PLANT INVASIVENESS ASSESSMENT FORM

Botanical name: *Alliaria petiolata* (Bieb.) Cavara & Grande

Common name: garlic mustard

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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	No	
3	Arctic-Alpine	No	
	This species is unlikely to establish in any region in Alaska		

B.	**Invasiveness Ranking**	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	24
2	Biological characteristic and dispersal ability	25 (25)	16
3	Ecological amplitude and distribution	25 (25)	16
4	Feasibility of control	10 (10)	7
	Outcome score	100 (90)[b]	63 [a]
	Relative maximum score†		0.70

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

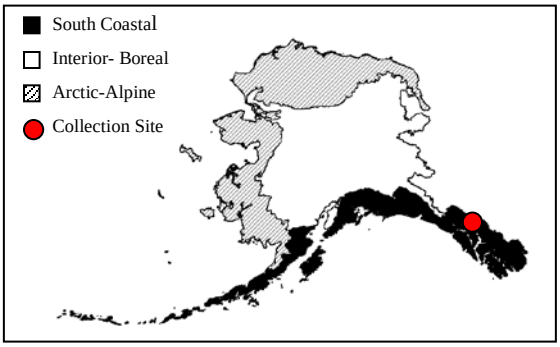
A. CLIMATIC COMPARISON:

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
No — Interior-Boreal
No — Arctic-Alpine



Documentation: Garlic mustard has been collected in South Coastal Region, in downtown Juneau, (AK Weeds Database, 2004).
Sources of information:
AK Weeds Database. 2004. Database of exotic vegetation collected in Alaska. University of Alaska, Alaska Natural Heritage Program – US Forest Service – National Park Service Database.

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
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 Fairbanks and areas where the species is documented is very low. This is true for Nome as well. However, this taxon has been collected from Stockholm, Sweden (Natur Historiska Riksmuseet Database, 2004), which has a moderate climate match (57% similarity) with Anchorage, suggesting that establishment in south central Alaska may be possible.
Sources of information:
CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
Natur Historiska Riksmuseet Database. 2004. http://www.nrm.se/wise/

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 U

Documentation:
Identify ecosystem processes impacted:
No information was found identifying impacts to ecosystem processes.
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	7

an existing layer)

D. Major alteration of structure (e.g., covers canopy, eradicating most or all layers below) 10

U. Unknown

Score 10

Documentation:

Identify type of impact or alteration:

Garlic mustard displaces native grasses, herbs, and tree seedlings (Blossey 2003, Blossey et al. 2002, Plant Conservation Alliance Alien Plant Working Group).

Rational:

Sources of information:

Blossey, B. 2003. Garlic Mustard. Ecology and management of invasive plants program http://www.invasiveplants.net/plants/garlicmustard.htm

Blossey, B., V.A. Nuzzo, H.L. Hinz, E. Gerber. 2002. Garlic mustard. In Van Driesche, R., et al. 2002. Biological control of invasive plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04. 413 pp.

Plant Conservation Alliance Alien Plant Working Group. On-line document http://www.nps.gov/plants/alien/fact/alpe1.htm

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 7

Documentation:

Identify type of impact or alteration:

Garlic mustard can completely dominate and displace native plants in the rich herbaceous understory layer (Nuzzo 2000).

Rational:

Sources of information:

Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

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 7

Documentation:

Identify type of impact or alteration:

Garlic mustard appears to alter habitat suitability for native birds, mammals, and amphibians, and may affect populations of these species. Phytotoxic chemicals produced by *Alliaria petiolata* may interfere with growth of native species (Nuzzo 2000).

