Ohio Invasive Plant Assessment Protocol - 2015

				Team Score	Notes	References
Botanical Name:	*Phalaris arundinacea*	Step I Outcome:	**Invasive**			
Common Name:	Reed canary grass	Step II Score:	**74**			
Family Name:	Poaceae	Step II Outcome:	**Invasive**			
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Step I

Directions: Place an "X" in the Score column next to the selected answer to each of the four questions.

		Team Score	Notes	References
1. Is this plant known to occur in the state and listed as "noxious" on any federal or Ohio Department of Agriculture plant list?	Yes. *Place on invasive plant list, no further investigation needed.* ***STOP***			
	No. *Continue on to question 2.*	X		
2. Has this plant demonstrated widespread dispersion and establishment (i.e. high numbers of individuals forming dense stands) in natural areas across two or more regions in Ohio?[a]	Yes. *Place on invasive plant list, no further investigation needed.* ***STOP***	x	Species occurs in all 5 regions, but information regarding individual populations is lacking.	1,7,8
	No. *Continue on to question 3.*			
3. Does this plant form self-replicating populations outside of cultivation in Ohio and is it documented to alter the composition, structure, or normal processes or functions of a natural ecosystem?	Yes	x		
	No			
	Unknown			
4. Is the plant listed as invasive in an adjoining state or a nearby state east of the Mississippi within the USDA Plant Hardiness zones 5-6?[b,c]	Yes			
	No		PA, IN, MI, WV	1,2,3,4,5,6
	Unknown			

If the answer was yes for both questions 3 and 4, the plant is placed on the invasive plant list and no further research is needed. Stop here. If the answer is no for both questions 3 and 4, the plant is not considered invasive and no further investigation is warranted. Otherwise, proceed to Step II.

Step II: Invasion Status

Directions: Place the appropriate numerical score (or "U") in the Score column next to the selected answer to each of these 18 questions.

	Team Score	Notes	References
1. Current Invasion in Ohio - plant is not found in natural areas (**0 pts.**) - plant is found in natural areas but only because it persist from previous planting in that location (e.g. old home sites) (**0 pts.**) - plant is only expanding from sites of previous planting (**1 pt.**) - plant occurs in natural areas away from site of planting (**3 pts.**) - Information unknown (**U**)	3		8
2. State Distribution[a] - plant is not naturalized in any region of Ohio (**0 pts.**) - plant is naturalized in only one region in Ohio (**1 pt.**) - plant is naturalized in two regions in Ohio (**2 pts.**) - plant is naturalized in three regions in Ohio (**3 pts.**) - plant is naturalized in four regions in Ohio (**4 pts.**) - plant is naturalized in five regions in Ohio (**5 pts.**) - Information unknown (**U**)	5	8:"found in all but a few western counties"	1,7,8
3. Regional/US Distribution - plant is not considered to be a problem in any other state (**0 pts.**) - plant has been reported as a widespread problem in another non-neighboring state within the USDA Plant Hardiness Zones 5-6 (**1 pt.**) - plant has been reported to be a widespread problem in 1-2 adjoining states (**3 pts.**) - plant has been reported to be a widespread problem in 3 or more adjoining states (**5 pts.**) - plant has been reported to be a widespread problem in similar habitat outside the US (**1 pt.**) - Information unknown (**U**)	5	MI, PA, WV, IN	2,3,4,5

Step II: Biological Characters

	Team Score	Notes	References
4. Vegetative Reproduction - no vegetative reproduction (**0 pts.**) - reproduces readily within the original site (**1 pt.**) - has runners or spreading rhizomes that root easily (**3 pts.**) - fragments easily and fragments can be easily dispersed (**4 pts.**) - has runners or spreading rhizomes that root easily AND fragments easily and fragments can be easily dispersed (**5 pts.**) - Information unknown (**U**)	3	11: Is a rhizomatous species with rapid new growth from seed. 14: invasive status of the species is due to its "high capacity for vegetative propagation". 22: Can reproduce via rhizomes or tillers (or flattened stems that fall down and sprout).	8,10,11,14,16,18,22,24,26

