NAME OF SPECIES: Pueraria montana (Lour.) Merr. and 2 varieties: Pueraria montana (Lour.) Merr. var. lobata (Willd.) Maesen & S. Almeida and Pueraria montana (Lour.) Merr. var. montana (1).		
Synonyms: Dolichos lobatus Willd., Pueraria hirsuta (Thunb.) C. Schneider, Pueraria lobata var. thomsonii (Benth.) Maesen, Pueraria lobata (Willd.) Ohwi, Pueraria montana (Lour.) Merr. var. lobata (Willd.), Pueraria thunbergiana (Sieb. & Zucc.) Benth. (3).		
Common Name: Kudzu (1)		
A. CURRENT STATUS AND DISTRIBUTION		
I. In Wisconsin?	1. YES ☐	NO ☒
	2. Abundance:	
	3. Geographic Range:	
	4. Habitat Invaded: Disturbed Areas ☐ Undisturbed Areas ☐	
	5. Historical Status and Rate of Spread in Wisconsin:	
	6. Proportion of potential range occupied: 0%	
II. Invasive in Similar Climate Zones	1. YES ☒ NO ☐ Where (include trends): Common throughout the southeastern US and has been found as far north as Pennsylvania and the north suburbs of Chicago. Rarely occurs in the northeastern US, but is occasionally found from Connecticut to Illinois. The most severe infestations occur in the piedmont regions of Mississippi, Alabama, and Georgia. However, most spread is slow. Kudzu colonies in southern Illinois were found producing large numbers of viable seed in the summer of 1997. If kudzu begins to seed more often, it could begin to spread much more rapidly. It may spread further in New England. (5)	
III. Invasive in Similar Habitat Types	1. Upland ☒ Wetland ☒ Dune ☐ Prairie ☐ Aquatic ☐ Forest ☒ Grassland ☒ Bog ☐ Fen ☐ Swamp ☐ Marsh ☐ Lake ☐ Stream ☒ Other: Agricultural areas, disturbed areas, natural forests, planted forests, range/grasslands, riparian zones, scrub/shrublands, urban areas (3). Usually inhabits low quality disturbed areas, such as forest edges, abandoned fields, roadsides, and disturbed areas where sunlight is abundant. It is found in many old, collapsed southern homesteads, in ravines, in former cotton fields and pasture lands, agricultural areas, disturbed areas, planted forests, and urban areas. (5)	
IV. Habitat Effected	1. Soil types favored or tolerated: Can be found growing in a wide range of soil types with little to no special nutrient requirements, except it does not grow in periodically flooded soils. (3). Kudzu can be found growing in almost all eco-types from the driest flatwoods to the margins of permanent bodies of water, but not in periodically flooded soils. (5) Kudzu performs best on deep, well-drained, loamy soils. Because kudzu is a nitrogen-fixing plant, it is likely to be competitive on nitrogen-deficient sites (8).	
	2. Conservation significance of threatened habitats: Serious impacts on forests.	
V. Native Habitat	1. List countries and native habitat types: In Asia kudzu is found in China; Japan; Korea; Taiwan; Laos; Myanmar; Thailand; Vietnam; Indonesia; Malaysia; Papua New Guinea; and the Philippines. Also	

	from Australia and islands from the Southwestern Pacific (Fiji; New Caledonia; Solomon Islands; Tonga; Vanuatu). (2)
VI. Legal Classification	1. Listed by government entities? Connecticut: Potentially invasive, banned; Florida: Noxious weed; Illinois: Noxious weed; Kansas: Noxious weed; Kentucky: Noxious weed; Massachusetts: Prohibited; Mississippi: Noxious weed; Missouri: Noxious weed; Oregon: "A" designated weed and Quarantine; Pennsylvania: Noxious weed; Texas: Noxious plant; Washington: Class A noxious weed and Noxious weed seed and plant quarantine; West Virginia: Noxious weed
	2. Illegal to sell? YES ☒ NO ☐ Notes: Connecticut; Florida; Illinois; Kansas; Massachusetts; Oregon; Pennsylvania; Texas; Washington; West Virginia (1).
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: Kudzu plants do not usually flower until their 3rd year (8).
	3. Length of Seed Viability: Although information on seed longevity is lacking, seed banks can apparently develop (8). Large seeded legumes typically have viability measured in decades.
	4. Methods of Reproduction: Asexual ☒ Sexual ☒ Notes: Seed production by kudzu in the United States varies from 0 to 1,800 seeds per m2 soil surface, with higher values occurring where vines are climbing on structures. Seedlings develop a woody root crown, with multiple runners and extensive tuberous roots. These roots contain carbohydrate reserves that permit the plant to survive repeated mowing and/or herbicide applications. (4) Rooting usually occurs every few feet along horizontal stems, and new root crowns develop at these nodes. New ramets develop the following spring, with new tendrils radiating in all directions from newly established root crowns. It is speculated that kudzu seedlings are far less competitive than asexually established ramets, and may be of minor concern regarding invasiveness. (8)
	5. Hybridization potential: NA
II. Climate	1. Climate restrictions: Grows best where winters are mild, summer temperatures are above 80 degrees F, and annual rainfall is 40 inches or more. Inhabits temperate zones or higher altitudes in the tropics. (5)
	2. Effects of potential climate change: Global warming would allow this species to spread north.