Rational:

Sources of information:
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

Total Possible	30
Total	24

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):
Plant produces an average of 136-295 seeds (Byers and Quinn 1998), and up to 2421 seeds under lab conditions (Nuzzo 2000). Maximum production per plant is estimated at 7,900 seeds on a plant with 12 stems (Nuzzo 2000).
Rational:

Sources of information:
Byers, D.L. and J.A. Quinn. 1998. Demographic variation in *Alliaria petiolata* (Brassicaceae) in four contrasting habitats. Journal of the Torrey Botanical Society 125:138-149.
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis)* Garlic Mustard. The Nature Conservancy, Arlington, VA.

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:
Seeds typically fall within a few meters radius of the plant. Wind dispersal is limited, and seeds do not float well, although seeds readily attach to moist surfaces. It may be dispersed by rodents, birds, and deer (Nuzzo 2000).
Rational:

Sources of information:
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis)* Garlic Mustard. The Nature Conservancy, Arlington, VA.

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:
Anthropogenic distribution appears to be the primary dispersal mechanism of *Alliaria petiolata*. Seeds are transported on boots, clothes, and hair, and by roadside mowing, automobiles and trains (Nuzzo 2000). The species has medicinal properties (McGuffin 1997). This plant is an ingredient in several 'gourmet' recipes. At least one U.S. seed company (Canterbury Farms) offers *Alliaria petiolata* seeds for sale ($1.00/package) (Nuzzo 2000).
Rational:

Sources of information:
McGuffin, M. 1997. American Herbal Product Association's safety handbook. Boka Raton, Fla. CRC Press. 231pp.
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis)* Garlic Mustard. The Nature Conservancy, Arlington, VA.

2.4. Allelopathic

A. No 0
B. Yes 2
U. Unknown

Score 2

Documentation:
Describe effect on adjacent plants:
Alliaria petiolata produces several phytotoxic chemicals that may interfere with native plant species. The roots contain sinigrin, and glucotopaeolin (Nuzzo 2000).
Rational:

Sources of information:
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

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 3

Documentation:
Evidence of competitive ability:
Garlic mustard outcompetes native herbaceous species for light, moisture, nutrient, and space (Rowe and Swearingen 2003). Experiments demonstrated that seedlings of chestnut oak had reduced growth when grown with *Alliaria petiolata* (Nuzzo 2000).
Rational:

Sources of information:
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.
Rowe, P. and J.M. Swearingen. 2003. Garlic mustard *Alliaria petiolata*. PCA Alien Plant Working Group.

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:
Grows from 1 foot to 4 feet tall (Nuzzo 2000, Wisconsin DNR 2004).
Rational:
Although aggressive, this taxon does not have a smothering growth habit.
Sources of information:
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.
Wisconsin Department of Natural Resources. 2004. http://dnr.wi.gov

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 3

Documentation:
Describe germination requirements:
Seeds can remain dormant for 20 months (Blossey 2003). Cold stratification is necessary for germination. Germinates well in intact woodland communities (Wisconsin DNR 2004). Can germinate in both light and dark after dormancy is broken (Byers 1988, Bloom et al. 1990). Exposed soil caused by deer trampling has been suggested to facilitate spread of the species (Blossey 2003), but garlic mustard is capable of germinating in the absence of exposed soil.
Rational:

Sources of information:
Bloom, C. T., C. C. Baskin, and J. M. Baskin. 1990. Germination ecology of the facultative biennial *Arabis laevigata* var. *laevigata*. American Midland Naturalist
Blossey, B. 2003. Garlic Mustard. Ecology and management of invasive plants program. http://www.invasiveplants.net/plants/garlicmustard.htm
Byers, D. L. 1988. Life history variation of *Alliaria petiolata* in a range of habitats in New Jersey. M. S. Thesis. Rutgers University, New Brunswick, NJ. Pp. 132.
Wisconsin Department of Natural Resources. 2004. http://dnr.wi.gov

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

A.	No	0
B.	Yes	3
U.	Unknown	

Score 0

Documentation:
Species:
Alliaria petiolata is the only species of the genus *Alliaria* in North America. (Blossey et al. 2002, USDA 2002).
Sources of information:
Blossey, B., V.A. Nuzzo, H.L. Hinz, E. Gerber. 2002. Garlic mustard. In Van Driesche, R., et al. 2002. Biological control of invasive plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04. 413 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

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 0

Documentation:

Describe type of habitat:

Alilaria petiolata formerly considered a plant of floodplains and moist woods has become common in drier and more open habitats (Byers and Quinn 1987). It occurs in forest edges, hedgerows, shaded roadsides, and urban areas, and occasionally in full sun (Nuzzo 2000).

