NAME OF SPECIES: *Cardamine impatiens* L.		
Synonyms:		
Common Name: Narrowleaf bittercress and Bushy Rockcress	**Cultivars?** YES ☐ NO ☒	
A. CURRENT STATUS AND DISTRIBUTION		
I. In Wisconsin?	1. YES ☐	NO ☒
	2. Abundance: N/a	
	3. Geographic Range: N/A	
	4. Habitat Invaded: N/A Disturbed Areas ☐ Undisturbed Areas ☐	
	5. Historical Status and Rate of Spread in Wisconsin: N/a	
	6. Proportion of potential range occupied: N/a	
II. Invasive in Similar Climate Zones	1. YES ☒ NO ☐ Where (include trends): Naturalizing in NE US and Eastern Great Lakes. Listed in Connecticut and Massachusetts (1)	
III. Invasive in Which Habitat Types	1. Upland ☐ Wetland ☐ Dune ☐ Prairie ☐ Aquatic ☐ Forest ☒ Grassland ☒ Bog ☐ Fen ☐ Swamp ☒ Marsh ☒ Lake ☐ Stream ☒ Other: Roadsides; forests, edges, floodplain forests, wetlands, river or stream, roadside, vacant lot/yard/garden (6)	
IV. Habitat Affected	1. Soil types favored or tolerated: Prefers moist soil, pH studies have not been conducted (4)	
	2. Conservation significance of threatened habitats:	
V. Native Range and Habitat	1. List countries and native habitat types: Europe (2); Europe, where it grows in shady woods and on moist limestone rocks and cliffs (6).	
VI. Legal Classification	1. Listed by government entities? CT- invasive, banned and MA- prohibited (1)	
	2. Illegal to sell? YES ☒ NO ☐ Notes:	
B. ESTABLISHMENT POTENTIAL AND LIFE HISTORY TRAITS		
I. Life History	1. Type of plant: Annual ☒ Biennial ☒ Monocarpic Perennial ☐ Herbaceous Perennial ☐ Vine ☐ Shrub ☐ Tree ☐	
	2. Time to Maturity: Spring to early summer (2)	
	3. Length of Seed Viability: seeds extremely adabtable and durable, studies found germination rates as high as 80% even after deep freezing (-196 degrees C for 50 days) (Voronkova, 2007); and germination rates over 56% in standing water (Kimata, 1983). No evidence for viability for longer than 10 years. While no definitive studies on germination vis a vis existing vegetation have been located, the authors' personal observations in the field suggest the ability to readily germinate in existing vegetation. (3)	
	4. Methods of Reproduction: Asexual ☐ Sexual ☒ Notes: Narrowleaf bittercress can self-pollinate and produces prolific quantities of seed in seedpods (siliques) that can shoot the seed a short distance from the plant when the dried seedpods burst open. Thus, a single plant can quickly form a colony(4)	

	5. Hybridization potential:
II. Climate	1. Climate restrictions: Requires part sun to deep shade; moist woods, thickets, stream banks (2)
	2. Effects of potential climate change:
III. Dispersal Potential	1. Pathways - Please check all that apply: Unintentional: Bird ☐ Animal ☒ Vehicles/Human ☒ Wind ☐ Water ☒ Other: Often observed along roadside and footpaths probably spread by motorized vehicles and foot traffic. Possibly also spread via contaminated soil from nursery plantings and through mowing (3). Intentional: Ornamental ☐ Forage/Erosion control ☐ Medicine/Food: Other:
	2. Distinguishing characteristics that aid in its survival and/or inhibit its control: Individual plants have been reported to produce over 5,500 seeds (3, 4). Seeds can germinate in water and rivers and streams are considered a method of long-range dispersal (4).
IV. Ability to go Undetected	1. HIGH ☐ MEDIUM ☒ LOW ☐
C. DAMAGE POTENTIAL	
I. Competitive Ability	1. Presence of Natural Enemies:
	2. Competition with native species: Shade tolerant, fast growth. Annual or biennial with selfing rates as high as 99% (Kimata, 1983). Basal rosettes formed in autumn, providing an advantage over spring-germinating species (authors' personal observations). (3)
	2. Rate of Spread: -changes in relative dominance over time: -change in acreage over time: HIGH(1-3 yrs) ☒ MEDIUM (4-6 yrs) ☐ LOW (7-10 yrs) ☐ Notes: Individual plants have been reported to produce over 5,500 seeds. (3)
II. Environmental Effects	1. Alteration of ecosystem/community composition? YES ☒ NO ☐ Notes: Reported to form dense patches and to outcompete native species (Lu, 2004). The authors' personal observations in the CT-NJ-NY area to date suggest that while large numbers can occur in populations; the species rapidly completes its reproductive cycle and usually dies back by mid-summer. Nonetheless, impacts on spring ephemerals are likely significant. (3)
	2. Alteration of ecosystem/community structure? YES ☒ NO ☐ Notes: Slightly Reported to form dense patches at the ground-level herbaceous layer. (Lu, 2004). The author's personal observations in the CT-NJ-NY area to date suggest that while large numbers can occur in populations; this species is weak and spindly, and does not have a dense or smothering habit; additionally, C. impatiens rapidly