III. Dispersal Potential	1. Pathways - Please check all that apply: Unintentional: Bird ☒ Animal ☒ Vehicles/Human ☒ Wind ☐ Water ☒ Other: Seeds are dispersed by birds and mammals. Slow spread through local movement of infested soil. Long-distance dispersal mechanisms includes road vehicles, while local dispersal includes translocation of machinery, road vehicles, digest/excretion, and water currents (5) Intentional: Ornamental ☒ Forage/Erosion control ☒ Medicine/Food: ☐ Other: Still available on line for sale (5).
	2. Distinguishing characteristics that aid in its survival and/or inhibit its control: Kudzu's competitive edge has been attributed to its resource allocation strategy (i.e., its very high ratio of leaf surface area to structural tissues); a high rate of net photosynthesis; and diurnal leaf movements that maximize exposure of lower canopy leaves and reduce overheating of upper canopy leaves. (Plant can grow about one foot a day). There is little spread by seed, so expansion of kudzu patches occurs mainly by rooting of runners at nodes. Adventitious rooting gives rise to large storage tubers that can survive repeated herbicide treatments over many years. There some seed spread in areas where the giant resin bee (a pollinator) occurs. (4) (5) Spread of kudzu through forested areas may be accelerated by other vines such as Japanese honeysuckle (Lonicera japonica), since kudzu can more easily twine around smaller diameter vines than around bare tree trunks. Kudzu stems and foliage are likely to resist fire damage during the growing season because they typically maintain high water content. Even during drought when nearby plants may be susceptible to fire due to desiccation, kudzu's deep taproot allows the plant to maintain a relatively high water content. (8)
IV. Ability to go Undetected	1. HIGH ☐ MEDIUM ☐ LOW ☒
C. DAMAGE POTENTIAL	
I. Competitive Ability	1. Presence of Natural Enemies: Twelve species of fungi and forty-eight arthropod species have been reported for Kudzu. (7) In a recent experiment, Myrothecium verrucaria, a fungus native to the Southeastern United States, has been found to be an effective pathogen against kudzu grown in the greenhouse and field. In addition, though the fungus, acquired from naturally infected sickle pod, can produce toxins in a variety of substrates, it does not in kudzu tissues. The results argue that the fungus can be used safely as a biological control of kudzu and supports proceeding to animal feeding trials for further evaluation of its safety. (9)
	2. Competition with native species: Kudzu kills or degrades other plants by smothering them under a solid blanket of leaves, by girdling woody stems and tree trunks, and by breaking branches or uprooting entire trees and shrubs through the sheer force of its weight. (7)

	Plant densities in mature kudzu stands may be 1-2 plants per square foot or tens of thousands of plants per acre (8).
	3. 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: Most spread is slow. Kudzu was introduced into the US in 1876, planted by farmers to control erosion from 1935 to the mid-1950s, and the Civilian Conservation Corps planted it widely for many years. USDA recognized this plant as a pest weed in 1953 and removed it from its list of permissible cover plants. Estimated to infest at least two million acres in the eastern US. Recently found in southern Florida where it has begun to invade the Everglades. The most severe infestations occur in the piedmont regions of Mississippi, Alabama, and Georgia. (5) Illinois had 105 known populations in 2001(6).
II. Environmental Effects	1. <u>Alteration of ecosystem/community composition?</u> YES ☒ NO ☐ Notes: Can quickly cover shrubs and trees with a dense tangle of stems, smothering and shading out the other vegetation. Able to smother trees up to 35 m tall. Kills or degrades other plants by smothering them under a solid blanket of leaves, girdling woody stems and tree trunks, and breaking branches or uprooting entire trees and shrubs through the sheer force of its weight. (5)
	2. <u>Alteration of ecosystem/community structure?</u> YES ☒ NO ☐ Notes: Kudzu forms mats that may be more than 2 m thick. It blankets trees with a dense canopy through which little light can penetrate. (5) Spreading kudzu infestations can eliminate forest cover by enveloping trees along margins of wooded areas. Trees of any size may succumb to competition from arboreal kudzu vines, whose prodigious foliage reduces light availability within the canopy. Infested trees, especially shade-intolerant species such as native pines, are weakened from reduced carbon fixation. (8)
	3. <u>Alteration of ecosystem/community functions and processes?</u> YES ☒ NO ☐ Notes: Kudzu is a nitrogen fixer (5). Kudzu monocultures can arrest successional development of native plant communities. In addition, dry kudzu litter can provide substantial fuel for dormant-season surface fires, perhaps providing a positive feedback in promoting seed germination. This substantial fuel loading from dense mats of kudzu litter may enhance dormant-season fire potential. Additionally, the presence of kudzu in forest canopies may provide ladder fuels that enhance the likelihood of crown fires, particularly in areas where frequent surface fires may otherwise maintain seral pine or oak dominants. As kudzu invades shrub and forest communities, increases in standing and ground-layer fuels from dead woody plants that have succumbed to invasion could also increase fire intensity and severity. Conversely, abundant, moist, green kudzu foliage can inhibit fire, and may alter historic fire regimes by lengthening fire return intervals. These scenarios are speculative. (8).

