

## ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

*Botanical name:*            *Schedonorus arundinaceus* (Schreb.) Dumort.

*Common name:*            tall fescue

**Assessors:**

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*Date:* 3/3/2011

*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	<u>Yes</u>
Interior-Boreal	<u>Yes</u>
Arctic-Alpine	<u>Yes</u>

**INVASIVENESS RANKING**

	Total (total answered points possible <sup>1</sup> )	Total
Ecological impact	40 ( <u>40</u> )	<u>22</u>
Biological characteristics and dispersal ability	25 ( <u>25</u> )	<u>17</u>
Ecological amplitude and distribution	25 ( <u>25</u> )	<u>18</u>
Feasibility of control	10 (7)	4
Outcome score	100 ( <u>97</u> ) <sup>b</sup>	<u>61</u> <sup>a</sup>
Relative maximum score <sup>2</sup>		<u>63</u>

<sup>1</sup> For questions answered “unknown” do not include point value for the question in parentheses for “total answered points possible.”

<sup>2</sup> Calculated as  $a/b \times 100$

## A. CLIMATIC COMPARISON

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

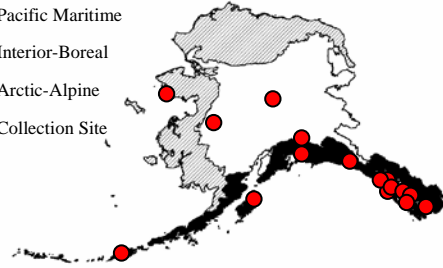
- Yes - continue to 1.2  
 No - continue to 2.1

1.2. From which eco-geographic region has it been collected or documented (see inset map)?

Proceed to Section B. INVASIVENESS RANKING

- Pacific Maritime  
 Interior-Boreal  
 Arctic-Alpine

- Pacific Maritime  
 Interior-Boreal  
 Arctic-Alpine  
 Collection Site



**Documentation:** *Schedonorus arundinaceus* has been documented from all three ecogeographic regions of Alaska (Hultén 1968, AKEPIC 2011, UAM 2011).

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:**

## 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
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**Documentation:** The roots of *Schedonorus arundinaceus* form dense mats that decrease soil erosion and increase organic matter inputs to the soil (Walsh 1995, Batcher 2003, Dzyubenko and Dzyubenko 2009). This species is a strong competitor with surrounding vegetation and tree seedlings for water, nutrients, and light (Walsh 1995), and its presence is likely to alter natural successional processes. Reclaimed mine sites seeded with *Schedonorus arundinaceus* in the Midwestern U.S. have resisted the development of forb-rich or woody communities (Scott and Lima 2004).

*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
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**Documentation:** *Schedonorus arundinaceus* is known to reduce the growth and survival of woody plant species (Walsh 1995, Smith et al. 2001). When seeded with *Trifolium pratense* in a reclaimed mine site in Indiana, *Schedonorus arundinaceus* reduced the survival of native *Quercus rubra* and *Juglans nigra*. Tree seedling survival was greatly increased when *Schedonorus arundinaceus* was controlled chemically (Andersen et al. 1989).

*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 

5
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**Documentation:** *Schedonorus arundinaceus* forms dense stands that reduce native plant populations and decrease local biodiversity (Walsh 1995, Batcher 2003).

*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
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**Documentation:** *Schedonorus arundinaceus* serves as a host for the fungus *Neotyphodium coenophialum*, which produces toxic alkaloids. Livestock grazing mature, infected plants show decreased weight gain, reduced peripheral blood flow, longer hair coats, and lower enzyme activities (Nihsen et al. 2004). Infected seeds negatively impact the growth, circulation, reproduction, and thermoregulation of mice (Tannenbaum et al. 1998). Most populations in the U.S. host the fungus; however, uninfected seeds are available commercially (Washburn and Barnes 2000). Young plants are palatable to livestock. Deer, pronghorn, and elk are known to feed on *Schedonorus arundinaceus*. Birds, including waterfowl, and small mammals eat the seeds and leaves (Walsh 1995). Dense stands can reduce habitat quality for many wildlife species by decreasing structural complexity and biodiversity (Washburn and Barnes 2000). *Schedonorus arundinaceus* can cause allergic reactions in people (Walsh 1995).

Total Possible	40
Total	22

## 2. Biological Characteristics and Dispersal Ability

### 2.1. Mode of reproduction

- a. Not aggressive (produces few seeds per plant [0-10/m<sup>2</sup>] and not able to reproduce vegetatively). 0
  - b. Somewhat aggressive (reproduces by seed only [11-1,000/m<sup>2</sup>]) 1
  - c. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed [<1,000/m<sup>2</sup>]) 2
  - d. Highly aggressive (extensive vegetative spread and/or many seeded [>1,000/m<sup>2</sup>]) 3
  - e. Unknown U
- Score 

2
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**Documentation:** *Schedonorus arundinaceus* reproduces sexually by seeds and vegetatively by tillering and sometimes from short rhizomes (Walsh 1995, Darbyshire 2007, Klinkenberg 2010). The fungus *Neotyphodium coenophialum* is transmitted maternally in seeds. The number of seeds produced per plant has not been quantified. High nitrogen levels and cold winters stimulate tillering (Walsh 1995).

### 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

**Documentation:** Seeds can be spread in the excrement of animals (Walsh 1995).

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

**Documentation:** *Schedonorus arundinaceus* is grown for forage, soil stabilization, and coarse turf (Darbyshire 2007). Seeds can be spread in the excrement of livestock (Walsh 1995). They are a contaminant in grass seed purchased in Alaska (Conn pers. obs.).

