NAME OF SPECIES: Epilobium hirsutum L.	
Synonyms:	
Common Name: Hairy Willow Herb, Codlins-and-Cream, European Fireweed, Great Willowherb (1).	
A. CURRENT STATUS AND DISTRIBUTION	
I. In Wisconsin?	1. YES ☒ NO ☐
	2. Abundance: Presently uncommon, but persistent where it is.
	3. Geographic Range: Herbarium records exist from 4 counties in eastern Wisconsin: Kenosha, Manitowoc and Door (1).
	4. Habitat Invaded: High quality wetland and Wet Prairie. Chiwachee is only site in Natural area. Disturbed Areas ☒ Undisturbed Areas ☒
	5. Historical Status and Rate of Spread in Wisconsin: First reported in the United States ca. 1860, where it was introduced as a garden ornamental and was also a contaminant in ballast sand (2). The earliest herbarium specimen from Wisconsin was collected in 1964 in Douglas County (1).
	6. Proportion of potential range occupied: Presently migrating westward from the eastern United States (2). Also spreading in Europe (3).
II. Invasive in Similar Climate Zones	1. YES ☒ NO ☐ Where (include trends): England, Wales, Ireland, Belgium, Egypt, Turkey, southern Australia, Norway, and the United States (2).
III. Invasive in Similar Habitat Types	1. Upland ☐ Wetland ☒ Dune ☐ Prairie ☒ Aquatic ☒ Forest ☐ Grassland ☐ Bog ☒ Fen ☒ Swamp ☒ Marsh ☒ Lake ☒ Stream ☒ Other: Semi-aquatic and damp waste places, stream banks, ditches, low fields, pastures, and meadows, erosion zones along riparian corridors.
IV. Habitat Effected	1. Soil types favored (e.g. sand, silt, clay, or combinations thereof, pH): Seed germination requires a pH of 5.5 or greater (2).
	2. Conservation significance of threatened habitats: Wetlands provide billions of dollars annually in ecosystems services. Simplified and homogenized systems do not exhibit congruent magnitude of nutrient and carbon sequestration and retention.
V. Native Habitat	1. List countries and native habitat types: Mediterranean region of Europe, Western Asia, and Africa (2).
VI. Legal Classification	1. Listed by government entities? Yes. Regulated in WA (2).
	2. Illegal to sell in WI? 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: At least two growing seasons.

	3. Length of Seed Viability: Experimental evidence suggests that temperature, light, and pH are major variables influencing seed viability and germination (5) (6).
	4. Methods of Reproduction: Asexual ☒ Sexual ☒ Please note abundance of propagules and and other important information: Spreads by seeds and stolons, which develop into rhizomes after growing into the ground. Flower buds develop after 10 to 12 weeks of spring growth, and seeds are ripe and ready for dispersal 4 to 6 weeks after anthesis. Although E. hirsutum is capable of selfing, seed production is reduced by self-pollination (2). Prolific seeder.
	5. Hybridization potential: Unknown?
II. Climate	1. Climate restrictions: Shade intolerant during its establishment phase (2) (7). Will not grow in locations above 2500 meters (8100 feet) in elevation (2).
	2. Effects of potential climate change: Unknown.
III. Dispersal Potential	1. Pathways - Please check all that apply: Intentional: Ornamental ☒ Forage/Erosion control ☐ Medicine/Food: Other: Gardeners consider E. hirsutum a substitute for Lythrum salicaria (Purple Loosestrife) (2). Unintentional: Bird ☐ Animal ☐ Vehicles/Human ☒ Wind ☒ Water ☒ Other: Seeds are primarily wind-dispersed, but can also migrate via irrigation and drainage ditches (2). In Norway, ballast soil, imported gypsum, and seed contamination in soil from plant nurseries are dispersal vectors (3).
	2. Distinguishing characteristics that aid in its survival and/or inhibit its control: Rhizomes branch extensively and can grow up to 2 meters in length, aiding in the spread of E. hirsutum (2). Tolerant of flooding. Mechanisms of flood tolerance include aerenchyma production and cork suberization of root and rhizome tissue (2). Established stands are capable of spreading into undisturbed natural areas.
IV. Ability to go Undetected	1. HIGH ☒ MEDIUM ☐ LOW ☐
C. DAMAGE POTENTIAL	
I. Competitive Ability	1. Presence of Natural Enemies: Unknown.
	2. Competition with native species: Highly competitive. Forms dense monocultures that replace and exclude native species. Can outcompete and grow faster than Lythrum salicaria in autumn, when there are shorter days and cooler temps. Conversely, Lythrum salicaria outcompetes E. hirsutum in spring.
	3. Rate of Spread: HIGH(1-3 yrs) ☒ MEDIUM (4-6 yrs) ☐ LOW (7-10 yrs) ☐ Notes: Rhizomes and stolons increase E. hirsutum's rate of spread.
II. Environmental Effects	1. Alteration of ecosystem/community composition? YES ☒ NO ☐ Notes: Reduces native species richness and diversity (2).
	2. Alteration of ecosystem/community structure? YES ☒ NO ☐ Notes: E. hirsutum monocultures are structurally homogeneous relative to the native species assembledges they replace.

