

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Aegopodium podagraria* L.

Common name: bishop's goutweed

Assessors:

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Date: 1/10/2011

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 (<u>40</u>)	<u>20</u>
Biological characteristics and dispersal ability	25 (<u>25</u>)	<u>9</u>
Ecological amplitude and distribution	25 (<u>25</u>)	<u>21</u>
Feasibility of control	10 (<u>7</u>)	<u>5</u>
Outcome score	100 (<u>97</u>) ^b	<u>55</u> ^a
Relative maximum score ²		<u>57</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?

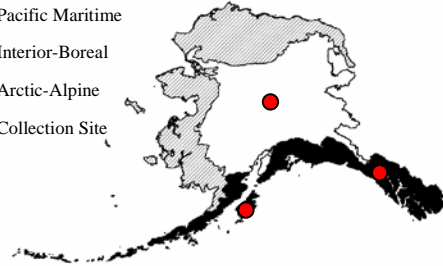
- Yes - continue to 1.2
 No - continue to 2.1

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: *Aegopodium podagraria* has been documented from the Pacific Maritime and Interior-Boreal ecogeographic regions of Alaska (AKEPIC 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: *Aegopodium podagraria* has been documented from two locations approximately 3.5 km from Røros, Norway, which has a 76% climatic similarity with Nome (CLIMEX 1999, Vascular Plant Herbarium Trondheim 2010). It has also been documented from near Arkhangel’sk, Russia, which also has a 76% climatic similarity with Nome (CLIMEX 1999, Luneva and Budrevskaya 2007).

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

Documentation: *Aegopodium podagraria* is highly competitive in shaded areas (Garske and Schimpf 2005) and may decrease the nutrients and moisture available to native plant species. Its ability to inhibit the germination and growth of trees and shrubs (Garske and Schimpf 2005) in forests and woodlands suggests that this species may significantly alter decomposition, nutrient cycling, and other ecological processes.

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

Documentation: *Aegopodium podagraria* is highly shade tolerant and can form dense patches in closed-canopy forests, significantly increasing the density of herbaceous ground cover, and inhibiting the germination and growth of trees and shrubs (Garske and Schimpf 2005).

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

Documentation: *Aegopodium podagraria* forms dense stands that displace native species and reduce species diversity in ground layers (Klinkenberg 2010) suggesting that this species may significantly alter decomposition, nutrient cycling, and other ecological processes.

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 3

Documentation: *Aegopodium podagraria* provides food and habitat for insects and mollusks (Waggy 2010). It is pollinated by a variety of beetles, bees, and small flies (Garske and Schimpf 2005, Waggy 2010); for this reason, its presence may alter native plant-pollinator interactions.

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/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: *Aegopodium podagraria* reproduces sexually by seeds and vegetatively from rhizomes and root fragments (Klinkenberg 2010, Waggy 2010). The number of seeds produced per plant is unknown but probably low (Waggy 2010). This species rarely produces seeds in shaded areas. In sunny areas, seedlings are rarely able to compete with mature plants, and most perish (Gatsuk et al. 1980). Patches increase in size primarily through extension of the rhizome system (Garske and Schimpf 2005). New individuals are formed by vegetative separation when the rhizomes decay. Subdivision into two or several filial plants can occur, each consisting of partial shoots joined by rhizomes (Gatsuk et al. 1980).

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 0

Documentation: Seeds have no specific adaptations for dispersal (Garske and Schimpf 2005), but can be transported short distances by wind (Waggy 2010). In Gustavus, Alaska, *Aegopodium podagraria* appears to primarily reproduce vegetatively (Rapp 2006).

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: *Aegopodium podagraria* is grown in gardens as an ornamental plant, a medicinal herb, or a vegetable. Most infestations originate from intentional plantings that have spread to natural areas (Garske and Schimpf 2005, Plants for a Future 2010, Waggy 2010). This species can spread from root fragments in dumped garden debris (Klinkenberg 2010). The variegated variety has been planted in Gustavus as a ground cover and was observed spreading beyond maintained plantings and displacing native species (Rapp 2006).