	4. Allelopathic properties? YES ☐ NO ☒ Notes:
D. SOCIO-ECONOMIC Effects	
I. Positive aspects of the species to the economy/society:	Notes: Kudzu seeds are a favored food for northern bobwhite, comprising 61.4% of the January and February diet of birds studied on an abandoned agricultural site in the Georgia Piedmont. Also kudzu has potential value as livestock feed. (8) Growing fast and with a strong root system, kudzu is excellent for erosion control. The plant also has agricultural uses. The plant fixes nitrogen and can be used as a feed for pasture animals. Kudzu contains several medical chemicals such as daidzen, used to fight inflammation and microbial infections, dilute coronary arteries, relax muscles, and promote estrous cycles. It also contains daidzin, which is used to prevent cancer, and genistein, an anti-leukemic. Several people throughout the south have found that kudzu's rubber-like vines are excellent for making basket weaving and artistic paper. Others incorporate it in their diet, cooking such things as kudzu quiche and deep-fried kudzu leaves. (9)
II. Potential socio-economic effects of requiring controls: Positive: Negative:	Notes: Since there are no known populations, controls needed should be very limited.
III. Direct and indirect socio-economic effects of plant:	Notes: Kudzu completely replaces existing vegetation. No information has been published on the resulting economic damage, and the following estimates rely upon the personal experience of Dr. Coleman Dangerfield (University of Georgia, forest economist). "Losses vary with the potential use of the land in an uninfested state. Where productive forest land has been overtaken, lost productivity is estimated at $48 per acre per year. The present net value of an average stand of pines grown on cutover land for 25 years in the southeast is approximately $650 per acre. Kudzu control costs exceed $200 per acre per year for five years. Thus, kudzu control for forest production is not economically feasible." Dr. James Miller (USDA Forest Service plant ecologist, Auburn, Alabama), who has researched herbicides for kudzu control for the last 20 years, estimates control costs by power companies alone at $1.5 million per year. (4)
IV. Increased cost to sectors caused by the plant:	Notes: Forestry, natural areas management, homeownership, transportation departments, utilities all could take on heavy costs.
V. Effects on human health:	Notes:
VI. Potential socio-economic effects of restricting use: Positive: Negative:	Notes: Not anticipated to be a problem in WI
E. CONTROL AND PREVENTION	
I. Costs of Prevention (including education; please be as specific as possible):	Notes: Relatively low if sales/planting is banned.

II. Responsiveness to prevention efforts:	Notes: Likely to be high.
III. Effective Control tactics:	Mechanical ☒ Biological ☐ Chemical ☒ Times and uses: Repeated herbicide treatments and overgrazing have been the most used and successful control treatments followed by pine and pasture grass planting (3). Control includes grazing by goats, persistent weeding or mowing, and chemical control. To control this species, the extensive root system must be destroyed and no root crowns left. This can be accomplished through using systemic herbicides, cutting vines, or close mowing every month for two growing seasons. Also can be controlled by flaming to defoliate the plant. (5)
IV. Minimum Effort:	Notes: Because kudzu is so invasive, control is best equated with kudzu eradication. To ensure complete eradication from a site and prevent reinvasion, every root crown must be killed. Well-established stands may require as long as ten years to eradicate. (8) Herbicide use can take up to five years to control this plant. Close mowing every month for two growing seasons can also control this plant. (5) If managers are limited to a single defoliation treatment per year, it should be conducted in early fall (September in most areas), because fall defoliation is important to reduce resource allocation to roots, and hopefully gain substantial momentum toward eventual eradication. (8)
V. Costs of Control:	Notes: The costs of control using herbicides is about $225/acre-$285 for inital foliar applications & cut stem (includes three treatments/growing season to get 100% brownout). $140/acre for spot treating residual. Expect residual treatment for 4 years.
VI. Cost of prevention or control vs. Cost of allowing invasion to occur:	Notes: Prevention and early detection are minimal in comparison to long term control of larger infestations.
VII. Non-Target Effects of Control:	Notes: Transline is the recommended herbicide for foliar applications and triclopyr for cut stems. Other herbicides used include Glyphosphate, Garlon, Escort, and Tordon. Treatments should try to achieve 100% brownout and expect 3-4 years of treating residual (usually 3-5% for first year).
VIII. Efficacy of monitoring:	Notes: Should be very effective.
IX. Legal and landowner issues:	Notes: Requirements for removal will affect landowners.

F. REFERENCES USED:

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☒ Native Plant Conservation Alliance
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