Step II

5. Sexual Reproduction - no sexual reproduction (**0 pts.**) - infrequent sexual reproduction (**1 pt.**) - frequent sexual reproduction, but high variation among years in seed production (**3 pts.**) - frequent sexual reproduction (one or more events per year) (**5 pts.**) - Information unknown (**U**)	5	10: species produces viable seed, but seed production is highly variable. 11: Biomass experiment started with plants collected from natural sites as seed. 27: Species is wind-pollinated and highly self-incompatible, reproducing primarily through outcrossing.	8,9,10,11,14,16,19,22, 17
6. Number of Viable Seeds or Propagules per Plant - few (0-10) (**1 pt.**) - moderate (11-1,000) (**3 pts.**) - prolific (>1,000) (**5 pts.**) - Information unknown (**U**)	5	References indicate that species reproduces by seed, but numbers are lacking. 10: species produces viable seed, but seed production is highly variable.	8,9,10
7. Flowering Period - one month or less per year (**0 pts.**) - two months (**1 pt.**) - three to five months (**2 pts.**) - longer than five months (**3 pts.**) - Information unknown (**U**)	2	Late May to August	8
8. Dispersal Ability - low potential for long-distance seed/propagule dispersal (>1km) (**0 pts.**) - medium potential for long-distance seed/propagule dispersal (**3 pts.**) - high potential for long-distance seed/propagule dispersal (**5 pts.**) - Information unknown (**U**)	5	Waterways, animals and people. Seeds become sticky when wet and adhere to wildlife and humans (and their vehicles).	8,9,10
9. Generation Time - long juvenile period (>5 or more years for trees, 3 or more years for other growth forms) (**0 pts.**) - short juvenile period (<5 years for trees, <3 years for other forms) (**3 pts.**) - Information unknown (**U**)	3		10
10. Establishment - unable to invade natural areas (**0 pts.**) - can only colonize certain habitat stages (e.g. early successional habitats) (**1 pt.**) - aggressively colonizes and establishes in edge habitats (**3 pts.**) - aggressively colonizes and establishes in intact and healthy natural areas (**6 pts.**) - Information unknown (**U**)	6	10: "Establishment most common on moist open sites such as mud flats, seasonal floodplains and reservoir shores." and once established, species undergoes rapid development.	8,10,11
Step II: Ecological Importance			
11. Impact on Ecosystem Processes - no known effect on ecosystem-level processes (**0 pts.**) - moderate effects on ecosystem-level processes (e.g., changes in nutrient cycling)(**3 pts.**) - causes long-term, substantial alterations in the ecosystem (e.g., changing fire regime of an area, changing hydrology of wetlands) (**6 pts.**)	3	Species is considered to impact ecosystems primarily through reducing plant diversity, but species may degrade wildlife habitat, and impede water flow. 21: Species has high leaf litter mass which can promote further *Phalaris* growth.	8,9,10,21,25
12. Impact on Rare Organisms - no known negative impact on Ohio State-listed or federal-listed plants or animals (**0 pts.**) - negatively impacts listed species, such as through displacement or interbreeding (**3 pts.**)	3	Impacts Eastern Prairie Fringed Orchid	31
13. Impact on Native Animals - no known negative impact on animals (**0 pts.**) - documented direct or indirect negative effects on animal taxa (**3 pts.**)	3	8: "Reed canary grass contains several potentially toxic alkaloids. Poisonings have been reported in New Zealand and Norway for sheep that have fed on reed canary grass, resulting in a condition referred to as "phalaris staggers". However, no poisonings have been reported in North America." 12: Species is toxic to beef cattle in the US. 16: Some animal species show decreased abundance with reed canarygrass while other species show increased abundance. 20: Plant species is associated with lower abundance of rare garter snake (*Thamnophis butleri*). 29: Species negatively impacts wetland moth species. 30: Diversity and abundance of Homopteran insects decreased with canarygrass dominance (as also did richness and abundance for all other arthropods)	8,12,16,23,29,30

14. Impact on Native Plants

- no known negative effects on native plants (**0 pts.**)
- negatively impacts some native plants (increasing their mortality and/or recruitment of certain taxa) (**3 pts.**)
- impacts native plants to such an extent that community structure is greatly altered (**6 pts.**)