2.4. *Allelopathic*

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

Score

Documentation: No evidence suggests that *Aegopodium podagraria* 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: *Aegopodium podagraria* competes well for sunlight in ground layers under closed canopies and can displace surrounding herbaceous vegetation (Garske and Schimpf 2005, Klinkenberg 2010).

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: *Aegopodium podagraria* forms dense patches that displace native species (Klinkenberg 2010), but is a low-growing species.

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: *Aegopodium podagraria* most often establishes under closed canopies where the ground layer vegetation has been disturbed or where the soil is bare (Waggy 2010).

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

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

Score

0

Documentation: No other *Aegopodium* species are known to occur as non-native weeds in North America (ITIS 2011, USDA 2011).

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 Europe and Vermont, *Aegopodium podagraria* grows in riparian areas in deciduous woodlands and forests. In Massachusetts, it grows in wetland communities. In North and South Carolina, it grows on the edges of bogs (Waggy 2010).

Total Possible

25

Total

9

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: *Aegopodium podagraria* is cultivated as an ornamental plant (Plants for a Future 2010, Waggy 2010). It has also been planted as a low-maintenance ground cover (Garske and Schimpf 2005). Although the less vigorous variegated variety is often cultivated, 'normal' non-variegated plants, which are more vigorous and rapidly spreading, can arise from variegated

populations (Small 1973). The variegated variety has been planted as a ground cover in Gustavus (Rapp 2006).

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 <input type="text" value="4"/> |

Documentation: *Aegopodium podagraria* forms dense mats in Massachusetts (Waggy 2010). Infestations displace native species and reduce species diversity in ground layers in British Columbia (Klinkenberg 2010). This species inhibits the germination and growth of trees and shrubs (Garske and Schimpf 2005).

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 <input type="text" value="3"/> |

Documentation: In North America, *Aegopodium podagraria* commonly grows in anthropogenically disturbed sites, such as mesic roadsides and waste places (Klinkenberg 2010, Waggy 2010). However, it can also establish in naturally disturbed sites such as those disturbed by the digging of animals (Waggy 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 <input type="text" value="5"/> |

Documentation: *Aegopodium podagraria* is common in Europe, Asia Minor, and Central Asia, but its native range is unclear (Luneva and Budrevskaya 2007, Waggy 2010). It has been introduced to North America, Australia, New Zealand, and Japan (Mito and Uesugi 2004, Waggy 2010, Landcare Research 2011). In Norway, this species grows as far north as 71.042°N (Vascular Plant Herbarium Trondheim 2010).

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: *Aegopodium podagraria* is considered invasive and banned in Connecticut, prohibited in Massachusetts, and noxious in Vermont. It grows in 29 states of the U.S. and throughout much of Canada (USDA 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>21</td></tr></table>	21
21		

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: The amount of time seeds remain viable is unknown (Waggy 2010).

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>2</td></tr></table> | 2 |
| 2 | | | |

Documentation: *Aegopodium podagraria* can regenerate from rhizome fragments (Garske and Schimpf 2005, Klinkenberg 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 <table border="1" style="display: inline-table;"><tr><td>3</td></tr></table> | 3 |
| 3 | | | |

Documentation: Small patches can be dug by hand. All underground parts must be removed to prevent plants from regenerating from rhizome fragments. Plant material should be bagged to prevent the dispersal of rhizome fragments. Large infestations can be controlled with herbicides, such as glyphosate. Frequent mowing to prevent seed set can contain populations. Mowing populations in the spring or early summer followed by covering them with black plastic sheeting can effectively control *Aegopodium podagraria*. Controlled areas should be monitored for several years following treatment. No biological control agents are available in North America (Garske and Schimpf 2005).

Total Possible	7
Total	5

Total for four sections possible	97
Total for four sections	55

References:

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