WEED RISK ASSESSMENT FORM

Botanical and common name: Silene noctiflora L night-flowering catchfly, S. latifolia ssp. alba L. white cockle, S. vulgaris (Moench) Garcke bladder campion, S. dioica (L.) Clairville red catchfly

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Outcome score:

<table>
<thead>
<tr>
<th>A. Climatic Comparison</th>
<th>Total (Total Answered*)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Possible</td>
<td></td>
</tr>
<tr>
<td>1 South Coastal</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2 Interior-Boreal</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>3 Arctic-Alpine</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Invasiveness Ranking</th>
<th>Total (Total Answered*)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ecological impact</td>
<td>40 (40)</td>
<td>13</td>
</tr>
<tr>
<td>2 Biological characteristic and dispersal ability</td>
<td>25 (25)</td>
<td>9</td>
</tr>
<tr>
<td>3 Ecological amplitude and distribution</td>
<td>25 (25)</td>
<td>13</td>
</tr>
<tr>
<td>4 Feasibility of control</td>
<td>10 (10)</td>
<td>7</td>
</tr>
<tr>
<td>Outcome score</td>
<td>100 (100)†</td>
<td>42 a</td>
</tr>
<tr>
<td>Relative maximum score†</td>
<td>0.42</td>
<td></td>
</tr>
</tbody>
</table>

* For questions answered “unknown” do not include point value for the question in parentheses for “Total Answered Points Possible.”
† Calculated as †/b.

SPECIAL NOTE: A number of Silene species have been introduced to Alaska. Because these species share similar biological and ecological attributes we treat each species description, distribution and abundance separately, but combine the discussion of ecological impacts and control methods.
A. CLIMATIC COMPARISON:

<table>
<thead>
<tr>
<th>1.1. Has this species ever been collected or documented in Alaska?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

1.2. Which eco-geographic region has it been collected or documented (see inset map)? Proceed to Section B. Invasiveness Ranking.

<table>
<thead>
<tr>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Coastal</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Interior-Boreal</td>
</tr>
<tr>
<td>Arctic-Alpine</td>
</tr>
</tbody>
</table>

Documentation: *Silene noctiflora* has been collected from Fairbanks, Anchorage, Healy, and the Kenai Peninsula (Hultén 1968, UAM 2004). Although this species is reported by Hultén (1968) from Nome and Juneau, these specimens appear to be misidentified (McNeill 1980). *Silene vulgaris* has been documented from the Yukon Territory in the vicinity of Dawson (Cody 1996, UAM 2004).

Silene latifolia ssp. alba has been documented from Eklutna Valley and the Matanuska and Susitna valleys in Alaska (AK Weed Database 2004, UAM 2004). *Silene dioica* has been collected from Palmer, Alaska (AK Weed Database 2004).

Sources of information:


2.1. Is there a 40% or higher similarity (based on CLIMEX climate matching) between climates anywhere the species currently occurs and any where the species is thought to occur?

<table>
<thead>
<tr>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juneau (South Coastal Region)?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes – record locations and similarity; proceed to Section B. Invasiveness Ranking</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Fairbanks (Interior-Boreal)?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes – record locations and similarity; proceed to Section B. Invasiveness Ranking</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Nome (Arctic-Alpine)?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes – record locations and similarity; proceed to Section B. Invasiveness Ranking</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

If “No” is answered for all regions, reject species from consideration.

Documentation: The CLIMEX computer matching program indicates the climatic similarity between Alaska and areas where *Silene noctiflora*, *S. latifolia* ssp. *alba*, *S. vulgaris*, and *S. dioica* are documented is moderately high. These species’ ranges include Røros and Dombås, Norway (Lid and Lid 1994), which have a 76% and 63% climatic match with Nome; they have been collected from Bergen, Norway which has a 73% climatic match with Juneau. *Silene latifolia* ssp. *alba* and *S. dioica* also have been documented from arctic and subarctic Norway and Finland (Lid and Lid 1994, Thompson 1975). Thus establishment of these non-native *Silene* species in Arctic-Alpine and South Coastal ecoregions is likely.
B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes

A. No perceivable impact on ecosystem processes 0
B. Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability) 3
C. Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl) 7
D. Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology, hydrology; or affects fire frequency, 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
U. Unknown

Score 3

Documentation:
Identify ecosystem processes impacted:
Silene species occupy disturbed ground and likely hinders colonization by native species. These weeds can decrease soil moisture and nutrient availability (Royer and Dickinson 1999).

Rational:
Sources of information:

1.2. Impact on Natural Community Structure

A. No perceived impact; establishes in an existing layer without influencing its structure 0
B. Influences structure in one layer (e.g., changes the density of one layer) 3
C. Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer) 7
D. Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) 10
U. Unknown

Score 3

Documentation:
Identify type of impact or alteration:
These species have been observed in the existing layer of vegetation in disturbed areas (I. Lapina – pers. obs.). Red catchfly is capable of forming almost complete monocultures on bare soil (Matlack and Harper 1986).

Rational:
Sources of information:
Lapina, I., Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.

1.3. Impact on Natural Community Composition

A. No perceived impact; causes no apparent change in native populations 0
B. Influences community composition (e.g., reduces the number of individuals in one or more native species in the community) 3
C. Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community)  
D. Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community)

U. Unknown

Score 2

Documentation:
Identify type of impact or alteration:
These species compete for moisture, nutrients, and sunlight in pastures and crowd native plants (Royer and Dickinson 1999).

Rational:

Sources of information:

1.4. Impact on higher 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. Minor alteration 3
C. Moderate alteration (minor reduction in nesting/foraging sites, reduction in habitat connectivity, interference with native pollinators, injurious components such as spines, toxins) 7
D. Severe alteration of higher trophic populations (extirpation or endangerment of an existing native species/population, or significant reduction in nesting or foraging sites) 10

U. Unknown

Score 5

Documentation:
Identify type of impact or alteration:
Grazing animals find Silene species unpalatable. These plants are alternate hosts for numerous viruses (Royer and Dickinson 1999). Hybrids of S. dioica and S. latifolia ssp. alba have been collected in Canada (Douglas and MacKinnon 1998). The flowers of most Silene species open in the evening and are moth-pollinated. Red catchfly flowers open during the day and are typically pollinated by bees or butterflies (McNeill 1978).

Rational:

Sources of information:


| Total Possible | 40 |
| Total         | 13 |

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode of reproduction

A. Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction) 0
B. Somewhat aggressive (reproduces only by seeds (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 reproduction (extensive vegetative spread and/or many seeded, >1,000/m²)  
U. Unknown  

Score 3

Documentation:
Describe key reproductive characteristics (including seeds per plant):
*Silene* species reproduce primarily by seed. Each plant of night-flowering catchfly is capable of producing up to 2,600 seeds. White cockle plant produces over 24,000 seeds (Royer and Dickinson 1999) and red catchfly plants produced more than 4,500 seeds in an experimental garden in Britain (Kay et al. 1984). White campion and bladder campion are able to reproduce vegetatively by root and stem fragments (Whitson et al. 2000).  

Rational:

Sources of information:

2.2. Innate potential for long-distance dispersal (bird dispersal, sticks to animal hair, buoyant fruits, wind-dispersal)

A. Does not occur (no long-distance dispersal mechanisms)  
B. Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations)  
C. Numerous opportunities for long-distance dispersal (species has adaptations such as pappus, hooked fruit-coats, etc.)  
U. Unknown  

Score 0

Documentation:
Identify dispersal mechanisms:
Most seeds fall from the parent plant to the ground (Guide to Weeds in British Columbia 2002).  

Rational:

Sources of information:

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contamination, etc.)

