unknown	U

Score **U**

Documentation: *Elymus sibiricus* grows in riparian areas in British Colombia, but no ecological impacts have been documented from this habitat (Bowden and Cody 1961, Klinkenberg 2010).

3.3. Role of anthropogenic and natural disturbance in establishment

a.	Requires anthropogenic disturbance to establish	0
b.	May occasionally establish in undisturbed areas, readily establishes in naturally disturbed areas	3
c.	Can establish independently of natural or anthropogenic disturbances	5
e.	Unknown	U

Score **3**

Documentation: *Elymus sibiricus* can establish in areas naturally disturbed by river action, as it has along the Nenana and Mackenzie Rivers in Alaska and Canada, respectively (Bowden and Cody 1961, AKEPIC 2010). All recorded infestations in Alaska are associated with soil disturbances or open mineral soils; 95% of infestations are associated with fill importation (AKEPIC 2010).

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
e.	Unknown	U

Score **5**

Documentation: *Elymus sibiricus* is native to western Russia and much of Asia (Dzyubenko et al. 2005, eFloras 2008). It has been introduced to North America (Barkworth et al. 2007, USDA 2010). Established populations have been recorded from above the Arctic Circle in western and central Russia (Dzyubenko et al. 2005).

3.5. Extent of the species' U.S. range and/or occurrence of formal state or provincial listing

a.	Occurs in 0-5 percent of the states	0
b.	Occurs in 6-20 percent of the states	2
c.	Occurs in 21-50 percent of the states and/or listed as a problem weed (e.g., "Noxious," or "Invasive") in one state or Canadian province	4
d.	Occurs in more than 50 percent of the states and/or listed as a problem weed in two or more states or Canadian provinces	5
e.	Unknown	U

Score **0**

Documentation: *Elymus sibiricus* has not been listed as a noxious weed in any state of the U.S. or province of Canada (Invaders 2010, USDA 2010). In North America, this species has been documented from Alaska, British Columbia, Northwest Territories, and Yukon (Barkworth et al. 2007, USDA 2010).

Total Possible 19
Total **12**

4. Feasibility of Control

4.1. Seed banks

a.	Seeds remain viable in the soil for less than three years	0
b.	Seeds remain viable in the soil for three to five years	2
c.	Seeds remain viable in the soil for five years or longer	3
e.	Unknown	U

Score **U**

Documentation: The amount of time seeds remain viable is unknown.

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
e.	Unknown	U

Score **1**

Documentation: *Elymus sibiricus* sometimes forms short rhizomes from which it can resprout (Klinkeberg 2010).

4.3. Level of effort required

a.	Management is not required (e.g., species does not persist in the absence of repeated anthropogenic disturbance)	0
b.	Management is relatively easy and inexpensive; requires a minor investment of human and financial resources	2
c.	Management requires a major short-term or moderate long-term investment of human and financial resources	3
d.	Management requires a major, long-term investment of human and financial resources	4
e.	Unknown	U

Score **U**

Documentation: Control methods for *Elymus sibiricus* have not been documented.

Total Possible	3
Total	**1**

Total for four sections possible	87
Total for four sections	**46**

References:

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