2.4. *Allelopathic*

- |    |         |   |
|----|---------|---|
| a. | No      | 0 |
| b. | Yes     | 2 |
| c. | Unknown | U |

Score

**Documentation:** *Schedonorus arundinaceus* produces allelopathic compounds (Luu et al. 1989, Walsh 1995, Smith et al. 2001, Batcher 2003).

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

**Documentation:** The presence of *Neotyphodium coenophialum*, a fungus which grows in *Schedonorus arundinaceus*, increases the competitive ability, photosynthetic rate, survival, growth, and drought tolerance of the grass and discourages insect herbivory (Marks et al. 1991). This grass is highly competitive (Smith et al. 2001, Batcher 2003). Uninfected *Schedonorus arundinaceus* is less competitive and is prone to fail when stressed (Walsh 1995).

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

**Documentation:** *Schedonorus arundinaceus* forms dense stands (Walsh 1995) but does not usually grow taller than 1.5 m (Darbyshire 2007, Klinkenberg 2010).

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
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**Documentation:** *Schedonorus arundinaceus* colonizes bare soil and can invade sparsely vegetated natural areas (Walsh 1995, Batcher 2003). Seeds germinate best on disturbed soil (Washburn and Barnes 2000).

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

- a. No 0
- b. Yes 3
- c. Unknown U

Score 

3
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**Documentation:** *Schedonorus pratensis* is considered a noxious weed seed in New Jersey and Virginia (Invaders 2011). Both *S. pratensis* and *S. giganteus* occur as non-native weeds in North America (Darbyshire 2007).

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 

2
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**Documentation:** *Schedonorus arundinaceus* can invade the edges of open marshes and fens (Batcher 2003) and has invaded riparian areas in Japan (Miyawaki and Washitani 2004).

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Total Possible 

25
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Total 

17
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**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
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**Documentation:** *Schedonorus arundinaceus* is grown for forage, soil stabilization, and coarse turf (Darbyshire 2007, Dzyubenko and Dzyubenko 2009, Klinkenberg 2010). It has been planted for the revegetation of surface mines in the eastern U.S. (Walsh 1995).

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 

1
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**Documentation:** *Schedonorus arundinaceus* invades coastal scrub and grassland on the north and central coast in California (DiTomaso and Healy 2007). It has invaded natural grassland, savanna, and woodland habitats in the U.S. (Walsh 1995, Batcher 2003).

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
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**Documentation:** Most infestations in Alaska are associated with anthropogenically disturbed habitats (AKEPIC 2011). However, *Schedonorus arundinaceus* was found growing along a rocky upper beach near a logging camp on Chichagof Island (UAM 2011), suggesting that it can spread from anthropogenically disturbed areas to naturally disturbed areas.

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
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**Documentation:** *Schedonorus arundinaceus* is native to Eurasia and North Africa (Darbyshire 2007, eFloras 2008). It has been introduced to Japan, Korea, North America, South America, Australia, and New Zealand (Darbyshire 2007, eFloras 2008, Landcare Research 2011, Western Australian Herbarium 2011). This species has been documented as far north in Norway as 68.8°N (Vascular Plants Field Notes Oslo 2011).

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 <table border="1" style="display: inline-table;"><tr><td>5</td></tr></table> | 5 |
| 5  |  |  |   |

**Documentation:** *Schedonorus arundinaceus* grows in 46 states of the U.S. and much of Canada (Darbyshire 2007, USDA 2011). It is considered a noxious weed seed in New Jersey and Virginia (Invaders 2011).

Total Possible	<table border="1" style="display: inline-table;"><tr><td>25</td></tr></table>	25
25		
Total	<table border="1" style="display: inline-table;"><tr><td>18</td></tr></table>	18
18		

#### 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 <table border="1" style="display: inline-table;"><tr><td>U</td></tr></table> | U |
| U  |   |  |   |

**Documentation:** *Schedonorus arundinaceus* produces persistent seed banks. The amount of time seeds remain viable in soil is unknown, but 4.5% of seeds germinated after 19 years of storage in cool, dry conditions (Walsh 1995, Batcher 2003).

##### 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 <table border="1" style="display: inline-table;"><tr><td>1</td></tr></table> | 1 |
| 1  |  |  |   |

**Documentation:** *Schedonorus arundinaceus* resprouts from the root crown after the removal of the aboveground growth (Walsh 1995). This species can regenerate from rhizome fragments when rhizomes are present (DiTomaso and Healy 2007).

##### 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 |



**Documentation:** *Schedonorus arundinaceus* can be controlled with applications of chlorsulfuron, metsulfuron, imazapic, paraquat, glyphosate, or AC 263,222 (Walsh 1995, Washburn and Barnes 2000, Batcher 2003). A mixture of .21 kg of clethodim, 2.34 liters of crop oil concentrate, and 2.85 kg ammonium sulfate per hectare reduced *Schedonorus arundinaceus* as effectively as applications of imazapic; clethodim did less harm to forbs, while imazapic did less damage to native grasses (Ruffner and Barnes 2010). Prescribed burning in spring followed by herbicide applications can further control this species (Batcher 2003, Applegate 2009). However, prescribed burning in summer without subsequent herbicide application has been shown to stimulate seed production during the following season (Batcher 2003). Controlled areas will likely need to be monitored for several years after treatment.

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Total Possible	7
Total	4

Total for four sections possible	97
Total for four sections	61

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## References:

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