NAME OF SPECIES: Carduus nutans L.	
Synonyms: C. nutans L. subsp. leiophyllus (Petrovic) Stoj. & Stefani; C. nutans L. var. leiophyllus (Petrovic) Arenes.	
Common Name: Musk Thistle, Nodding Thistle.	
A. CURRENT STATUS AND DISTRIBUTION	
I. In Wisconsin?	1. YES ☒ NO ☐
	2. Abundance: Widespread distribution in southern and west central Wisconsin, where it is locally abundant (1).
	3. Geographic Range: Found in 18 counties in Wisconsin (1).
	4. Habitat Invaded: Dry, open or partially shaded areas. Disturbed Areas ☒ Undisturbed Areas ☒
	5. Historical Status and Rate of Spread in Wisconsin: Earliest herbarium specimen was collected in 1947 in Waukesha County (1).
	6. Proportion of potential range occupied: Could potentially expand into additional disturbed areas.
II. Invasive in Similar Climate Zones	1. YES ☒ NO ☐ Where (include trends): Invasive throughout the United States.
III. Invasive in Similar Habitat Types	1. Upland ☒ Wetland ☐ Dune ☒ Prairie ☒ Aquatic ☐ Forest ☐ Grassland ☒ Bog ☐ Fen ☐ Swamp ☐ Marsh ☐ Lake ☐ Stream ☐ Other: roadsides, disturbed sites, hayfields, glade communities, buffer zones, restorations, abandoned agricultural land, dumps, fencerows, pastures, canopy gaps and open spaces in high quality natural areas.
IV. Habitat Effected	1. Soil types favored (e.g. sand, silt, clay, or combinations thereof, pH): grows in a variety of soil conditions (2).
	2. Conservation significance of threatened habitats: Prairie and grassland communities provide ecosystem services (carbon sequestration) and habitat for arthropods and birds.
V. Native Habitat	1. List countries and native habitat types: Southern Europe and western Asia (3).
VI. Legal Classification	1. Listed by government entities? Yes. Notes: Listed as a noxious weed in AR, ID, IL, KS, KY, MY, MO, NE, NV, ND, OK, PN, UT, WV, WY, CA, CO, MN, OH, NM, NC, Also regulated in OR, SD, WA (4).
	2. Illegal to sell? YES ☒ NO ☐

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: Typically 2 growing seasons, but could act as a winter annual (3).
	3. Length of Seed Viability: Greater than 60 months in dry soil,possibly as long as 10 years (9). no germination observed in waterlogged soil (5).
	4. Methods of Reproduction: Asexual ☐ Sexual ☒ Please note abundance of propagules and and other important information: Each plant can produce up to 10,000 seeds (3). Populations can be up to 60% self-fertile (6).
	5. Hybridization potential: High. Carduus X orthocephalus Wallr. is a hybrid between C. acanthoides L. and C nutans L. (1) (2) (6). Hybrids are more aggressive than C. nutans (2).
II. Climate	1. Climate restrictions: requires cold period to induce reproductive stage
	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: Unintentional: Bird ☐ Mammals ☐ Vehicles/Human ☒ Wind ☒ Water ☐ Other: Mowers, impurity in hay and straw.
	2. Distinguishing characteristics that aid in its survival and/or inhibit its control: Prolific seeder.
IV. Ability to go Undetected	1. HIGH ☐ MEDIUM ☐ LOW ☒
C. DAMAGE POTENTIAL	
I. Competitive Ability	1. Presence of Natural Enemies: Rhynocilus connicus has introduced to control it. Not widely introduced due to impacts on rare thistles in WI.
	2. Competition with native species: Allelopathic effects accelerate C. nutans invasions (7) and reduce N fixation capacity of legumes (8).
	3. Rate of Spread: HIGH(1-3 yrs) ☐ MEDIUM (4-6 yrs) ☒ LOW (7-10 yrs) ☐ Notes: Mower decks enhance the rate (and distance) of spread.
II. Environmental Effects	1. Alteration of ecosystem/community composition? YES ☒ NO ☐ Notes: Displaces native species, lowering species density and diversity (7).
	2. Alteration of ecosystem/community structure? YES ☒ NO ☐ Notes: Can form monotypic vegetation stands.
	3. Alteration of ecosystem/community functions and processes? YES ☒ NO ☐ Notes: Fire will not push through heavy infestations. May distract pollinators from native species (4). C. nutans infestations can induce long-term declines in soil nitrogen input via allelopathic effects on legumes (8).
	4. Allelopathic properties? YES ☒ NO ☐

F. REFERENCES USED:

D. SOCIO-ECONOMIC Effects	
I. Positive aspects of the species to the economy/society:	Notes: None.
II. Potential socio-economic effects of restricting use:	Notes: None
III. Direct and indirect effects :	Notes: Degrades pastures
IV. Increased cost to a sector:	Notes: Negatively impacts livestock production and reduces land values.
V. Effects on human health:	Notes: Thistles have spines on leaves and stems.
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:
III. Effective Control tactics:	Mechanical ☒ Biological ☒ Chemical ☒ Times and uses: Herbicide applications are most effective in the rosette stage. Clopyralid and aminopyralid are more selective than glyphosate. Mowing is most effective immediately prior to flowering.
IV. Minimum Effort:	Notes: Two growing seasons.
V. Costs of Control:	Notes: 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: Composite/legume-specific herbicides can harm or eliminate desired vegetation. Mowing in early summer can be detrimental to nesting birds. Even selective herbicides will impact non-target forbs.
VIII. Efficacy of monitoring:	Notes: If detected early, C. nutans can be eradicated. Subsequent monitoring is usually necessary.
IX. Legal and landowner issues:	Notes: Uncontrolled infestations spread to adjacent 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	Warwick, I., B.K. Thompson, and L.D. Black. 1990. Comparative Growth Response in Carduus nutans, C.

	acanthoides, and their F1 Hybrids. Canadian Journal of Botany 68(8):1675-1679.
3	Hoffman, R.A. and S. K. Kearns. 1997. Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants. WDNR Publication Publ ER-090 97.
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	Comes, R.D.; V.F. Bruns; and A.D. Kelley. 1978. Longevity of Certain Weed and Crop Seeds in Fresh Water. Weed Science, Vol.26(4):336-344.
6	Warwick, I. and B. K. Thompson. 1989. The Mating System in Sympatric Populations of Carduus nutans, C. acanthoides and their Hybrid Swarms. Heredity 63(3):329-337.
7	Wardle, D.A., K.S. Nicholson, and A. Rahman. 1993. Influence of Plant Age on the Allelopathic Potential of Nodding Thistle (Carduus nutans L.) Against Pasture Grasses and Legumes. Weed Research 33(1):69-78.
8	Wardle, D.A., K.S. Nicholson, M. Ahmed, and A. Rahman. 1994. Interference Effects of the Invasive Plant Carduus nutans L. Against the Nitrogen Fixation Ability of Trifolium repens L. Plant and Soil 163(2):287-297.
9	State of California. 2007. Weed Info: Carduus (http://www.cdfa.ca.gov/phpps/ipc/weedinfo/carduus.htm.).

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Reviewer(s) and date reviewed: Jerry Doll, August 20, 2007

Approved and Completed Date: