

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Veronica serpyllifolia* L. ssp. *serpyllifolia*

Common name: thymeleaf speedwell

Assessors:

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Date: 12/6/2010

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>30</u>)	<u>5</u>
Biological characteristics and dispersal ability	25 (<u>25</u>)	<u>9</u>
Ecological amplitude and distribution	25 (<u>25</u>)	<u>10</u>
Feasibility of control	10 (7)	<u>7</u>
Outcome score	100 (<u>87</u>) ^b	<u>31</u> ^a
Relative maximum score ²		<u>36</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

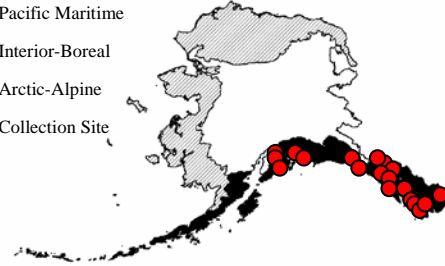
Arctic-Alpine

■ Pacific Maritime

□ Interior-Boreal

▨ Arctic-Alpine

● Collection Site



Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* has been documented from the Pacific Maritime ecogeographic region of Alaska (Hultén 1968, AKEPIC 2010, UAM 2010).

Note on Taxonomy: Two subspecies of *Veronica serpyllifolia* are known to occur in Alaska. *Veronica serpyllifolia* ssp. *humifusa* is native to Alaska and occurs in all three ecogeographic regions in the southern half of the state (Hultén 1968, UAM 2010, USDA 2010). *Veronica serpyllifolia* ssp. *serpyllifolia* is an introduced subspecies that is considered non-native in North America (USDA 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: *Veronica serpyllifolia* has been documented from Røros, Norway, and Dombås, Norway, which have 55% and 52% climatic similarities with Fairbanks and 76% and 63% climatic similarities with Nome, respectively (CLIMEX 1999, Vascular Plants Field Notes Oslo 2010). Introduced *Veronica serpyllifolia* is known to occur in Haines Junction, Yukon (Cody 1996). Whitehorse (which is the only CLIMEX data-point in Yukon) has a 62% climatic similarity with Fairbanks (CLIMEX 1999); therefore, *Veronica serpyllifolia* ssp. *serpyllifolia* is likely to establish in the Interior-Boreal and Arctic-Alpine ecogeographic regions.

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

1

Documentation: *Veronica serpyllifolia ssp. serpyllifolia* may reduce the nutrients and moisture available to native plant species, but only in disturbed areas (Hultén 1968, Cody 1996, AKEPIC 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: Because *Veronica serpyllifolia ssp. serpyllifolia* colonizes disturbed areas (Hultén 1968, Cody 1996, AKEPIC 2010), it may increase the density of vegetation on disturbed ground.

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: *Veronica serpyllifolia* ssp. *serpyllifolia* can form mats (Webb et al. 1988), and it may limit the sizes of native plant populations in disturbed areas by reducing available moisture and nutrients. However, this taxon is unlikely to impact natural communities (Hultén 1968, Cody 1996, 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

U

Documentation: The impacts of *Veronica serpyllifolia* ssp. *serpyllifolia* on associated trophic levels have not been documented.

Total Possible	30
Total	5

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: *Veronica serpyllifolia* ssp. *serpyllifolia* reproduces sexually by seeds and vegetatively by rhizomes and creeping stems that root at the nodes (Hultén 1968, Cody 1996, DiTomaso and Healy 2007, Klinkenberg 2010). The number of seeds produced per plant has not been documented. However, stems usually have 10 to 40 flowers that each produce a capsule filled with numerous seeds (DiTomaso and Healy 2007, eFlorae 2008, Klinkenberg 2010).

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: Most of the seeds of plants in the *Veronica* genus fall to the ground relatively close to the parent plant. Seeds lack specialized adaptations for dispersal; however, some seeds may be dispersed long distances by water, wind, or animals (DiTomaso and Healy 2007).

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: Seeds can be transported in mud attached to shoes, clothing, vehicles, agricultural equipment, and construction equipment. Seeds can likely survive ingestion by cattle (DiTomaso and Healy 2007). Most infestations in Alaska are associated with areas of high human frequency, such as roads and hiking trails (AKEPIC 2010).

2.4. *Allelopathic*

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

Score

Documentation: No evidence has been documented to suggest that *Veronica serpyllifolia* ssp. *serpyllifolia* 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: *Veronica serpyllifolia* ssp. *serpyllifolia* does not compete well with other species (Jacobson 2001).

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: *Veronica serpyllifolia* can form mats (Webb et al. 1988). In Alaska, however, *Veronica serpyllifolia* ssp. *serpyllifolia* does not appear to grow at high enough densities to exclude other plant species; 77% of recorded infestations in Alaska have a canopy cover of 1% (AKEPIC 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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>0</td></tr></table> | 0 |
| 0 | | | |

Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* grows in moist, roadside ditches, roadsides, and waste places in Alaska and Yukon (Hultén 1968, Cody 1996). All recorded infestations in Alaska, except for 4% that do not include information on disturbance type, are associated with anthropogenic 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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>3</td></tr></table> | 3 |
| 3 | | | |

Documentation: *Veronica anagallis-aquatica*, *V. arvensis*, *V. chamaedrys*, *V. longifolia*, *V. peregrina*, *V. persica*, and *V. spicata* are known or expected to occur as non-native species in Alaska (AKEPIC 2010). *V. arvensis*, *V. peregrina* ssp. *xalapensis*, and *V. persica* are considered non-native weeds in California (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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>0</td></tr></table> | 0 |
| 0 | | | |

Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* has not been documented invading riparian or wetland communities.

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

Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* is an occasional turf, lawn, and garden weed, but it is not associated with agriculture (UC IPM Online 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

Documentation: Ecological impacts of *Veronica serpyllifolia* ssp. *serpyllifolia* have not been documented from natural areas.

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

Documentation: All recorded infestations in Alaska, except for 4% that do not include information on disturbance type, are associated with anthropogenic disturbances; 87% 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

Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* is native to Europe (DiTomaso and Healy 2007, Klinkenberg 2010). It has been introduced to North America and New Zealand (Webb et al. 1988, USDA 2010). This taxon is known to grow in arctic regions from Europe to western Siberia (Elven 2007). *Veronica serpyllifolia* has been documented as far north as 71°N in Norway (Vascular Plant Herbarium Oslo 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

5

Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* grows in 37 states of the U.S. (USDA 2010). It is not considered a noxious weed in any state of the U.S. or province of Canada (Invaders 2010, USDA 2010).

Total Possible

25

Total

10

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

3

Documentation: *Veronica serpyllifolia* ssp. *serpyllifolia* produces persistent seed banks (Onaindia and Amezaga 2000). The seeds of other taxa in the *Veronica* genus, such as *V. arvensis* and *V. peregrina* ssp. *xalapensis*, remain viable for up to 30 years (DiTomaso and Healy 2007).

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 extent to which *Veronica serpyllifolia* ssp. *serpyllifolia* is able to resprout 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

4

Documentation: Efforts to control *Veronica serpyllifolia* with herbicides have proven only partially successful. After three months, applications of dimethyl tetrachloroterephthalate, a pre-emergent herbicide, reduced a population of *Veronica serpyllifolia* by 87%. However, this pre-emergent herbicide is not practical for controlling infestations outside of an agricultural setting. Other herbicide treatments were less successful (Hanson and Branham 1985). The effects of mechanical control methods have not been evaluated.

Total Possible	7
Total	7

Total for four sections possible	87
Total for four sections	31

References:

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