

Ohio Invasive Plant Assessment Protocol

Botanical Name: *Centaurea stoebe* spp. *micranthos* (previously *C. maculosa*)
 Common Name: Spotted knapweed
 Family Name: Asteraceae
 Posted Date: 07/20/16
 Initial assessment conducted by: Allison Mastalerz

Step I Outcome: **Continue**
 Step II Score: **59**
 Step II Outcome: **Invasive**

Score Notes References

	Directions: Place an "X" in the Score column next to the selected answer to each of the four questions.			
Step I	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.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
	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? Yes. Place on invasive plant list, no further investigation needed. STOP No. Continue on to question 3.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Species occurs in all 5 regions of Ohio, but information on individual populations is lacking.
	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 No Unknown	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	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 Unknown	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	PA, IN, MI, WV, CT, MA; invasive species in North America is a tetraploid form of the normal diploid form.			1,2,3,4,5,6,8,19
	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.

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	Species occurs in all 5 regions of Ohio and is rarely, if ever, cultivated.	1
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		1
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.)				

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- 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

PA, IN, MI, WV, CT, MA

1,2,3,4,5,6

Step II: Biological Characters

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)

1

7:" Perennial plants can have a main rosette and minor rosettes that form at the ends of lateral shoots extending horizontally just below the soil surface. "

7

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)

3

Species is a biennial, but can also be a short-lived perennial. 19: Invasive tetraploid genotype produces more seedlings per plot than European tetraploid's or diploids.

7, 9,10,19,20

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)

3

20: Seed survival was 84%, germination was 97% and seedling emergence was 60%.

7,20

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)

1

July-August

7

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

Seeds are spread by animals and birds, as well as waterways and roadways.

16

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

19: Tetraploid plants are predominantly polycarpic and start flowering their first year.

7,9,10,19

10. Establishment

- unable to invade natural areas (0 pts.)

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Step II	<ul style="list-style-type: none"> - 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		8,19,20	
	Step II: Ecological Importance				
	11. Impact on Ecosystem Processes <ul style="list-style-type: none"> - 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.) 	6	Elevates soil phosphorous within its rhizosphere, alters carbon and nitrogen pools in grasslands. Exhibits allelopathy. Is associated with lower fungal biomass. 17: Species is allelopathic with effects modulated by light intensity. 21: Biological controls (insect herbivores) can be effective.	11,12,13,17,21	
	12. Impact on Rare Organisms <ul style="list-style-type: none"> - 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.) 	0			
	13. Impact on Native Animals <ul style="list-style-type: none"> - no known negative impact on animals (0 pts.) - documented direct or indirect negative effects on animal taxa (3 pts.) 	3	14:"our results show that Chipping Sparrows breeding in knapweed-invaded vs. native habitats have degraded food resources, lower fecundity and reduced fidelity to breeding sites". 15: illustrates how spotted knapweed can increase web spiders (primarily in Dictyna) which can alter community trophic structures.	14,15	
14. Impact on Native Plants <ul style="list-style-type: none"> - 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.) 		Displaces native plant species through the creation of			

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Score **Notes** **References**

- impacts native plants to such an extent that community structure is greatly altered (**6 pts.**)

6

monocultures. Reduces native plant species richness and diversity. Allelopathic activity negatively impacts some native plants. 17: Allelopathic effects are negatively impacted by light availability (i.e. shading) but species can negatively impact North American bunchgrass (*Koeleria macrantha*). 18: But species does not compete very well with *Ammophila breviligulata*, a dominant native grass of the Great Lakes sand dunes. 22: Some native seeded grasses can outcompete knapweed over time (15 years).

11,12,13,17,18,22

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.**)

0

A hybrid of diffuse knapweed and spotted knapweed occurs, but evidence illustrates that the hybrid itself was introduced, and that spotted and diffuse knapweeds do not actively hybridize in North America due to ploidy incompatibility (N. American invaders are tetraploid) and lack of distributions overlapping. Experimental evidence indicates that if diploid individuals of spotted knapweed were to be introduced in proximity to diffuse knapweed, active hybridization would likely occur with potentially increased abilities to invade natural areas.

9, 10

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.**)

4

Species can become dominant in areas of invasion, but it is important to recognize that its distribution is patchy. Data indicate that as patch size increases, ecosystem-level impacts increase as well. 18: Species is known to create large monocultures, especially in western states.

11,13,18

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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

Species can create long-term, overall shifts in community compositions, impacting structural and trophic elements, as well as underlying abiotic conditions.

11,13,14,15

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.)**

1

8: grasslands, agricultural fields, ruderal habitat, transportation corridors. 18: Is also found on sand dunes along the Great Lakes

8,18

59

0

Invasive

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