6	Dense colonies can inhibit native species. 8:"This species has also become a serious threat to native wetland plant communities." 15: Species is a threat to endangered northeastern bulrush in studies in MD,WV,PN,VA. 28: In OR, the impact of species on wetland plant richness depended on presence of beaver. 30: Plant diversity and floristic quality decreased with increasing canarygrass dominance in IL.	8,15,17,22,23,28,30

15. Hybridization

- no known instances of hybridization with other plant species (**0 pts.**)
- can hybridize with native Ohio plants or commercially-available species, but seeds are inviable (**1 pt.**)
- can hybridize with native Ohio plants or commercially-available species, producing viable seed (**3 pts.**)

3	10: There is evidence that there are populations of native P. arundinacea, and that lines that were brought over from Europe are more aggressive and outcompete native lines. There is also some evidence that these two lineages "hybridize". 13: Invasive forms of this species resulted from recombination following hybridization between multiple introductions of European strains and hybridization with native strains.	10,13,27

16. Population Density

- occurs only as small, sporadic populations or individuals (**1 pt.**)
- typically forms small, monospecific patches (**3 pts.**)
- is a dominant plant in area where population occurs (absolute cover 15-50%) (**4 pts.**)
- forms an extensive, monospecific stand (absolute cover >50%) (**5 pts.**)

5	10: "In marshes, wet meadows, and prairie potholes, reed canary grass may comprise from >50% to 100% of the vegetation cover." However, it does not always dominate a community. 16: Species forms dense monotypic stands that decrease native plant species diversity and productivity.	8,9,10,16,17,21,22,25, 26

17. Role in Succession in Natural Areas

- successional information is unknown (**0 pts.**)
- is an early successional species that temporarily invades a disturbed site but does not persist as the site matures (**0 pts.**)
- readily invades disturbed sites and persists, but does not interfere with succession (**1 pt.**)
- readily invades disturbed sites, persists and interferes with succession of native plants (**4 pts.**)

4	10:"Various factors make it difficult to define reed canary grass' successional role. Sites where reed canary grass is most common such as wetlands, floodplains, and abandoned farm fields may not have clear patterns of succession…Additionally, some evidence suggests that dense, tall stands of reed canary grass may themselves influence successional pathways, further complicating its successional role." And "Typically, reed canary grass persists and spreads in mid- to late succession. In the Great Plains, reed canary grass invaded 80% of restored prairie potholes (n=41) within 10 years after restoration efforts were completed and was the dominant shoreline vegetation in nearly 50%" And "Dense stands of reed canary grass may influence succession by preventing the establishment of woody species. For example, along the Allegheny River in Pennsylvania, reed canary grass dominated the vegetation and precluded forest development on sites that had been logged about 66 to 126 years earlier ."	10

18. Number of Habitats Invaded

Forestlands: Floodplain forest, hemlock-hardwood forest, mixed mesophytic forest, beech-maple forest, oak-maple forest, oak-hickory forest.

Grasslands: Alvar*, beach-dune community*, bur oak savanna*, slough-grass-bluejoint prairie*, sand barren*, big bluestem prairie, little bluestem prairie (xeric limestone prairie*+), post oak opening*+

Wetlands: Bog*, fen*, twigrush-wiregrass wet prairie*, marsh, buttonbush swamp, mixed shrub swamp, hemlock-hardwood swamp*, maple-ash-oak swamp, white pine-red maple swamp*

* Considered a rare plant community in Ohio by ODW's Biodiversity Database Program.

+ = xeric limestone prairies or cedar glades and post oak openings are unique to the Interior Low Plateau Region of Adams, Highland and Pike counties, and are not included in Schneider and Cochrane (1997).

- not found in any natural habitats in Ohio (**0 pts.**)
- only found in 1 broad category (**1 pt.**)
- found in 2 broad categories or 2 rare habitat types (**3 pts.**)
- found in 3 broad categories or 3 rare habitat types (**4 pts.**)
- found in 4 or more rare habitat types (**5 pts.**)

5	9: "Reed canary grass occurs in wetlands such as marshes, wet prairies, wet meadows, fens and stream banks." Also occurs in floodplain and riparian forests.	8,9,10

Total Points	Assessment Decision
4 or more U	Insufficient Data
0-34	Not Known to be Invasive
35-44	Pending Further Review
45-80	Invasive

Total Score: 74

Number of Unknowns: 0

Outcome: Invasive