

## ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

*Botanical name:* *Arctium minus* (Hill) Bernh.

*Common name:* common burdock

**Assessors:**

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*Date:* 11/30/2010

*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 <sup>1</sup> )	Total
Ecological impact	40 ( <u>40</u> )	<u>16</u>
Biological characteristics and dispersal ability	25 ( <u>25</u> )	<u>16</u>
Ecological amplitude and distribution	25 ( <u>25</u> )	<u>14</u>
Feasibility of control	10 (10)	<u>3</u>
Outcome score	100 ( <u>100</u> ) <sup>b</sup>	<u>49</u> <sup>a</sup>
Relative maximum score <sup>2</sup>		<u>49</u>

<sup>1</sup> For questions answered “unknown” do not include point value for the question in parentheses for “total answered points possible.”

<sup>2</sup> Calculated as  $a/b \times 100$

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## 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:** *Arctium minus* has been documented from Glacier Bay National Park and Ketchikan in the Pacific Maritime ecogeographic region of Alaska and from Anchorage in the Interior-Boreal ecogeographic region (AKEPIC 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:** *Arctium minus* grows as far north as 64°13'N in Scandinavia (Gross et al. 1980), but it appears to be restricted to the warmer coastal regions of Norway. However, this species has been documented from a site approximately 18 km north of Lillehammer, Norway, which has a 49% climatic similarity with Nome (CLIMEX 1999, Vascular Plant Herbarium Oslo 2010) It is known to occur in several locations in Finland that have 40% or greater climatic similarities with Nome (CLIMEX 1999, NatureGate 2011).

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## 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:** *Arctium minus* grows primarily in disturbed areas, dry roadsides, abandoned fields, disturbed woodlands, and pastures (Gross et al. 1980, Keil 2006, Klinkeberg 2010), where it may reduce the amount of soil moisture, nutrients, and light available to native species.

*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:** *Arctium minus* may increase the density of vegetation 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 5

**Documentation:** The broad, long-petiolated leaves of *Arctium minus* can overtop and outshade surrounding herbaceous vegetation, thereby suppressing the growth of native species in disturbed areas. By outshading surrounding vegetation, *Arctium minus* creates bare patches of soil that facilitate the establishment of its seedlings (Gross et al. 1980) and may facilitate the establishment of other non-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 

5
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**Documentation:** The burred flower heads of *Arctium minus* have been known to hook and immobilize small birds in North America, although the effects of entanglement on avian populations are negligible (Nealen and Nealen 2000, Hager et al. 2009). This species contains diuretic chemicals, and it taints the milk of cows when grazed in large quantities. It is associated with several harmful nematode species, insect pests, and plant diseases. Many species of pollinating insects are associated with *Arctium minus* (Gross et al. 1980). The presence of this species may alter native plant-pollinator interactions.

Total Possible	40
Total	16

## 2. Biological Characteristics and Dispersal Ability

### 2.1. Mode of reproduction

- a. Not aggressive (produces few seeds per plant [0-10/m<sup>2</sup>] and not able to reproduce vegetatively). 0
  - b. Somewhat aggressive (reproduces by seed only [11-1,000/m<sup>2</sup>]) 1
  - c. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed [<1,000/m<sup>2</sup>]) 2
  - d. Highly aggressive (extensive vegetative spread and/or many seeded [>1,000/m<sup>2</sup>]) 3
  - e. Unknown U
- Score 

3
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**Documentation:** *Arctium minus* reproduces by seeds only. It often produces from 6,000 to 17,000 seeds per plant, and isolated plants can produce up to 30,000 seeds each (Hawthorn and Hayne 1978, Gross 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 

3
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**Documentation:** Seeds are attached to hooked involucre bracts that cling strongly to fur. Animals can disperse seeds long distances (Gross et al. 1980, Keil 2006, Kulbaba et al. 2009). Seed heads can be transported by water or blown across snow (Gross et al. 1980).