Rational:

Sources of information:

Byers, D.L. and J.A. Quinn. 1987. The effect of habitat variation in *Alliaria petiolata* on life history characteristics. Abstracts. American Journal of Botany 74:647.

Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

Total Possible 25

Total 16

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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 0

Documentation:

Identify reason for selection, or evidence of weedy history:

Alliaria petiolata is a weed of natural areas (Blossey et al. 2002).

Rational:

Although used in cooking and medicines, this taxon in not domesticated or associated with agriculture.

Sources of information:

Blossey, B., V.A. Nuzzo, H.L. Hinz, E. Gerber. 2002. Garlic mustard. In Van Driesche, R., et al. 2002. Biological control of invasive plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04. 413 pp.

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 4

Documentation:

Identify type of habitat and states or provinces where it occurs:

Garlic mustard is common in low-quality forests in central Pennsylvania (Nuzzo 2000) and less frequent in isolated woodlots in central Indiana (Brothers and Springarn 1992). It is rarely found under coniferous trees in the Midwest, but has been reported from under seven species of coniferous trees in Ontario. Garlic mustard is most frequently recorded from moist, usually riverine, habitat and waste ground in Kansas and Oklahoma (Nuzzo 2000).

Sources of information:

Brothers, T.S. and A. Springarn. 1992. Forest fragmentation and alien plant invasion of central Indiana old-growth forests. Conservation Biology 6: 91-100.

Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria*

officinalis) Garlic Mustard. The Nature Conservancy, Arlington, VA.

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 4

Documentation:

Identify type of disturbance:

Alliaria petiolata is disturbance adapted, and is frequent in sites subjected to continued or repeated disturbance (Luken et al. 1997, Pyle 1995). Byers and Quinn (1998) found that garlic mustard resource allocation was greatest in the most disturbed site. Continued disturbance promotes greater seed production which in turn promotes larger populations. In the absence of disturbance, garlic mustard gradually declines to a low stable level (Nuzzo 2000).

Rational:

Sources of information:

Byers, D.L. and J.A. Quinn. 1998. Demographic variation in *Alliaria petiolata* (Brassicaceae) in four contrasting habitats. Journal of the Torrey Botanical Society 125:138-149.

Luken, J.O., L.M. Kuddes, T.C. Tholeneier. 1997. Response of understory species to gap formation and soil disturbance in *Lonicera maackii* thickets. Restoration Ecology 5:229-235.

Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis)* Garlic Mustard. The Nature Conservancy, Arlington, VA.

Pyle, L.L. 1995. Effects of disturbance on herbaceous exotic plants species on the floodplain of the Potomac river. American Midland Naturalist 134:224-253.

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:

Native to Europe, *Alliaria petiolata* also occurs in North Africa, India, Sri Lanka, New Zealand, and North America.

Rational:

Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

Welk, E., K. Schubert and M.H. Hoffmann. 2002. Present and potential distribution of invasive garlic mustard (*Alliaria petiolata*) in North America. Diversity and Distributions 8: 219-233.