F. REFERENCES USED:

	3. <u>Alteration of ecosystem/community functions and processes?</u> YES ☒ NO ☐ Notes: Alters fire regimes, food chains, succesional trajectories, and hydrologic cycles (2).
	4. <u>Allelopathic properties?</u> YES ☐ NO ☒ Notes: No allelopathic substances have been isolated to date.
D. SOCIO-ECONOMIC Effects	
I. Positive aspects of the species to the economy/society:	Notes: Ornamental variety.
II. Potential socio-economic effects of restricting use:	Notes: Not being grown commercially.
III. Direct and indirect effects :	Notes: Minimal costs are associated with substituting less invasive ornamental varieties for E. hirsutum.
IV. Increased cost to a sector:	Notes: N/A
V. Effects on human health:	Notes: N/A
E. CONTROL AND PREVENTION	
I. Costs of Prevention (including education; please be as specific as possible):	Notes: N/A
II. Responsiveness to prevention efforts:	Notes: Unknown. Most available information appears to be anecdotal.
III. Effective Control tactics:	Mechanical ☒ Biological ☐ Chemical ☒ Times and uses: Data on effective control tactics for E. hirsutum are lacking. At Chiwachee, regular control each year keeps it from spreading.
IV. Minimum Effort:	Notes: Several growing seasons. Due to persistence and size of rhizome bud bank, subsequent monitoring is an essential component of any management plan for E. hirsutum.
V. Costs of Control:	Notes: Specific costs are variable and site-specific.
VI. Cost of prevention or control vs. Cost of allowing invasion to occur:	Notes: N/A
VII. Non-Target Effects of Control:	Notes: Control may require the use of herbicides and additives.
VIII. Efficacy of monitoring:	Notes: Early detection and intervention can greatly reduce the time and resources that must be invested into controlling established E. hirsutum stands.
IX. Legal and landowner issues:	Notes: Permits and/or licenses may be required to control this species on public lands.

☒ UW Herbarium
☒ WI DNR
☒ TNC
☐ Native Plant Conservation Alliance
☐ IPANE

☒ USDA Plants

Number	Reference
1	Wisconsin State Herbarium. 2007. WISFLORA: Wisconsin Vascular Plant Species (http://www.botany.wisc.edu/wisflora/). Dept. Botany, Univ. Wisconsin, Madison, WI 53706-1381 USA.
2	Washington State Ecology website (http://www.ecy.wa.gov/programs/wq/plants/weeds/willowherb.html).
3	Fremsted, E. 2003. Great Willowherb (Epilobium hirsutum) is Spreading in Norway. Blyttia 61(1):4.
4	USDA, NRCS. 2007. The PLANTS Database (http://plants.usda.gov, 16 March 2007). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
5	Shamsi, S.R.A., and F.H. Whitehead. 1974. Comparative Eco-Physiology of Epilobium hirsutum L. and Lythrum salicaria L.: I. General Biology, Distribution, and Germination. The Journal of Ecology 62(1):279-290.
6	Etherington, J.R. 1983. Control of Germination and Seedling Morphology by Ethene: Differential Responses, Related to Habitat of Epilobium hirsutum L. and Chamerion angustifolium (L.) J. Holub. Annals of Botany 53:653-658.
7	Shamsi, S.R.A. 1976. Effect of a Light-Break on the Growth and Development of Epilobium hirsutum and Lythrum salicaria in Short Photoperiods. Annals of Botany 40:153-162.

Author(s), Draft number, and date completed: Craig A. Annen, Draft 1, June 30, 2007.

Reviewer(s) and date reviewed: Leonhard Weiss, July 7, 2007.

Approved and Completed Date: July 7, 2007