ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Brassica napus* L.
Common name: rapeseed mustard
Assessors:

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Date: 2/9/2011
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	Yes
Interior-Boreal	Yes
Arctic-Alpine	Yes

INVASIVENESS RANKING	**Total** (total answered points possible[1])	**Total**
Ecological impact	40 (40)	13
Biological characteristics and dispersal ability	25 (25)	14
Ecological amplitude and distribution	25 (25)	14
Feasibility of control	10 (10)	6
Outcome score	100 (100)[b]	47[a]
Relative maximum score[2]		**47**

[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

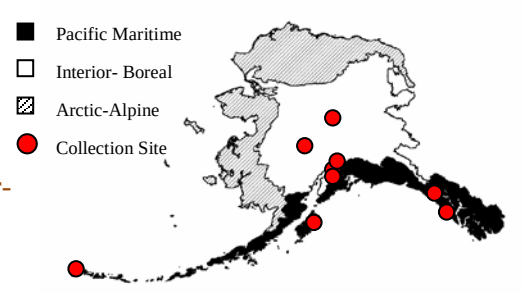
A. CLIMATIC COMPARISON

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: *Brassica napus* has been documented from the Pacific Maritime and Interior-Boreal ecogeographic regions of Alaska (Hultén 1968, 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: *Brassica napus* is known to grow in many locations in Finland, western Russia, Estonia, Latvia, Lithuania, Belarus, and Ukraine that have 40% or greater climatic similarities with Nome (CLIMEX 1999, Terekhina 2003, 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	10

substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)

e. Unknown U

Score **3**

Documentation: *Brassica napus* requires large amounts of moisture (Terekhina 2003). It may reduce soil moisture and nutrient availability in disturbed areas.

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: *Brassica napus* colonizes disturbed areas (Warwick 2010) and may increase the density of plants in ruderal habitats.

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 **2**

Documentation: *Brassica napus* reduces crop yields when growing as a weed in agricultural fields (Gulden et al. 2008), and it may reduce native plant populations in disturbed areas. However, this species is not likely to persist beyond two to four years where natural successional processes are allowed to continue (Crawley and Brown 1995).

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: Deer, squirrels, and a variety of insects feed on cultivated *Brassica napus* in Canada (Gulden et al. 2008). This species contains glucosinolates (mustard oils) that may irritate the digestive tracts of animals and can be toxic if consumed in large quantities (DiTomaso and Healy 2007). Although *Brassica napus* is primarily self-pollinating, plants are visited by honeybees, bumblebees, solitary bees, and flies; the presence of this species may therefore alter native plant-pollinator interactions. *Brassica napus* is associated with a wide variety of nematodes, fungi, and diseases (Gulden et al. 2008).

Total Possible 40

Total **13**

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: *Brassica napus* reproduces by seeds only and is predominately self-pollinating. In Saskatchewan, this species produced from 700 to 15,000 seeds per plant (Gulden et al. 2008).

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 **2**

Documentation: *Brassica napus* produces fruits that shatter when mature, dispersing seeds a limited distance. It does not have any other specialized adaptations for dispersal. Seeds can be spread in the excrement of grazing animals (Gulden et al. 2008). Some seeds may be transported on the feet or fur of animals, but most seeds do not disperse far from the parent plant (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 **3**

Documentation: *Brassica napus* is a common crop that is cultivated throughout much of the world. Cultivars include rutabaga and canola (Terekhina 2003, DiTomaso and Healy 2007, Warwick 2010, NatureGate 2011). This species escapes from or persists after cultivation (Gulden et al. 2008). Human dispersal occurs when seeds cling to people, vehicles, machinery, clothing, or shoes (DiTomaso and Healy 2007). Grazing animals can spread seeds in their excrement (Gulden et al. 2008).

2.4. Allelopathic

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

Score **2**

Documentation: As dead plant materials from *Brassica napus* decompose, glucosinolates and myrosinase from the plant tissues form phytotoxic isothiocyanates that suppress the growth of surrounding plants. Living plants also release isothiocyanates into the soil, but to a lesser degree than do decomposing plant tissues (Petersen et al. 2001, Gulden 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 **1**

Documentation: *Brassica napus* is often a serious competitor with cultivated crops and can lower the quality of harvests (Gulden et al. 2008). It has a high moisture requirement (Terekhina 2003). This species may therefore be moderately competitive in disturbed habitats.

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 **0**

Documentation: *Brassica napus* does not form dense thickets or significantly overtop surrounding vegetation (Gulden et al. 2008, Warwick 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 **0**

Documentation: *Brassica napus* is not known to occur outside of agricultural fields and disturbed areas in North America (Gulden et al. 2008, Klinkenberg 2010, Warwick 2010).

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

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

Score **3**

Documentation: *Brassica juncea* is considered a noxious weed in Alaska. *B. rapa* is known to occur as a non-native weed in Alaska with an invasiveness rank of 51 (AKEPIC 2011). *B. rapa*, *B. juncea*, and *B. nigra* are each considered a noxious weed in one or more states of the U.S. or provinces of Canada (Invaders 2011). All *Brassica* species are considered noxious weeds in Alabama, Connecticut, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Oklahoma, Texas, Virginia, and Vermont (AKEPIC 2011, Invaders 2011, Michigan Department of Agriculture 2011, USDA 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 **1**

Documentation: *Brassica napus* has been documented from urban riparian habitats in the metropolitan areas of and surrounding Birmingham, England (Maskell et al. 2006).

Total Possible 25
Total **14**

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: Many different cultivars of *Brassica napus* have been bred for a variety of purposes, such as vegetable crops and oilseed, and are grown throughout the world (DiTomaso and Healy 2007, Gulden et al. 2008, Terekhina 2009). This species is also cultivated as fodder (Terekhina 2003). It commonly grows as an agricultural weed, often germinating from remaining seeds from *Brassica napus* crop sown in previous years (Plant Biotechnology Office 1999, Gulden et al. 2008).

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: *Brassica napus* has 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 **0**

Documentation: *Brassica napus* grows in anthropogenically disturbed sites, roadsides, and cultivated fields in North America (Klinkenberg 2010, DiTomaso and Healy 2007, 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: *Brassica napus* is native to Eurasia. It grows as a weed in North America, South America, Australia, and New Zealand (Gulden et al. 2008, Warwick 2010). It is known to occur in arctic regions of western Russia (Terekhina 2003) and as far north as 68.5°N in Norway (University Museums of Norway 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: *Brassica napus* grows in 38 states of the U.S. and most of Canada (USDA 2011). All *Brassica* species are listed as noxious weeds in Alabama, Connecticut, Louisiana, Maine, Massachusetts, Michigan, Mississippi, Oklahoma, Texas, Virginia, and Vermont (Invaders 2011, Michigan Department of Agriculture 2011).

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 **3**

Documentation: Seeds can remain viable in soil for ten years or longer. The longevity of seeds increases as the depth at which they are buried increases (Gulden et al. 2008).

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: In agricultural fields in Quebec, taproots of *Brassica napus* can survive after harvest, overwinter, and regrow the following year (Gulden et al. 2008).

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: Populations of *Brassica napus* are likely replaced by mid-seral vegetation after two to four years in the absence of regular disturbances (Crawley and Brown 1995). *Brassica napus* can be controlled by hand-pulling. Manual control must be repeated annually until the seed bank is depleted (DiTomaso and Healy 2007). Because this species is commonly cultivated, populations may be resistant to one or more herbicides. Most documented control methods are specific to agricultural systems (Gulden et al. 2008).

Total Possible	10
Total	**6**

Total for four sections possible	100
Total for four sections	**47**

References:

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