# APPENDIX A

## Oak Openings Invasive Plant Assessment

*From a thesis entitled "A Regional Management Strategy for Invasive Plants in the Oak Openings"*
*by Sara N. Guiher, 2017*

**Oak Openings Invasive Plant Assessment Purpose and Background**

Invasive species degrade natural communities through changes in structure and the loss of native flora and fauna, while human populations are affected by the loss of ecosystem services and the cost of treatment or removal. Management of invasive plants often focuses on a specific site or the properties owned by a single organization. However, invasive species establishment and spread typically occurs on a larger scale, and effective management requires coordinated action across a large area. The Green Ribbon Initiative works to address this through collaboration among more than 20 partners throughout the Oak Openings region.

Partners of the GRI and researchers from the University of Toledo developed the Oak Openings Invasive Plant Assessment to establish management priority for invasive plant species within the region. To avoid duplication of efforts, existing assessment protocols from federal and state agencies and conservation organizations were reviewed. Our assessment is largely based on the successful protocol used by the Ohio Invasive Plant Council, with an added focus on management. Using published research and information from agencies and organizations, questions are answered for each assessed species, leading to an overall score from 11-100. This provides an evidence-based, defensible priority rank (higher score = higher priority) for invasive plants that land managers can use to inform daily work. The assessment is structured to place an emphasis on early detection and rapid response: an emerging species that can be effectively managed is considered a higher priority for management than a widespread species that is difficult to manage, even if the two species have the same biological/ecological threat level.

An initial set of 20 well-known invasive plants were scored using the assessment (Version 2) during 2015-2017. Resultant priority ranks were evaluated by partners based on the known effects of these species in the Oak Openings. Scores were consistent with current knowledge, and partners elected to continue with this version of the assessment. Moving forward, scores should be periodically reviewed and species ranks adjusted as distributions, scientific knowledge, or management techniques evolve. The assessment itself should also be a living document; questions may be edited, deleted, or added over time to ensure that this tool remains relevant.

# Oak Openings Invasive Plant Assessment

**Overall Threat Rank/Priority for Management**:

Score for each species is determined by the total points earned divided by the total possible points in the assessment. If information is unknown for a species, the question is not scored and the points are not included in the possible points. If information is unknown for four or more questions, plant may be scheduled for assessment at a later date; this will be determined by the person(s) completing the assessment.

**Threat Levels**:

A threat level will be established for each species assessed. The levels are:

**Alert**: Species is not currently known to be present in the region, but poses threat of serious ecological harm. Monitor and alert (preferably through the chosen mapping program) if found. (e.g., Japanese stilt-grass)

**Target**: Species exists in isolated populations or low densities, are spreading rapidly, and have the potential to cause environmental degradation or ecological harm. (e.g., phragmites)

**Monitor**: Species is widespread but currently not perceived as causing serious environmental degradation or ecological harm. (e.g., wild carrot)

**Control**: Species is nearly ubiquitous and has already degraded natural systems and ecological processes. Eradication is impossible, but localized control in high quality natural areas can retain most of the diversity and ecosystem services. (e.g., glossy buckthorn)

**Major Oak Openings Habitat Types**:

**Wet Prairie**: Hydric soils, seasonally inundated, dominated by sedges, tree canopy primarily composed of oak species and typically <20% cover, shrub cover low or absent, at least 10 hummocks or tussocks per acre

**Savanna/Upland Prairie**: Sandy soils, dominated by native grasses (big bluestem, little bluestem, Indiangrass) and forbs, tree canopy primarily comprised of oak species and typically 20-40% cover, shrub cover (blueberry, raspberry) averages 20%, 1-10 snags per acre

**Deciduous Forest**: Sandy soils; tree canopy primarily comprised of oak species and typically >80% cover; shrubs comprised of blueberry, witch hazel, sassafras, and young oak covering approximately 20% of unit, >10 snags per acre

**Floodplain Forest**: Poorly to moderately drained soils, wihin floodplain of stream or ditch, tree canopy primarily comprised of Eastern cottonwood, sycamore, and ash at >80% cover

**Flatwoods Forest**: Seasonally inundated hydric soils or muck overlaying sandy soils; tree canopy comprised primarily of pin oak and swamp white oak at >80% cover; herbaceous layer includes Canada bluejoint, cinnamon fern, royal fern, and may be patchily distributed where sunlight penetrates canopy

