

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Sagina procumbens* L.

Common name: birdseye pearlwort

Assessors:

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Date: 3/8/2011

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 ¹)	Total
Ecological impact	40 (40)	<u>6</u>
Biological characteristics and dispersal ability	25 (25)	<u>12</u>
Ecological amplitude and distribution	25 (25)	<u>15</u>
Feasibility of control	10 (7)	<u>5</u>
Outcome score	100 (97) ^b	<u>38^a</u>
Relative maximum score ²		<u>39</u>

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

² Calculated as $a/b \times 100$

A. CLIMATIC COMPARISON

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

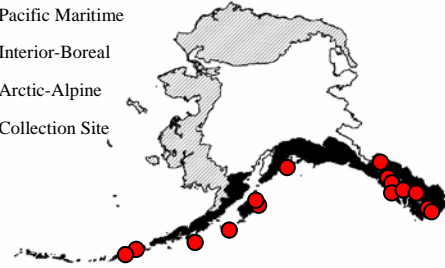
- Yes - continue to 1.2
 No - continue to 2.1

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: *Sagina procumbens* has been documented from the Pacific Maritime eco-geographic region of Alaska (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: *Sagina procumbens* has been documented from sites near Røros and Dombås, Norway, which have 55% and 53% climatic similarities with Fairbanks, respectively, and 76% and 63% climatic similarities with Nome, respectively (CLIMEX 1999, Agder Naturmuseum 2010, Norwegian Species Observation Service 2010).

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 | 10 |

- substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)
- e. Unknown
- U
Score 1

Documentation: *Sagina procumbens* may reduce the availability of soil moisture and nutrients in disturbed areas. However, its potential impacts are likely minor because it is easily outcompeted by taller vegetation (Western Australian Herbarium 2011).

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 3

Documentation: *Sagina procumbens* colonizes disturbed soil (Pakeman and Small 2005, DiTomaso and Healy 2007) and forms extensive mats (Klinkenberg 2010, NatureGate 2011), likely increasing the density of vegetation in disturbed areas. Approximately 10% of infestations in Alaska occur at or above 20% ground cover (AKEPIC 2011).

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 1

Documentation: *Sagina procumbens* forms extensive mats (Klinkenberg 2010, NatureGate 2011) that may reduce native plant populations in disturbed areas. However, this species is displaced as the vegetative cover in disturbed areas increases (Pakeman and Small 2005).

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 7

- in habitat connectivity, interferes with native pollinators, or introduces injurious components such as spines, toxins)
- 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

1

Documentation: *Sagina procumbens* is consumed by mammals and birds (Welch 1985).

Total Possible

40

Total

6

2. Biological Characteristics and Dispersal Ability

2.1. Mode of reproduction

- a. Not aggressive (produces few seeds per plant [0-10/m²] and not able to reproduce vegetatively). 0
- b. Somewhat aggressive (reproduces by seed only [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 (extensive vegetative spread and/or many seeded [>1,000/m²]) 3
- e. Unknown U
- Score

2

Documentation: *Sagina procumbens* reproduces sexually by seeds and vegetatively by stems that root at the nodes (Crow 2005). Plants produce large numbers of seeds (Western Australian Herbarium 2011).

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: Seeds are likely dispersed by moving water. They have been found in sediment samples from Lake Mills on the Olympic Peninsula in Washington (Brown and Chenoweth 2008). Seeds can be spread in the excrement of some animals (Welch 1985).

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 <input type="text" value="2"/> |

Documentation: *Sagina procumbens* has been identified as a weed contaminant in soil from container-grown ornamental plants available from vendors in Alaska (Conn et al. 2008). Seeds have also been found in cattle dung (Welch 1985, Matějková et al. 2003).

2.4. *Allelopathic*

- | | | |
|----|---------|--------------------------------------|
| a. | No | 0 |
| b. | Yes | 2 |
| c. | Unknown | U |
| | | Score <input type="text" value="0"/> |

Documentation: No evidence suggests that *Sagina procumbens* is allelopathic.

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 <input type="text" value="0"/> |

Documentation: *Sagina procumbens* is a ruderal species that colonizes bare soil but does not persist in closed vegetation (Pakeman and Small 2005). Infestations in Alaska have been noted for low aggressiveness (AKEPIC 2011).

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 <input type="text" value="0"/> |

Documentation: *Sagina procumbens* forms extensive mats by vegetative spread (Klinkenberg 2010, NatureGate 2011). However, the mats are low-growing and are outshaded by taller plants (Western Australian Herbarium 2011).

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 <input type="text" value="0"/> |

Documentation: *Sagina procumbens* occupies coastal cliffs, shores, roadsides, bare areas, open ground, and disturbed sites (DiTomaso and Healy 2007, Klinkenberg 2010, NatureGate 2011, Western Australian Herbarium 2011). It exploits gaps in vegetation created by disturbances but is often excluded as the cover of other species increases (Pakeman and Small 2005).

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

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

Documentation: *Sagina apetala* and *S. japonica* are known to occur as non-native weeds in North America (Crow 2005, DiTomaso and Healy 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 | | 3 |

Documentation: *Sagina procumbens* can grow in wetland communities and pond and lake margins (Crow 2005, Brown and Chenoweth 2008).

Total Possible	25
Total	12

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 | | 1 |

Documentation: *Sagina procumbens* is an occasional weed in lawns (Klinkenberg 2010) and container-grown ornamental plants (Conn et al. 2008).

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

Documentation: *Sagina procumbens* dominates and modifies the vegetative composition of some habitats that have been associated with past disturbances on the subantarctic Marion Island (Frenot et al. 2001).

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: Seedlings are not likely to persist in closed vegetation (Pakeman and Small 2005). The majority of infestations in Alaska are associated with anthropogenically disturbed areas (AKEPIC 2011, UAM 2011); however, *Sagina procumbens* can also establish in areas disturbed by natural fluvial or coastal processes (UAM 2011).

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: *Sagina procumbens* is native to Europe (Crow 2005). It has been introduced to North America, South America, Asia, Australia, New Zealand, and several subantarctic islands (Frenot et al. 2001, Crow 2005, Landcare Research 2011, Western Australian Herbarium 2011). This species is known to grow as far north as 70.9°N in Norway (Vascular Plant Herbarium Trondheim 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

5

Documentation: *Sagina procumbens* grows in 33 states of the U.S. and much of Canada (USDA 2011). It is not considered a noxious weed in any states of the U.S. or provinces of Canada.

Total Possible

25

Total

15

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"><tr><td>3</td></tr></table> | 3 |
| 3 | | | |

Documentation: Seeds can remain viable in the soil for more than 5 years (Rosef 2008).

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"><tr><td>U</td></tr></table> | U |
| U | | | |

Documentation: The extent to which *Sagina procumbens* resprouts after the removal of the aboveground growth is unknown.

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 <table border="1"><tr><td>2</td></tr></table> | 2 |
| 2 | | | |

Documentation: Small infestations can be removed by digging. Glyphosate may effectively control larger infestations (Western Australian Herbarium 2011). Plants can be controlled with two or three applications of 2, 4-D with mecoprop, 2, 4-D with dichlorprop-P, or 2, 4-D with Dicamba (Royal Horticultural Society 2011).

Total Possible	<table border="1"><tr><td>7</td></tr></table>	7
7		
Total	<table border="1"><tr><td>5</td></tr></table>	5
5		

Total for four sections possible	<table border="1"><tr><td>97</td></tr></table>	97
97		
Total for four sections	<table border="1"><tr><td>38</td></tr></table>	38
38		

References:

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