WEED RISK ASSESSMENT FORM

Botanical name: *Hesperis matronalis* L.

Common name: sweet rocket, dames rocket, dame's violet, mother-of-the-evening

Assessors:

Irina Lapina
Botanist, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2710; fax (907) 257-2789

Matthew L. Carlson, Ph.D.
Assistant Professor, Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A Street, Anchorage, Alaska 99501
tel: (907) 257-2790; fax (907) 257-2789

Reviewers:

Michael Shephard
Vegetation Ecologist Forest Health Protection State & Private Forestry 3301 C Street, Suite 202, Anchorage, AK 99503 (907) 743-9454; fax 907 743-9479

Jeff Conn, Ph.D.
Weed Scientist, USDA Agricultural Research Service
PO Box 757200 Fairbanks, Alaska 99775
tel: (907) 474-7652; fax (907) 474-6184

Roseann Densmore, Ph.D.
Research Ecologist, US Geological Survey, Alaska Biological Science Center, 1101 East Tudor Road Anchorage, AK 99503
tel: (907) 786-3916, fax (907) 786-3636

Julie Riley
Horticulture Agent, UAF Cooperative Extension Service
2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143
tel: (907) 786-6306

Jamie M. Snyder
UAF Cooperative Extension Service
2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143
tel: (907) 786-6310 alt.tel: (907) 743-9448

Page Spencer, Ph.D.
Ecologist, National Park Service, Alaska Region - Biological Resources Team, 240 W. 5th Ave, #114, Anchorage, AK 99501 tel: (907) 644-3448

Outcome score:

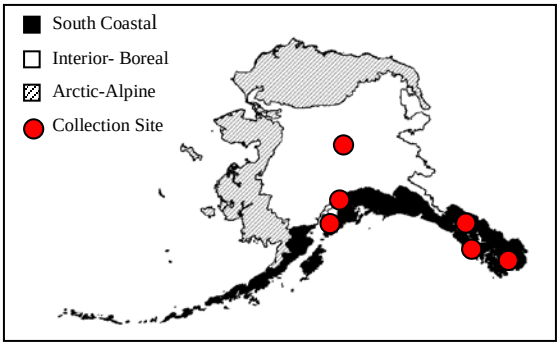
A.	**Climatic Comparison**		
	This species is present or may potentially establish in the following eco-geographic regions:		
1	South Coastal	Yes	
2	Interior-Boreal	Yes	
3	Arctic-Alpine		No

B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	10
2	Biological characteristic and dispersal ability	25 (22)	10
3	Ecological amplitude and distribution	25 (25)	17
4	Feasibility of control	10 (7)	2
	Outcome score	100 (94)[b]	39 [a]
	Relative maximum score†		0.41

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

A. CLIMATIC COMPARISON:

	1.1. Has this species ever been collected or documented in Alaska?
Yes	Yes – continue to 1.2
	No – continue to 2.1
	1.2. Which eco-geographic region has it been collected or documented (see inset map)? *Proceed to Section B. Invasiveness Ranking.*
Yes	South Coastal
Yes	Interior-Boreal
	Arctic-Alpine



Documentation: *Hesperis matronalis* is cultivated and escaping in Juneau, Sitka, and Ketchican (M. Shephard – pers. com., Welsh 1974). It is growing in gardens in Anchorage and Homer (J. Riley – pers. com.). It has also been recorded in Fort Wainwright Military Reservation (UAM 2004).

Sources of information:

Riley, J., Horticulture Agent, UAF Cooperative Extension Service. 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143. tel: (907) 786-6306. Pers. com.

Shephard, M., Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. com.

University of Alaska Museum. University of Alaska Fairbanks. 2004. http://hispida.museum.uaf.edu:8080/home.cfm

Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

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

a. Juneau (South Coastal Region)?
Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*
No

b. Fairbanks (Interior-Boreal)?
Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*
No

c. Nome (Arctic-Alpine)?
Yes – *record locations and similarity; proceed to Section B. Invasiveness Ranking*

No — No – *If "No" is answered for all regions, reject species from consideration*

Documentation: Using CLIMEX matching program, climatic similarity between Nome and areas where the species is documented is high. However, his species withstands winter temperatures only to -23°F, and requires 120 frost free days (USDA 2002). Winter temperature in Nome can reach -54°F (WRCC 2001) and the number of frost free days is generally less than 110. It is therefore unlikely to establish in the Arctic-Alpine ecogeographic region of Alaska. Range of dame's rocket includes Røros, Norway (Lid and Lid 1994), which has 73% climatic similarity with Anchorage, Alaska. Thus establishment in lower parts of interior boreal ecoregion of Alaska is likely. It is unknown if the recorded population in interior Alaska persists.

Sources of information:

CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.

Lid, J. and D.T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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 1

Documentation:
Identify ecosystem processes impacted:
Dames rocket may delay establishment of native species on site (M. Shephard – pers. com.)
Rational:

Sources of information:
Shephard, M., Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. com.