**Section 1: Regional Ranking**
**Invasion Status**

1. Ohio/Michigan County Distribution (outside of Oak Opeinings region- "considered to be a problem" refers to status in natural areas)

    a. species is not considered to be a problem in any other counties within OH/MI 0

    b. species has been reported as a widespread problem in a non-neighboring county within OH/MI 1

    c. species has been reported to be a widespread problem in 1-2 adjoining counties and/or considered invasive in OH *or* MI 3

    d. species has been reported to be a widespread problem in 3 or more adjoining counties and/or considered invasive in OH *and* MI 5

    e. information is unknown U

2. Oak Openings County Distribution

    a. species is not present in any OO Counties 0

    b. species is present in 5-7 OO counties 1

    c. species is present in 4 OO counties 2

    d. species is present in 3 OO counties 3

    e. species is present in 2 OO counties 4

    f. species is present in 1 OO county 5

    g. information is unknown U

3. Extent in Oak Openings Region

    a. species present in large infestations that are not expanding 1

    b. species present in large infestations that continue to expand 3

    c. species present in new, expanding populations 5

    d. information is unknown U

**Biological Characters**

4. Vegetative Reproduction

| | |
|---|---|
| a. no vegetative reproduction | 0 |
| b. vegetatively reproduces readily within original site | 1 |
| c. has runners or spreading rhizomes that root easily | 3 |
| d. fragments easily and fragments can easily be dispersed | 4 |
| e. true for both c and d above | 5 |
| f. information is unknown | U |

5. Sexual Reproduction

| | |
|---|---|
| a. no sexual reproduction | 0 |
| b. infrequent sexual reproduction | 1 |
| c. frequent sexual reproduction, but high variation among years in seed production | 3 |
| d. frequent sexual reproduction (one or more events per year) | 5 |
| e. information is unknown | U |

6. Number of Viable Seeds or Propagules per Plant

| | |
|---|---|
| a. few (0-10) | 1 |
| b. moderate (11-1,000) | 3 |
| c. prolific (>1,000) | 5 |
| d. information is unknown | U |

7. Flowering Period

    a. one month or less per year 0

    b. between one to two months 1

    c. between two to five months 3

    d. longer than five months 5

    e. information is unknown U

8. Dispersal Ability

    a. seeds/propagules lack characteristics promoting long-distance dispersal (e.g. fruits attractive to birds or mammals, or with adaptations to wind/flood dispersal) 0

    b. seeds/propagules have characteristics promoting long-distance dispersal, but no evidence of seeds traveling > 1km 3

    c. seeds/propagules have characteristics promoting long-distance dispersal, and evidence of seeds traveling > 1km 5

    d. information is unknown U

9. Generation Time

    a. long juvenile period (5 or more years for trees and shrubs, 3 or more years for other growth forms) 0

    b. short juvenile period (<5 years for trees and shrubs, <3 years for other forms) 3

    c. information is unknown U

**Ecological Impacts**

10. Impact on Ecosystem Processes

    a. no documented effects on ecosystem-level processes 0

    b. moderate effects on ecosystem-level processes (e.g., changes in nutrient cycling, succession) 3

    c. causes long-term, substantial alterations in the ecosystem (e.g., changing fire regime of an area, changing hydrology of wetlands) 6

11. Impact on Native Organisms

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

12. Hybridization

| | |
|---|---|
| a. no known instances of hybridization with other plant species | 0 |
| b. can hybridize with native OH/MI plants or commercially-available species, but seeds are inviable | 1 |
| c. can hybridize with native OH/MI plants or commercially-available species, producing viable seed | 3 |

13. Population Density

| | |
|---|---|
| a. occurs only as small, sporadic populations or individuals | 1 |
| b. typically forms small, monospecific patches | 3 |
| c. is a dominant plant in area where population occurs (absolute cover 15-50%) | 4 |
| d. forms an extensive, monospecific stand (absolute cover <50%) | 5 |
| e. information is unknown | U |

14. Establishment

| | |
|---|---|
| a. unable to invade natural areas | 0 |
| b. can only colonize certain habitat stages (e.g., early successional habitats, following disturbance such as prescribed fire) | 1 |
| c. aggressively colonizes and establishes in edge habitats | 3 |
| d. aggressively colonizes and establishes in intact and healthy natural areas | 6 |
| e. information is unknown | U |

15. Ability to Invade Oak Openings Habitat Types (question applies to five specific habitat types [*see attached sheet*] as defined in Schetter and Root, 2011; adapted by Thieme, 2015)

| | | |
|---|---|---|
| a. | unable to invade any habitat types | 0 |
| b. | able to invade only specialized habitats (1 habitat type) | 1 |
| c. | able to invade narrow range of habitats (1-2 habitat types) | 3 |
| d. | able to invade moderate range of habitats (3-4 habitat types) | 4 |
| e. | able to invade wide range of habitats (all 5 habitat types) | 5 |
| f. | information is unknown | U |

**Management**

16. Feasibility of Management

| | | |
|---|---|---|
| a. | species unlikely to be controlled with current management options | 1 |
| b. | species difficult to control with current management options and/or treatment will likely degrade desirable species | 3 |
| c. | species likely to be controlled with current management options but establishment of desired species will require considerable effort | 4 |
| d. | species likely to be controlled with current management options and establishment of desired species will require minimal effort | 5 |
| e. | information is unknown | U |

