

ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Silene chalcedonica* (L.) E. H. L. Krause

Common name: Maltese cross

Assessors:

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Date: 1/18/2011

Date of previous ranking, if any: 6T

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>14</u>
Biological characteristics and dispersal ability	25 (<u>25</u>)	<u>10</u>
Ecological amplitude and distribution	25 (<u>25</u>)	<u>14</u>
Feasibility of control	10 (0)	<u>0</u>
Outcome score	100 (<u>90</u>) ^b	<u>38</u> ^a
Relative maximum score ²		<u>42</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?

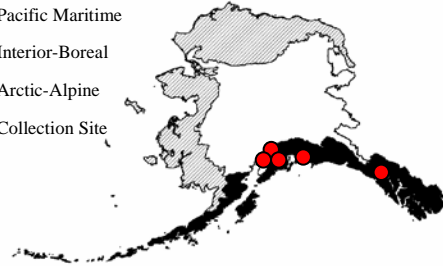
- Yes - continue to 1.2
 No - continue to 2.1

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: *Silene chalcedonica* has been documented from Cooper Landing, Cordova, and Gustavus in the Pacific Maritime ecogeographic region of Alaska and Anchorage and Kenai in the Interior-Boreal ecogeographic region (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: *Silene chalcedonica* has been documented from Jönköping, Sweden, and from a site approximately 9 km south of Uppsala, Sweden, which have 44% and 47% climatic similarities with Nome, respectively (CLIMEX 1999, Artdatabanken 2010, Herbarium of Oskarshamn 2010). It is known to occur in several locations in Finland that have 40% or greater climatic similarities with Nome (CLIMEX 1999, NatureGate 2011).

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 3

Documentation: Other *Silene* species, such as *S. latifolia* and *S. noctiflora*, are known to reduce soil moisture and nutrients (Royer and Dickinson 1999). It is likely that the closely related *Silene chalcedonica* similarly reduces the availability of moisture and nutrients.

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: In Alaska, *Silene chalcedonica* has been documented growing at 10% to 40% ground cover in disturbed areas near town sites (AKEPIC 2011), and it may therefore increase the density of forb layers in disturbed areas.

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 3

Documentation: Because *Silene chalcedonica* can grow at up to 40% ground cover (AKEPIC 2011), it has the potential to reduce populations of native colonizing 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: *Silene chalcedonica* is attractive to bees, butterflies, hummingbirds, and birds (WSU Clark County Extension 2011) and may therefore alter native plant-pollinator interactions. It is a known host for several plant diseases (Kahtz 2008).

Total Possible

40

Total

14

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: *Silene chalcedonica* reproduces sexually by seeds and vegetatively from rhizomes (Morton 2005). It has limited ability to move shoots horizontally, and it forms clumps (Hitchmough 2000). The number of seeds produced per plant has not been quantified for *Silene chalcedonica*.

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

1

Documentation: Seeds are relatively small, 0.7 to 1 mm in diameter (Morton 2005) and may be carried short distances by wind.

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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">3</td></tr></table> | 3 |
| 3 | | | |

Documentation: *Silene chalcedonica* is grown in gardens as an ornamental plant (Morton 2005, eFloras 2008). It has been grown as an ornamental plant in a garden in Cooper Landing and has escaped from cultivation around an abandoned home site in Gustavus. Seeds are sometimes included in “wildflower” seed mixes sold commercially in Alaska (AKEPIC 2011). However, this species rarely escapes cultivation and is not expected to persist (Morton 2005).

2.4. *Allelopathic*

- | | | | |
|----|---------|--|---|
| a. | No | 0 | |
| b. | Yes | 2 | |
| c. | Unknown | U | |
| | | Score <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">0</td></tr></table> | 0 |
| 0 | | | |

Documentation: No evidence suggests that *Silene chalcedonica* 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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">1</td></tr></table> | 1 |
| 1 | | | |

Documentation: *Silene chalcedonica* can grow at 10% to 40% cover, but these sites are only known currently in anthropogenically disturbed sites near towns (AKEPIC 2011). This species had the highest increase in dry weight out of all species grown in mixed plots in southwest Scotland (Hitchmough 2000).

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 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">0</td></tr></table> | 0 |
| 0 | | | |

Documentation: *Silene chalcedonica* is rhizomatous (Morton 2005) and forms clumps (Kahtz 2008), but no evidence indicates that it forms dense mats or thickets.

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: *Silene chalcedonica* grows in disturbed areas, abandoned home sites, roadsides, and open woodlands (Morton 2005, AKEPIC 2011).

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

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

Documentation: *Silene csereii*, *S. latifolia*, *S. noctiflora*, and *S. vulgaris* are each considered a noxious weed in one or more provinces of Canada or states of the U.S. (Invaders 2011, USDA 2011). *S. dioica*, *S. latifolia*, *S. noctiflora*, and *S. vulgaris* are non-native weeds known to occur in Alaska with invasiveness ranks of 42 (AKEPIC 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 0

Documentation: *Silene chalcedonica* is not known to grow in riparian or wetland communities (eFloras 2008, NatureGate 2011).

Total Possible 25
Total 10

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: *Silene chalcedonica* is cultivated often in North America, Russia, and China (Morton 2005, eFloras 2008). However, it rarely escapes cultivation (Morton 2005).

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: *Silene chalcedonica* does occasionally escape cultivation (Morton 2005), but no ecological impacts have 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 0

Documentation: All recorded infestations of *Silene chalcedonica* in Alaska occur in anthropogenically disturbed areas near towns or cities (AKEPIC 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: *Silene chalcedonica* is native to western Russia, Siberia, Central Asia, and Mongolia (eFloras 2008). It has been introduced to Europe and North America (Hitchmough 2000, NatureGate 2011, USDA 2011). This species is known to grow in subarctic regions.

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 4

Documentation: *Silene chalcedonica* grows in Alaska, Connecticut, Idaho, Illinois, Indiana, Maine, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, New York, North Dakota, Pennsylvania, Vermont, and Wisconsin (Morton 2005, USDA 2011). It is not considered a noxious weed.

Total

14

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 in the soil is unknown.

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 *Silene chalcedonica* resprouts after the removal of 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

U

Documentation: Control measures have not been documented for *Silene chalcedonica*.

Total Possible

0

Total

0

Total for four sections possible

90

Total for four sections

38

References:

AKEPIC database. Alaska Exotic Plant Information Clearinghouse Database. 2011. Available: <http://akweeds.uaa.alaska.edu/>
Artdatabanken. 2010. Accessed through GBIF (Global Biodiversity Information Facility) data

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- WSU Clark County Extension. 2011. Maltese Cross, *Lychnis chalcedonica*. Northwest Plants Database System, Clark County Extension, Washington State University. Brush Prairie, WA. [19 January 2011] <http://pnwplants.wsu.edu/>