ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Centaurea montana* L.
Common name: perennial cornflower
Assessors:

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Date: 10/18/2010
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	Yes
Interior-Boreal	Yes
Arctic-Alpine	Yes

INVASIVENESS RANKING	**Total** (total answered points possible[1])	**Total**
Ecological impact	40 (30)	9
Biological characteristics and dispersal ability	25 (23)	12

Ecological amplitude and distribution	25 (25)	13
Feasibility of control	10 (7)	5
Outcome score	100 (85)[b]	39[a]
Relative maximum score[2]		46

[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 × 100

A. CLIMATIC COMPARISON

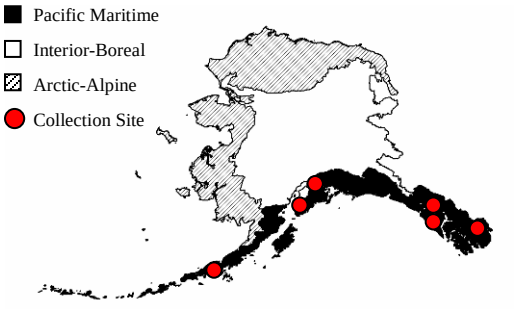
1.1. Has this species ever been collected or documented in Alaska?

☒ 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. INVASIVNESS RANKING

☒ Pacific Maritime
☐ Interior-Boreal
☐ Arctic-Alpine



Documentation: *Centaurea montana* has been documented from the Pacific Maritime ecogeographic region of Alaska (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: *Centaurea montana* has established at Nordkapp in arctic Norway (Elven 2007). It is known to occur in several locations in Finland that have 40% or greater climatic similarities with Fairbanks and Nome (CLIMEX 1999, NatureGate 2010). This species has been documented from Lillehammer, Norway, which has a 44% climatic similarity with Fairbanks and a 49% climatic similarity with Nome (CLIMEX 1999, 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 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 **U**

Documentation: The impacts of *Centaurea montana* on ecosystem processes have not been documented.

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: *Centaurea montana* can spread vegetatively from rhizomes to form clumps or dense stands (Cortés-Burns and Flagstad 2009, NatureGate 2010), changing the densities 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: *Centaurea montana* can form stands in disturbed areas (NatureGate 2010), likely limiting the population sizes of native 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 **3**

Documentation: *Centaurea montana* is attractive to bees (Plants for a Future 2010), and its presence may alter native plant-pollinator interactions. No significant diseases or insect pests are associated with this species (Kahtz 2008).

Total Possible 30
Total **9**

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: *Centaurea montana* can reproduce by seeds and rhizomes (Keil and Ochsmann 2006, NatureGate 2010). Seed production per plant has not been quantified.

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: The effects of wind and other factors on seed dispersal have not been documented; however, the achenes are relatively large and the pappus bristles are only 0.5 to 1.5

mm long (Keil and Ochsmann 2006). They are therefore unlikely to aid significantly in long distance dispersal.

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 **2**

Documentation: *Centaurea montana* is widely cultivated as a garden ornamental (Keil and Ochsmann 2006, NatureGate 2010). It has escaped from gardens in Anchorage and Southeast Alaska (Cortés-Burns and Flagstad 2009, AKEPIC 2010). This species can be transported in imported fill and on construction equipment (Rapp pers. obs.).

2.4. Allelopathic

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

Score **U**

Documentation: Many species in the *Centaurea* genus, such as *C. stoebe* and *C. diffusa*, are allelopathic. Allelopathic chemicals do not contribute to the invasiveness of other *Centuarea* species, such as *C. solstitialis* (Qin et al. 2007). It is unknown if *C. montana* exudes allelopathic chemicals to a significant degree or not.

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 **2**

Documentation: *Centaurea montana* is moderately competitive in Southcentral Alaska (Flagstad 2010), based on its rate of spread and persistence in relatively dense vegetation. The species is capable of forming persistent populations in Southeast Alaska (Rapp 2006).

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 **1**

Documentation: *Centaurea montana* is a clump-forming, perennial plant that can form dense stands (NatureGate 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 **2**

Documentation: All documented escaped populations of *Centaurea montana* in Alaska are associated with disturbed areas. This species grows most commonly on imported fill; 94% of recorded populations in Alaska are associated with fill importation (the remaining populations are associated with trampling disturbance) (AKEPIC 2010). *Centaurea montana* has not been documented invading natural areas (Schlaepfer et al. 2010). This species can germinate and grow under canopies, and it can germinate in vegetated, disturbed areas, although it does not disperse well (Rapp pers. obs.).

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

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

Score **3**

Documentation: *Centaurea stoebe* is an invasive species in Alaska with an invasiveness rank of 86. It is listed as a noxious weed in 16 states. *C. diffusa*, *C. iberica*, *C. jacea*, *C. macrocephala*, *C. melitensis*, *C. nigra*, *C. nigrescens*, *C. solstitialis*, *C. sulphurea*, and *C. virgata* are listed as noxious weeds by various states in the U.S. (AKEPIC 2010, Invaders 2010, USDA 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 **0**

Documentation: *Centaurea montana* has not been documented as invasive in wetland or riparian communities.

Total Possible 23
Total **12**

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: *Centaurea montana* is widely cultivated as an ornamental (Keil and Ochsmann 2006, NatureGate 2010). It is common in gardens in Anchorage and Southeast Alaska (Cortés-Burns and Flagstad 2009, AKEPIC 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 **0**

Documentation: *Centaurea montana* has not been documented invading natural areas (Schlaepfer et al. 2010).

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: *Centaurea montana* establishes on bare ground or in vegetated, disturbed areas (AKEPIC 2010, Rapp pers. obs.). When it escapes, it usually grows in mesic roadsides and waste places (Klinkenberg 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: *Centaurea montana* is native to the mountains of Europe. It is cultivated as an ornamental in Europe, Australia, and North America, and populations sometimes escape cultivation (Blood 2003, Keil and Ochsmann 2006). This species has been documented from arctic Norway (Elven 2007, Norwegian Species Observation Service 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 **4**

Documentation: *Centaurea montana* has been documented in 13 states in the U.S. (Keil and Ochsmann 2006, USDA 2010).

Total Possible 25
Total **13**

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 for which 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 **2**

Documentation: *Centaurea montana* is rhizomatous; plants can resprout from the rhizomes (Keil and Ochsmann 2006, Cortés-Burns and Flagstad 2009).

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 **3**

Documentation: Small populations of *Centaurea montana* can sometimes be controlled by digging or hand-pulling. Rhizomes must be removed to ensure that they do not form new plants. Controlled areas should be revisited several times during the growing season to ensure that no new plants have sprouted and no flowers have been produced. Manual control efforts may need to be repeated for multiple years (Cortés-Burns and Flagstad 2009, AKEPIC 2010). No chemical or biological control methods for this species have been documented.

Total Possible	7
Total	**5**

Total for four sections possible	85
Total for four sections	**39**

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