A. Does not occur  
B. Low (human dispersal is infrequent or inefficient)  
C. Moderate (human dispersal occurs)  
D. High (there are numerous opportunities for dispersal to new areas)  
U. Unknown  

Score 2

Documentation:
Identify dispersal mechanisms:
Seeds are very similar to those of crop clovers and are difficult to separate. Consequently, seed impurities have been a major source of dispersal. Seeds also are

Sources of information:

2.4. Allelopathic
A. No 0
B. Yes 2
U. Unknown

Documentation:
Describe effect on adjacent plants:
There are no records of allelophathy.

Rational:

Sources of information:

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 nitrogen fixing ability 3
U. Unknown

Documentation:
Evidence of competitive ability:
Silene species can rapidly colonize disturbed sites and compete with other vegetation (Royer and Dickinson 1999) however; cultivated field experiments demonstrated that bladder campion did not compete well with alfalfa and barley (Wall and Morrison 1990).

Rational:
Bladder campion and red catchfly tolerate high concentrations of copper, nickel, zinc, lead, and air pollution and are highly adapted to water and nutrient deficient conditions (Brooks and Crooks 1980, Leopold et al. 1999, Wierzbicka and Paufnik 1998).

Sources of information:

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation
A. No 0
### 2.7. Germination requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Requires open soil and disturbance to germinate</td>
<td>0</td>
</tr>
<tr>
<td>B. Can germinate in vegetated areas but in a narrow range or in special conditions</td>
<td>2</td>
</tr>
<tr>
<td>C. Can germinate in existing vegetation in a wide range of conditions</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Describe germination requirements:
Buried seeds germinate readily after soil disturbance (Guide to Weeds in British Columbia 2002). Some populations may require light for germination.

**Rational:**

**Sources of information:**

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

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. No</td>
<td>0</td>
</tr>
<tr>
<td>B. Yes</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Species:
The genus *Silene* consists of a number of serious agricultural weeds (Royer and Dickinson 1999, Whitson et al. 2000).

**Sources of information:**
2.9. Aquatic, wetland, or riparian species

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Not invasive in wetland communities 0</td>
</tr>
<tr>
<td>B.</td>
<td>Invasive in riparian communities 1</td>
</tr>
<tr>
<td>C.</td>
<td>Invasive in wetland communities 3</td>
</tr>
<tr>
<td>U.</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Score 0

**Documentation:**

Describe type of habitat:

These plants are important weeds of pastures, grain fields, and gardens. They are also found along highways, railroad tracks, and in waste places (Gubanov et al. 2003, McNeill 1980, Royer and Dickinson 1999).

**Rational:**

Sources of information:


Total Possible 25

Total 9

3. DISTRIBUTION

3.1. Is the species highly domesticated or a weed of agriculture

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>No 0</td>
</tr>
<tr>
<td>B.</td>
<td>Is occasionally an agricultural pest 2</td>
</tr>
<tr>
<td>C.</td>
<td>Has been grown deliberately, bred, or is known as a significant agricultural pest 4</td>
</tr>
<tr>
<td>U.</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Score 3

**Documentation:**

Identify reason for selection, or evidence of weedy history:

*Silene* species are found in most agricultural areas of United States and Canada, they are important weeds particularly of grain and leguminous crops (Royer and Dickinson 1999, McNeill 1980, Whitson et al. 2000).

**Rational:**

Sources of information:


3.2. Known level of impact in natural areas

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Not known to cause impact in any other natural area 0</td>
</tr>
<tr>
<td>B.</td>
<td>Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska 1</td>
</tr>
<tr>
<td>C.</td>
<td>Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska 3</td>
</tr>
</tbody>
</table>
D. Known to cause moderate impact in natural areas in similar habitat and climate zones
E. Known to cause high impact in natural areas in similar habitat and climate zones
U. Unknown

**Documentation:**
Identify type of habitat and states or provinces where it occurs:
*Silene* species are known as agricultural weeds but have not been reported to impact natural habitats (Royer and Dickinson 1999, Whitson et al. 2000).