17. Vectors of Spread

| | | |
|---|---|---|
| a. | species is spread predominantly by natural vectors (e.g., birds, mammals, wind, etc.) | 1 |
| b. | species is spread by natural and anthropogenic vectors (e.g., roadways, vehicles, equipment, etc.) | 3 |
| c. | species is spread by the above vectors and is also commercially available | 6 |
| d. | information is unknown | U |

18. Viability of Seed Bank

| | |
|---|---|
| a. seeds remain viable in the soil for one year or less | 1 |
| b. seeds remain viable in the soil for 2-5 years | 3 |
| c. seeds remain viable in the soil for 5 or more years | 5 |
| d. information is unknown | U |

19. Response to Intermediate Disturbance (e.g., prescribed fire, flooding)

| | |
|---|---|
| a. species is unaffected or stimulated by disturbance | 1 |
| b. species requires regular and repeated disturbance to control | 3 |
| c. species can be eradicated using disturbance techniques | 5 |
| d. information is unknown | U |

20. Time Commitment/Ongoing Control Needed (chemical or mechanical)

| | |
|---|---|
| a. species requires ongoing or long-term management to control | 1 |
| b. species can be controlled or eradicated with 2-3 treatments | 3 |
| c. species can be controlled or eradicated with 1 treatment | 5 |
| d. information is unknown | U |

**Section 2: Site Characteristics**

This optional section may be completed in order to generate a site-specific score for an invasive species on your property.

1. Quality of Habitat

| | |
|---|---|
| a. site is heavily degraded with few desirable native plants and many invasive plants | 0 |
| b. site is moderately intact or restored with a moderate amount of desirable native plants and few invasive plants | 3 |
| c. site is a high quality remnant or restoration with many desirable native plants and few invasive plants | 6 |

2. Propagule Pressure (see question 8 for dispersal ability)

    a. there are many sources of propagules on adjacent lands 1

    b. there are few propagule sources on adjacent lands, and species has high dispersal ability 3

    c. there are few propagule sources on adjacent lands, and species has moderate dispersal ability 4

    d. there are no known sources of propagules on adjacent lands 5

3. Presence of Roads/Paths

    a. roads or walking/ATV paths are adjacent to <20% of the site 1

    b. roads or walking/ATV paths are adjacent to <20-40% of the site 2

    c. roads or walking/ATV paths are adjacent to >40% of the site, and 1 walking/ATV path crosses the site 4

    d. roads or walking/ATV paths are adjacent to >40% of the site, and 2 or more walking/ATV paths cross the site 5

4. Hydrological Connectivity

    a. site is not connected to natural or agricultural systems via waterways such as streams or ditches 0

    b. site is connected to predominantly natural systems via waterways such as streams or ditches 3

    c. site is connected to natural and agricultural systems via waterways such as streams or ditches 6

5. Area of site

    a. total area is < 1- < 5 acres 1

    b. total area is 5- <25 acres 3

    c. total area is 25 or more acres 5

| **Assessment Score Sheet** | New/Update: | Date: | Completed by: | |
|---|---|---|---|---|
| Question | Points | Possible Points | References | Notes |
| | | | | |
| **Invasion Status** | | | | |
| 1) OH/MI County Distribution | | | | |
| 2) Oak Openings County Distribution | | | | |
| 3) Extent in Oak Openings Region | | | | |
| **Section Total:** | | | | |
| **Biological Characters** | | | | |
| 4) Vegetative Reproduction | | | | |
| 5) Sexual Reproduction | | | | |
| 6) Number Viable Seeds/Propagules | | | | |
| 7) Flowering Period | | | | |
| 8) Dispersal Ability | | | | |
| 9) Generation Time | | | | |
| **Section Total:** | | | | |
| **Ecological Impacts** | | | | |
| 10) Impact on Ecosystem Processes | | | | |
| 11) Impact on Native Organisms | | | | |
| 12) Hybridization | | | | |
| 13) Population Density | | | | |
| 14) Establishment | | | | |
| 15) Ability to Invade Oak Openings Habitat | | | | |
| **Section Total:** | | | | |
| **Management** | | | | |
| 16) Feasibility of Management | | | | |
| 17) Vectors of Spread | | | | |
| 18) Viability of Seed Bank | | | | |
| 19) Response to Intermediate Disturbance | | | | |
| 20) Time Commitment/Ongoing Control | | | | |
| **Section Total:** | | | | |
| **Ranking (Total Points/Possible Points)** | | | | |
| | | | | |
| ***Section 2: Site Specific Considerations*** | | | | |
| 1) Quality of Habitat | | | | |
| 2) Propagule Pressure | | | | |
| 3) Presence of Roads/Paths | | | | |
| 4) Hydrological Connectivity | | | | |
| 5) Area of Site | | | | |
| | | | | |
| **Site Ranking (Total Points/Possible Points for Sections 1 + 2)** | | | | |