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:** The hooked involucre bracts can attach seeds to fabric (Gross et al. 1980, Keil 2006). They attach especially well to pants (Kulbaba et al. 2009).

2.4. *Allelopathic*

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

Score

**Documentation:** *Arctium minus* produces chemicals that have been shown to have allelopathic effects on *Sorghum bicolor* and *Cucumis sativus* (Belinelo et al. 2008).

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:** The broad foliage of *Arctium minus* can overtop surrounding vegetation and outcompete grasses and other forbs for light (Gross et al. 1980). This species, however, appears to be restricted to disturbed habitats and is therefore unlikely to be highly competitive.

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:** *Arctium minus* is tall and can grow in dense patches that significantly reduce the amount of light that reaches the ground. In Michigan, populations have been recorded growing at

densities of 22 rosettes per square meter with 10 flowering stems per square meter (Gross et al. 1980).

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:** In Canada, *Arctium minus* most commonly establishes on previously cultivated or heavily grazed lands. The success of colonization largely depends on the presence of open soil (Gross et al. 1980). The emergence and survival of seedlings are reduced by the presence of organic litter and vegetation (Gross and Werner 1983).

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

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

**Documentation:** *Arctium lappa* and *A. tomentosum* are considered noxious weeds in Manitoba. All *Arctium* species are considered noxious weeds in British Columbia and Quebec (Invaders 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 1

**Documentation:** *Arctium minus* is known to grow in riparian communities in the western U.S., especially in North and South Dakota (Ringold et al. 2008).

Total Possible	25
Total	16

**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 3

**Documentation:** *Arctium minus* is generally not a serious weed in agricultural fields because it is controlled by cultivation. However, the seeds cling to fur and can reduce the value of wool

(Gross et al. 1980). This species has been cultivated as a medicinal herb (Gross et al. 1980, Plants for a Future 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 <input type="text" value="3"/> |

**Documentation:** We are not aware of accounts of ecological impacts from natural areas; however, this species is recognized as a riparian weed in Montana, Idaho, Washington, and Oregon, where it is associated with reduced biological integrity (Ringold et al. 2008).

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="0"/> |

**Documentation:** In North America, *Arctium minus* grows in disturbed areas, dry roadsides, abandoned fields, disturbed woodlands, and pastures (Gross et al. 1980, Keil 2006, Klinkeberg 2010). All recorded infestations in Alaska are associated with anthropogenic disturbances (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 <input type="text" value="3"/> |

**Documentation:** *Arctium minus* is native to Europe and western Asia (Gross et al. 1980, Keil 2006). It is common throughout North America (USDA 2010), and it has been introduced to South America, Australia, and New Zealand (GBIF New Zealand 2010, NSW Flora Online 2010, Tropicos Specimen Database 2010). This species does not grow further north than 64°13'N in Scandinavia, and it has not been recorded from arctic or subarctic regions (Gross et al. 1980).

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:** All *Arctium* species are considered noxious weeds in British Columbia and Quebec. *Arctium minus* is considered a noxious weed in Colorado, Manitoba, and Wyoming (Invaders 2010, USDA 2010). It grows in 48 states of the U.S. (USDA 2010).

Total Possible 25  
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 0

**Documentation:** Indirect evidence suggests that seeds do not remain viable for more than three years. In Waterloo, Ontario, the densities of seed banks were recorded from 435 to 558 viable seeds per square meter (Gross et al. 1980).

##### 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 1

**Documentation:** Plants will resprout unless the taproot is removed (Van Vleet 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 2



**Documentation:** *Arctium minus* can be controlled by the application of several types of herbicides, including atrazine, silvex, 2,4-D-amine, 2,4,5-T, and MCPA-salt. This species can produce seeds after being mown early in the growing season (Gross et al. 1980). Mowing or cutting can effectively eliminate seed production when repeated multiple times per growing season. Infestations can be controlled by digging to remove the plant and as much of the taproot as possible (Good Oak LLC 2010).

Total Possible	10
Total	3

Total for four sections possible	100
Total for four sections	49

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## References:

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