**Sources of information:**

### 3.3. Role of anthropogenic and natural disturbance in establishment

A. Requires anthropogenic disturbances to establish
B. May occasionally establish in undisturbed areas but can readily establish in areas with natural disturbances
C. Can establish independent of any known natural or anthropogenic disturbances
U. Unknown

**Documentation:**
Identify type of disturbance:

**Rational:**

**Sources of information:**


### 3.4. Current global distribution

A. Occurs in one or two continents or regions (e.g., Mediterranean region)
B. Extends over three or more continents
C. Extends over three or more continents, including successful introductions in arctic or subarctic regions
U. Unknown

**Documentation:**
Describe distribution:
The native range of *Silene* species extends across Europe and southwest Asia. They are now found throughout Canada and the United States with the exception of Alabama, Arkansas, Hawaii, Nevada, Arizona, South Carolina, Tennessee, and Texas (USDA 2002). *Silene noctiflora* has been recorded from Australia and Greenland (McNeill 1980). *Silene noctiflora* and *S. dioica* have been recorded from arctic Norway and Finland (Lid and Lid 1994, Thompson 1975).

**Rational:**

**Sources of information:**
3.5. Extent of the species U.S. range and/or occurrence of formal state or provincial listing

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. 0-5% of the states</td>
<td>0</td>
</tr>
<tr>
<td>B. 6-20% of the states</td>
<td>2</td>
</tr>
<tr>
<td>C. 21-50%, and/or state listed as a problem weed (e.g., “Noxious,” or “Invasive”) in 1 state or Canadian province</td>
<td>4</td>
</tr>
<tr>
<td>D. Greater than 50%, and/or identified as “Noxious” in 2 or more states or Canadian provinces</td>
<td>5</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Score: 5

Documentation:
Identify states invaded:
Night-flowering catchfly, white cockle, and bladder campion are declared Federal noxious weeds in Canada. These species are also listed as weeds in Connecticut, Wisconsin, and Washington (Royer and Dickinson 1999).

Rational:
Sources of information:

4. FEASIBILITY OF CONTROL

4.1. Seed banks

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Seeds remain viable in the soil for less than 3 years</td>
<td>0</td>
</tr>
<tr>
<td>B. Seeds remain viable in the soil for between 3 and 5 years</td>
<td>2</td>
</tr>
<tr>
<td>C. Seeds remain viable in the soil for 5 years and more</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Score: 3

Documentation:
Identify longevity of seed bank:
Seeds of night-flowering catchfly and bladder campion can remain viable in the soil for at least 5 years (Chepil 1946). Seeds of red catchfly older than 2 years normally do not germinate (Carlsson-Graner et al. 1998).

Rational:
Sources of information:

4.2. Vegetative regeneration

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. No resprouting following removal of aboveground growth</td>
<td>0</td>
</tr>
<tr>
<td>B. Resprouting from ground-level meristems</td>
<td>1</td>
</tr>
<tr>
<td>C. Resprouting from extensive underground system</td>
<td>2</td>
</tr>
<tr>
<td>D. Any plant part is a viable propagule</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>
4.3. Level of effort required

A. Management is not required (e.g., species does not persist without repeated anthropogenic disturbance) 0
B. Management is relatively easy and inexpensive; requires a minor investment in human and financial resources 2
C. Management requires a major short-term investment of human and financial resources, or a moderate long-term investment 3
D. Management requires a major, long-term investment of human and financial resources 4
U. Unknown

Documentation:
Identify types of control methods and time-term required:
Mowing or burning is unlikely to control *Silene* species because of its large seed bank. Cultivation usually increases the infestation by facilitating the spread of *Silene*. Herbicides provide limited control, as these species are resistant or somewhat resistant to many common herbicides. No biological control agent is available (Guide to weeds in British Columbia 2002, McNeill 1980).

Rational:

Sources of information:


Lapina, I. Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska. Tel: (907) 257-2710 – Pers. obs.


