

Ohio Invasive Plant Assessment Protocol - 2015

Botanical Name: *Butomus umbellatus*
 Common Name: Flowering rush
 Family Name: Butomaceae
 Assessment conducted by: Allison Mastalerz, Theresa Culley

Step I Outcome: **Invasive**
 Step II Score: **56**
 Step II Outcome: **Invasive**

Team Score

Notes

References

Step I

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

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?

Yes. Place on invasive plant list, no further investigation needed. **STOP**
 No. Continue on to question 3.

x

Species is in three regions in Ohio, but information regarding density of stands is lacking.

7

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

X

Upon completion of Step II, this question should be answered in the affirmative.

See Step II

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

x

IN,MI

3

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

9, 12

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)

4

In all regions of OH except 5

7,15

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)

3

IN,MI

3,4,12

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.)

5

Species occurring in Ohio are, for the most part, diploid and produce hundreds of bulbils on rhizomes and inflorescences. A greenhouse experiment (see ref 13) measuring bulbil production ranged from 84-274 bulbils per individual diploid plants. 14: "Plants combine sexual reproduction with clonal reproduction via rhizome fragmentation and vegetative bulbils borne on both rhizomes and inflorescences." 20: Populations in North America vary in clonality because of differences in polyploidy - populations around the Great Lakes are usually diploid, which invest much in sexual reproduction and also make hundreds of tiny clonal bulbils on both rhizomes and inflorescences.

8,9,10,12,13,14,20,22

- Information unknown (U)

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)

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)

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)

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)

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)

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)

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.)

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.)

13. Impact on Native Animals

| | | |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| 3 | There are two types of flowering rush: those that produce viable seed, and those that do not. Populations occurring in Ohio are, for the most part, diploid and produce viable seed and bulbils. Population genetic surveys indicate that "plants are rarely recruited from seed in introduced populations (9)". 9: Flowers are fully self-compatible but require an insect for pollination (cannot self-fertilize). 14: "Plants combine sexual reproduction with clonal reproduction via rhizome fragmentation and vegetative bulbils borne on both rhizomes and inflorescences." 16: Introduced Canadian populations are fully fertile and self-compatible. 20: Populations of this species across North America vary in sexual fertility caused by polyploidy. [The score for this question is conservative and needs to be revisited] | 8,9,11,12,13,16,17,18,19,20,21,23 |
| 5 | Fertile, diploid populations occurring in Ohio often produce more than 24,000 viable seeds/plant, but population genetics indicate that species is spread predominantly through asexual means. 14: Flowers in North American populations typically produce approx. 200 seeds per fruit. 16: Flowers in Canadian populations produce an average of 127 seeds with 31% of seed germination, but some populations do not produce viable seeds. | 8,9,11,12,13,16,23 |
| 2 | 8:"Plants flower from early summer to mid-fall" | 8 |
| 5 | 8:"Rhizome fragmentation is facilitated by a constriction that develops between a bud and the main rhizome. This allows sections to break off easily with minor disturbances such as moving water, waves, passing boats or waterfowl." Long distance dispersal is possible because the rhizomes are buoyant. 9: Plants also produce bulbils that can be easily dislodged and dispersed. | 8,9,10,12,13 |
| 3 | 1 year | 13 |
| 6 | Species is prolifically spread via bulbils and can form dense monotypic stands, but establishment success is reduced in areas that are already vegetated. Species can establish in natural areas, such as marshes, mudflats, changes in water levels. | 8,9,10,11,13 |
| 6 | Species is able to form dense monotypic stands in previously open, unvegetated littoral zones. The species occurrence can change the structure and nutrient cycling on the area by "increased water temperature, nutrient transfers from hydrosol to the water column, altered sediment transport, deposition, and accretion rates (10)" and impact food webs. | 10 |
| 0 | No information found | |

- no known negative impact on animals (0 pts.)

- documented direct or indirect negative effects on animal taxa (3 pts.)

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.)

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.)

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.)

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.)

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.)

3

8:"Flowering rush also creates ideal habitat for the great pond snail that hosts parasites that cause swimmer's itch. Flowering rush can adversely impact native fish species by forming dense stands in waters previously unvegetated or sparsely vegetated by aquatic plants" which provides ideal habitat for piscivore fish and leads to the alteration of local trophic structure. 23: Flowering rush can adversely impact fish species by changing the habitat.

8,10,23

3

3:"Its dense stands crowd out native species like bulrush."
9: "threatens native littoral species like Zizania aquatica (wild rice)"

3, 8,9,10,12,13,23

0

No information found

4

All literature indicate that species can form large, dense, monotypic stands, but detailed information is lacking. More information is needed for the 5 point answer.

3,8,10,13

0

There is anecdotal evidence that the species invades mud flats and interferes with succession, but no published reference could be found.

1

aquatic plant

8,9,10,11,12

Total Score:

56

Number of Unknowns:

0

Outcome:

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 |