	completes its reproductive cycle and usually dies back by mid-summer. European studies (Margules et al., 1994; Willaims, 2000) suggest C. impatiens is intolerant of competition with high rates of extinction. There are conflicting reports from North American investigators regarding invasive nature (Lu, 2004; Poindexter, 2006) (3)
	3. Alteration of ecosystem/community functions and processes? YES ☐ NO ☒ Notes: No studies have been conducted however can be expected that there is no signiifcant impact (3)
	4. Allelopathic properties? YES ☐ NO ☒ Notes:
D. SOCIO-ECONOMIC EFFECTS	
I. Positive aspects of the species to the economy/society:	Notes:
II. Potential Socio-Economic Effects of Requiring Controls:	Positive: Not known to be in WI. Since spread through human activities, BMPs should be followed. Negative:
III. Direct and indirect Socio-Economic Effects of Plant :	Notes:
IV. Increased Costs to Sectors Caused by the Plant::	Notes: Fast growth grate and high seed production means potential long term management in forest communities including costs for herbicide (could be aquatic approved depending on habitat) in addtion to lots of labor for handpulling.
V. Effects on human health:	Notes:
VI. Potential socio-economic effects of restricting use:	Positive: Negative:
E. CONTROL AND PREVENTION	
I. Costs of Prevention (please be as specific as possible):	Notes: Recreationalists and professionals working in forests, wetlands, etc should follow BMPs to prevent spread (cleaning equipment, selves, gear, pets).
II. Responsiveness to prevention efforts:	Notes:
III. Effective Control tactics: (provide only basic info)	Mechanical ☒ Biological ☐ Chemical ☒ Times and uses: Mechanical- It is relatively easy to pull up (author's personal observations; Lamont & Young, 2004; Lu, 2004). No other management studies located. Populations frequently in wetlands. (3) There is little information available for chemical control of narrowleaf bittercress. Small infestations can be hand-pulled easily. This site should be monitored and plants removed in the spring, summer, and fall to prevent seed production. Plants with flowers and/or seed heads should be bagged and disposed. Following guidelines for controlling other biennial mustards such as garlic mustard, *Alliaria petiolata*, may be helpful. (4)
IV. Costs of Control:	Notes:

V. Cost of prevention or control vs. Cost of allowing invasion to occur:	Notes: Since not known in WI, cost of prevention = education, possible surveys vs. money for chemicals, supplies, and labor.
VI. Non-Target Effects of Control:	Notes:
VII. Efficacy of monitoring:	Notes:
VIII. Legal and landowner issues:	Notes:
F. HYBRIDS AND CULTIVARS AND VARIETIES	
I. Known hybrids? YES ☐ NO ☐	Name of hybrid: Names of hybrid cultivars:
II. Species cultivars and varieties	Names of cultivars, varieties and any information about the invasive behaviors of each:
	Notes: Subordinate taxa: *Cardamine impatiens* var. *impatiens* *Cardamine impatiens* var. *pectinata*, syn. *Cardamine pectinata* Pall. ex DC. (5)

G. REFERENCES USED:

☐ UW Herbarium (Madison or Stevens Point)
☐ WI DNR
☐ Bugwood (Element Stewardship Abstracts
☐ Native Plant Conservation Alliance
☒ IPANE
☒ USDA Plants

Number	Reference
1	http://plants.usda.gov/java/nameSearch
2	http://www.minnesotawildflowers.info/flower/narrow-leaf-bittercress
3	http://newyorkinvasivespecies.org/PlantAssessments/Cardamine.impatiens.NYS.pdf
4	http://www.mda.state.mn.us/plants/badplants/bittercress.aspx
5	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/cgi-bin/npgs/html/taxon.pl?9006 (25 October 2011)
6	IPANE, http://nbii-nin.ciesin.columbia.edu/ipane/icat/browse.do?specieId=44

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