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:
Dames rocket causes a moderate increase in the density of the mid-herbaceous layer, and in Ontario it has been recorded as dominating localized areas (CWS 2004).
Rational:

Sources of information:
Canadian Wildlife Service. 2004. Invasive plants and their biology, impact and control options. Available: http://www.cws-scf.ec.gc.ca/publications/inv/cont_e.cfm [December 15, 2004].

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)	7
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)	10
U.	Unknown	

Score 3

Documentation:
Identify type of impact or alteration:
Dames rocket likely competes with native species (Wisconsin DNR 2003).
Rational:

Sources of information:
Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

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	10

existing native species/population, or significant reduction in nesting or foraging sites)

U. Unknown

Score 3

Documentation:

Identify type of impact or alteration:

Dames rocket may alter pollinator behavior. Hawkmoths have been observed pollinating dames rocket in Alaska (M. Shephard – pers. obs.). It is an alternate host for number of viruses (Royer and Dickinson 1999).

Rational:

Sources of information:

Royer, F., and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

Shephard, M., Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. com.

Total Possible 40

Total 10

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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/m^2) 1

C. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m^2) 2

D. Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m^2) 3

U. Unknown

Score 3

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Dames rocket reproduces entirely by seed. A single plant is capable of producing up to 20,000 seeds (Royer and Dickinson 1999).

Rational:

Sources of information:

Royer, F., and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

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) 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

U. Unknown

Score 2

Documentation:

Identify dispersal mechanisms:

Dames rocket does not have particular adaptations to long-distance dispersal, but the large numbers of small seeds increase the probability of a long distance dispersal event.

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	0
B.	Low (human dispersal is infrequent or inefficient)	1
C.	Moderate (human dispersal occurs)	2
D.	High (there are numerous opportunities for dispersal to new areas)	3
U.	Unknown	

Score 3

Documentation:
Identify dispersal mechanisms:
Dames rocket is planted as an ornamental and quickly escapes cultivation. This plant is often included as a part of "wildflower" seed mixes and is widely sold at nurseries (CWMA 2004, Wisconsin DNR 2003).
Rational:

Sources of information:
CWMA - Colorado Weed Management Association. 2004. Noxious weeds and non-native plants – Dame's rocket (*Hesperis matronalis*). Available: http://www.cwma.org/tansy.html [October 11, 2004].
Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

2.4. Allelopathic

A.	No	0
B.	Yes	2
U.	Unknown	

Score 0

Documentation:
Describe effect on adjacent plants:
Dames rocket has no allelopathy potential (USDA 2002).
Rational:

Sources of information:
USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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	

Score 1

Documentation:
Evidence of competitive ability:
Dames rocket likely competes with native species (Wisconsin DNR 2003). It can outcompete grasses in open forest in Wisconsin (J. Riley – pers. com.).
Rational:

Sources of information:
Riley, J., Horticulture Agent, UAF Cooperative Extension Service. 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143. tel: (907) 786-6306. Pers. com.
Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation

A. No 0
B. Forms dense thickets 1
C. Has climbing or smothering growth habit, or otherwise taller than the surrounding vegetation 2
U. Unknown

Score 0

Documentation:
Describe grow form:
Dames rocket does not form dense thickets.
Rational:

Sources of information:

2.7. Germination requirements

A. Requires open soil and disturbance to germinate 0
B. Can germinate in vegetated areas but in a narrow range or in special conditions 2
C. Can germinate in existing vegetation in a wide range of conditions 3
U. Unknown

Score U

Documentation:
Describe germination requirements:
It is unknown if this species can germinate in established vegetation.
Rational:

Sources of information:

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

A. No 0
B. Yes 3
U. Unknown

Score 0

Documentation:
Species:
Other introduced species of *Hesperis* are not known in North America (USDA 2002).
Sources of information:
USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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
U. Unknown

Score 1

Documentation:
Describe type of habitat:
Dames rocket tends to invade riparian and wetland habitats as well as moist and mesic woodlands (CWMA 2004). It is also grows along roadsides, fencelines, and in open areas (Wisconsin DNR 2003).
Rational:

Sources of information:
CWMA - Colorado Weed Management Association. 2004. Noxious weeds and non-native plants – Dame's rocket (*Hesperis matronalis*). Available:

http://www.cwma.org/tansy.html [October 11, 2004].
Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

Total Possible	22
Total	10

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3. DISTRIBUTION

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

A.	No	0
B.	Is occasionally an agricultural pest	2
C.	Has been grown deliberately, bred, or is known as a significant agricultural pest	4
U.	Unknown	

Score 4

Documentation:
Identify reason for selection, or evidence of weedy history:
Dame's rocket is widely planted as an ornamental. It is often included in "wildflower" seed mixes (Wisconsin DNR 2003).
Rational:

Sources of information:
Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

3.2. Known level of impact in natural areas

A.	Not known to cause impact in any other natural area	0
B.	Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska	1
C.	Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska	3
D.	Known to cause moderate impact in natural areas in similar habitat and climate zones	4
E.	Known to cause high impact in natural areas in similar habitat and climate zones	6
U.	Unknown	

Score 3

Documentation:
Identify type of habitat and states or provinces where it occurs:
Dames rocket invades forests and prairies in Wisconsin competing with native species (J. Riley – pers. com., Wisconsin DNR 2003). It tends to invade riparian and wetland habitat throughout Colorado (CWMA 2004).
Sources of information:
CWMA - Colorado Weed Management Association. 2004. Noxious weeds and non-native plants – Dame's rocket (*Hesperis matronalis*). Available: http://www.cwma.org/tansy.html [October 11, 2004].
Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

3.3. Role of anthropogenic and natural disturbance in establishment

A.	Requires anthropogenic disturbances to establish	0
B.	May occasionally establish in undisturbed areas but can readily establish in areas with natural disturbances	3
C.	Can establish independent of any known natural or anthropogenic disturbances	5
U.	Unknown	

Score 2

Documentation:
Identify type of disturbance:
Dames rocket often establishes on anthropogenic disturbances and can be maintained in previously disturbed forest remnants (M. Shephard – pers. com.).
Rational:

Sources of information:
Shephard, M., Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. com.

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
U.	Unknown	

Score 3

Documentation:
Describe distribution:
Dames rocket is native to middle and southern Europe and temperate Asia. It is now introduced to the northern portion of North America (USDA, ARS 2004).
Rational:

Sources of information:
USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/var/apache/cgi-bin/npgs/html/taxon.pl?300618 (15 December, 2004).

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

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

Score 5

Documentation:
Identify states invaded:
Dames rocket is now found throughout Canada and the United States, except for the southern states (USDA 2002). The species is declared noxious in Colorado (Rice 2006), USDA 2002). It is considered a weed in Manitoba and Tennessee (Royer and Dickinson 1999).
Rational:

Sources of information:
Rice, P.M. 2006. INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.
Royer, F., and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Total Possible 25
Total 17

4. FEASIBILITY OF CONTROL

4.1. Seed banks

A.	Seeds remain viable in the soil for less than 3 years	0
B.	Seeds remain viable in the soil for between 3 and 5 years	2

C.	Seeds remain viable in the soil for 5 years and more	3
U.	Unknown	

Score: U

Documentation:

Identify longevity of seed bank:

Seeds of dames rocket can remain viable in the soil for several years (Wisconsin DNR 2003).

Rational:

Sources of information:

Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

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
U.	Unknown	

Score: 0

Documentation:

Describe vegetative response:

This plant has no ability to resprout (USDA 2002).

Rational:

Sources of information:

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

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	

Score: 2

Documentation:

Identify types of control methods and time-term required:

Pulling is required for several years to remove new plants established from the seed bank. Seeds are likely to mature if the fruits have begun developing at the time the plant is pulled, putting plants in the bag or burning them will prevent further seed dispersal. Burning and herbicides treatment has been found to be an effective control method (Wisconsin DNR 2003).

Rational:

Sources of information:

Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].

Total Possible	7
Total	2

Total for 4 sections Possible	94
Total for 4 sections	39

References:

CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.

Canadian Wildlife Service. 2004. Invasive plants and their biology, impact and control options. Available: http://www.cws-scf.ec.gc.ca/publications/inv/cont_e.cfm [December 15, 2004].

CWMA - Colorado Weed Management Association. 2004. Noxious weeds and non-native plants – Dame's rocket (*Hesperis matronalis*). Available: http://www.cwma.org/tansy.html [October 11, 2004].

Lid, J. and D.T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.

Riley, J. Horticulture Agent, UAF Cooperative Extension Service. 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143. tel: (907) 786-6306. Pers. com.

Rice, P.M. 2006. INVADERS Database System (http://invader.dbs.umt.edu). Division of Biological Sciences, University of Montana, Missoula, MT 59812-4824.

Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.

Shephard, M., Vegetation Ecologist, USDA, Forest Service, Forest Health Protection, State and Private Forestry, 3301 C Street, Suite 202, Anchorage, Alaska 99503 Division. Tel: (907) 743-9454 - Pers. com.

University of Alaska Museum. University of Alaska Fairbanks. 2003. http://hispida.museum.uaf.edu:8080/home.cfm

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, ARS, National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: http://www.ars-grin.gov/var/apache/cgi-bin/npgs/html/taxon.pl?300618 (11 October, 2004).

Welsh, S.L. 1974. Anderson's flora of Alaska and adjacent parts of Canada. Brigham University Press. 724 pp.

Wisconsin Department of Natural Resources. 2003. Dame's rocket (*Hesperis matronalis*). Available: http://www.dnr.state.wi.us [December 15, 2004].