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:
Alliaria petiolata is considered to be noxious in Alabama, Minnesota, Vermont, and Washington (Invaders Database System 2003).
Rational:

Sources of information:
Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/

Total Possible	25
Total	16

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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 2

Documentation:
Identify longevity of seed bank:
The small percentage of seed remains viable in the seed bank for up to four years (Byers and Quinn 1998, Nuzzo 2000).
Rational:

Sources of information:
Byers, D.L. and J.A. Quinn. 1998. Demographic variation in Alliaria petiolata (Brassicaceae) in four contrasting habitats. Journal of the Torrey Botanical Society 125:138-149.
Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

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 2

Documentation:
Describe vegetative response:
Garlic mustard can resprout after removal of aboveground biomass (Wisconsin DNR 2004).
Rational:

Sources of information:
Wisconsin Department of Natural Resources. 2004. http://dnr.wi.gov

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 3

Documentation:

Identify types of control methods and time-term required:

Once garlic mustard is established, the management goal is to prevent seed production until the seed bank is exhausted. This requires post removal management over several growing seasons. Many successful control regimes involve a combination of spring burning, hand pulling, and herbicide treatment. Monitoring once or twice annually for garlic mustard presence is required.

Rational:

Sources of information:

Nuzzo, V., 2000. Element Stewardship Abstract for *Alliaria petiolata (Alliaria officinalis) Garlic Mustard*. The Nature Conservancy, Arlington, VA.

Total Possible	10
Total	7

Total for 4 sections Possible	90
Total for 4 sections	63

References:

Baskin, J.M. and C.C. Baskin. 1992. Seed germination biology of the weedy biennial *Alliaria petiolata*. Natural Areas Journal 12: 191-197.

Bloom, C.T., C.C. Baskin, J.M. Baskin. 1990. Germination ecology of the facultative biennial *Arabis laevigata* variety *laevigata*. American Midland Naturalist 124: 214-230.

Blossey, B. 2003. Garlic Mustard. Ecology and management of invasive plants program http://www.invasiveplants.net/plants/garlicmustard.htm

Blossey, B., V.A. Nuzzo, H.L. Hinz, E. Gerber. 2002. Garlic mustard. In Van Driesche, R., et al. 2002. Biological control of invasive plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04. 413 pp

Brothers, T.S. and A. Springarn. 1992. Forest fragmentation and alien plant invasion of central Indiana old-growth forests. Conservation Biology 6: 91-100.

Byers, D. L. 1988. Life history variation of *Alliaria petiolata* in a range of habitats in New Jersey. M. S. Thesis. Rutgers University, New Brunswick, NJ. Pp. 132.

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CNIPM – Alaska Committee for Noxious and Invasive Plant Management. 2004. http://www.cnipm.org/plants.html

Invaders Database System. The University of Montana. 2003. Montana Noxious Weed Trust Fund. Department of Agriculture. http://invader.dbs.umt.edu/

Luken, J.O., L.M. Kuddes, T.C. Tholeneier. 1997. Response of understory species to gap formation and soil disturbance in *Lonicera maackii* thickets. Restoration Ecology 5:229-235.

McGuffin, M. 1997. American Herbal Product Association's safety handbook. Boka Raton, Fla. CRC Press. 231pp.

Nuzzo, V. 2000. Element Stewardship Abstract for *Alliaria petiolata* (*Alliaria officinalis*) Garlic Mustard. The Nature Conservancy, Arlington, Virginia.

Pyle, L.L. 1995. Effects of disturbance on herbaceous exotic plants species on the floodplain of the Potomac River. American Midland Naturalist 134:224-253.

Rowe, P. and J.M. Swearingen. 2003. Garlic mustard *Alliaria petiolata*. PCA Alien Plant Working Group.

Tu, M. and B. Meyers-Rice. 2001. A success story: early detection and quick elimination of a new invader in Southeast Alaska. The Nature Conservancy's Wildland Invasive Species Program. http://tncweeds.ucdavis.edu/index.html

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.

Welk, E., K. Schubert and M.H. Hoffmann. 2002. Present and potential distribution of invasive garlic mustard (*Alliaria petiolata*) in North America. Diversity and Distributions 8: 219-233.

Wisconsin Department of Natural Resources. 2004. http://dnr.wi.gov