

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Myosotis scorpioides* L.

Common name: European forget-me-not

Assessors:

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Date: 12/3/2010

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 | <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 (<u>40</u>) | <u>16</u> |
| Biological characteristics and dispersal ability | 25 (<u>25</u>) | <u>15</u> |
| Ecological amplitude and distribution | 25 (<u>25</u>) | <u>18</u> |
| Feasibility of control | 10 (0) | <u>0</u> |
| Outcome score | 100 (<u>90</u>) ^b | <u>49</u> ^a |
| Relative maximum score ² | | <u>54</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?

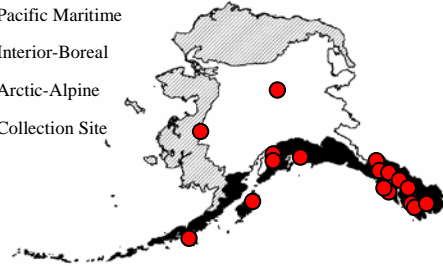
- Yes - continue to 1.2
 No - continue to 2.1

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

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: *Myosotis scorpioides* has been documented from many locations near Røros, Norway (Vascular Plant Herbarium Trondheim 2010), which has a 76% climatic similarity with Nome (CLIMEX 1999). This species grows in arctic regions in Scandinavia and Russia (Elven 2007) and has been found as far north in Norway as 69.733°N (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 | 10 |

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)

e. Unknown

U

Score

| |
|---|
| 3 |
|---|

Documentation: *Myosotis scorpioides* may reduce the nutrients available to native plant species in wet areas, particularly where it grows at high densities (Mehrhoff et al. 2003, Ling 2010).

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: *Myosotis scorpioides* can form large monocultures and may change the density of vegetation in naturally or anthropogenically disturbed, wet areas (Mehrhoff et al. 2003).

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 |
|---|

Documentation: *Myosotis scorpioides* competes with native plants in wet areas (Ling 2010) and can form large monocultures (Mehrhoff et al. 2003); therefore, it has the potential to significantly reduce populations of native plant species.

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

| |
|---|
| 5 |
|---|

Documentation: *Myosotis scorpioides* contains pyrrolizidine alkaloids that are toxic to mammals and can cause weight loss, poor body condition, and liver disease (DiTomaso and Healy 2007). Plants provide additional habitats for aquatic, winged insects (Ling 2010). The nectar and pollen attract pollinating insects (Ling 2010, Plants for a Future 2010); the presence of *Myosotis scorpioides* may alter native plant-pollinator interactions. This species forms associations with mycorrhizal fungi (Šraj-Kržič et al. 2006).

Total Possible

| |
|----|
| 40 |
|----|

Total

| |
|----|
| 16 |
|----|

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: *Myosotis scorpioides* reproduces sexually by seeds and vegetatively by stolons that root at the nodes (Washington Water Quality Program 2010). The number of seeds produced per plant has not been quantified for *Myosotis scorpioides*. However, the perennial *Myosotis alpestris* produces 20 to 120 seeds per plant in Britain (Elkington 1964), and the annual or biennial *M. arvensis* produces up to 700 seeds per plant in Russia (Luneva 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: Seeds can be transported by water (Mehrhoff et al. 2003). *Myosotis scorpioides* germinated from water and soil samples that were taken during and after a flood in a wetland along the Rhône River in France (Cellot et al. 1998).

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: *Myosotis scorpioides* is planted in gardens as an ornamental or medicinal herb, and it escapes from cultivation into natural areas (Hultén 1968, Cody 1996, Mehrhoff et al. 2003, Ling 2010, Plants for a Future 2010, Washington Water Quality Program 2010).

2.4. Allelopathic

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

Score

Documentation: No evidence suggests that *Myosotis scorpioides* 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

Documentation: *Myosotis scorpioides* competes with native vegetation in wet areas (Ling 2010) and can form large monocultures (Mehrhoff et al. 2003).

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: *Myosotis scorpioides* can form large monocultures along streams in New England (Mehrhoff et al. 2003), suggesting that the formation of dense growth is possible.

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 northern Germany, seedlings of *Myosotis scorpioides* were found most frequently in moderately grazed areas (Vogt et al. 2007), suggesting that grazing disturbances promote the germination of this species. All recorded infestations of *Myosotis scorpioides* in Alaska are associated with disturbances (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: *Myosotis latifolia* is a problematic, non-native species in California (DiTomaso and Healy 2007). *M. sylvatica* is known to occur as a non-native species in Alaska (AKEPIC 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

| |
|---|
| 3 |
|---|

Documentation: In Finland, *Myosotis scorpioides* grows in spruce swamps and in the marshy margins of rivers and lakes (NatureGate 2010). In North America, it grows in moist to wet meadows, ditches, pond margins, stream banks, and swamps (Mehrhoff et al. 2003, Klinkenberg 2010, Ling 2010).

Total Possible

| |
|----|
| 25 |
|----|

Total

| |
|----|
| 15 |
|----|

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: *Myosotis scorpioides* has been cultivated as an ornamental plant and was most likely brought to North America as an intentional planting. It escapes from gardens into natural communities (Hultén 1968, Cody 1996, Mehrhoff et al. 2003, Washington Water Quality Program 2010).

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: *Myosotis scorpioides* escapes from gardens and forms dense monocultures in wet areas in New England (Mehrhoff et al. 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 |

Documentation: All recorded infestations of *Myosotis scorpioides* in Alaska are associated with disturbances. Most infestations have established in anthropogenically disturbed sites, but some are associated with natural coastal, river, or stream disturbances (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: *Myosotis scorpioides* is native to temperate Eurasia (eFloras 2008). It has been introduced to North America and New Zealand (GBIF New Zealand 2010, USDA 2010). This species is known from many locations north of the Arctic Circle in Norway and grows as far north as 69.733°N (Norwegian Species Observation Service 2010). It is also known from arctic Russia (Elven 2007).

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: *Myosotis scorpioides* grows in 41 states of the U.S. and much of Canada. It is considered invasive in Connecticut and is prohibited in Massachusetts (USDA 2010).

| | |
|----------------|----|
| Total Possible | 25 |
| Total | 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 | U |

Documentation: The amount of time seeds remain viable has not been documented.

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 | U |

Documentation: The regenerative capacity of *Myosotis scorpioides* 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 | U |

Documentation: Control methods have not been documented for *Myosotis scorpioides*.

| | |
|----------------|---|
| Total Possible | 0 |
| Total | 0 |

| | |
|----------------------------------|----|
| Total for four sections possible | 90 |
| Total for four sections | 49 |

References:

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