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The North Carolina Invasive Species Assessment System

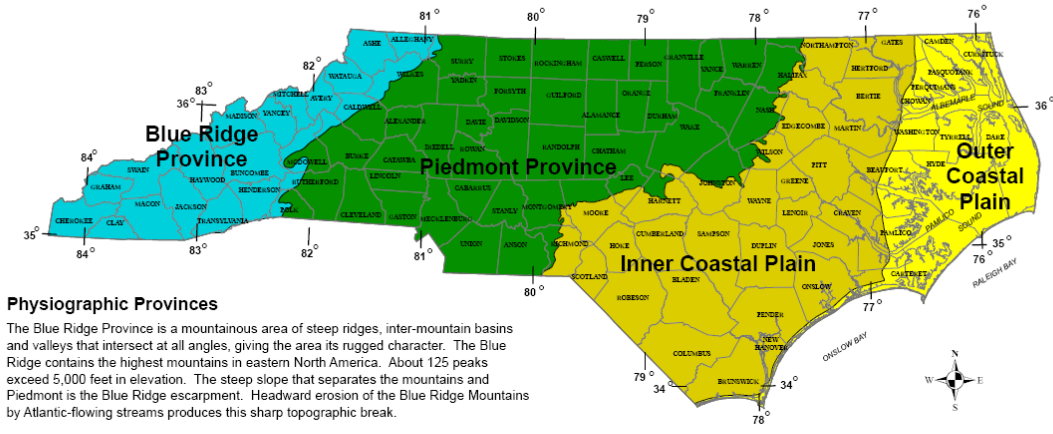
GENERAL DESCRIPTION OF THE CRITERIA

The assessment criteria have been adopted from current available invasive assessments (Fox et al. 2005; Morse et al. 2004; Schutzki et al. 2004; and Warner et al. 2003) and modified for use in the North Carolina horticultural trade. Criteria are those that are likely to have resources and information available for a variety of species. The model is largely non-predictive and not intended to predict invasive attributes or prescreen species not currently utilized in the North Carolina horticultural trade; however, potential for further spread of existing species is considered.

For each main assessment question, an evaluator selects a response that corresponds to a particular point value. If information is unavailable to answer a particular question, the response is recorded as unknown, and no points are assigned. Numerical values assigned to criteria are for ranking purposes and to separate invasive from innocuous non-native species.

The assessment is based on a total of 100 points. Scores for Economic Value (section 4) are negative and subtract from the overall invasiveness rating and possible “do not sell” recommendation. Ecological Impacts (section 1) and Distribution and Invasive Potential (section 2) are evaluated within natural areas and may be assessed specifically for different geographic regions of North Carolina (Figure 2.1).

Physiography of North Carolina



Physiographic Provinces

The Blue Ridge Province is a mountainous area of steep ridges, inter-mountain basins and valleys that intersect at all angles, giving the area its rugged character. The Blue Ridge contains the highest mountains in eastern North America. About 125 peaks exceed 5,000 feet in elevation. The steep slope that separates the mountains and Piedmont is the Blue Ridge escarpment. Headward erosion of the Blue Ridge Mountains by Atlantic-flowing streams produces this sharp topographic break.

The Piedmont Province consists of generally rolling, well-rounded hills and ridges with a few hundred feet of elevation difference between the hills and valleys. Elevations in the Piedmont range from 300 to 600 feet above sea level near its border with the Coastal Plain to 1,500 feet at the foot of the Blue Ridge. Resistant knobs and hills, called monadnocks, which occur in the Piedmont Province, include the Sauratown, South, and Uwharrie Mountains.

The Inner Coastal Plain Province consists of stair-step-like planar terraces that dip gently towards the ocean. At higher elevations, the land is dissected to form gently rolling hills and valleys. Elevations range from about 600 feet to 25 feet above mean sea level. The boundary between the Piedmont and Coastal Plain is the Fall Zone. This zone represents the elevational break between the resistant rocks of the Piedmont and the more easily eroded sediments of the Coastal Plain.

The Outer Coastal Plain Province is characterized by flat, poorly drained land lying below 25 feet above mean sea level. The boundary between the Outer and Inner Coastal Plain is the Suffolk scarp. This feature is an ancient shoreline formed during a high stand of sea level. The scarp was cut by shoreline erosion during the late Pleistocene Epoch, more than 10,000 years ago.



2004

Modified from 1991 Generalized Geologic Map
Digital representation by M.A. Medina, J.C. Reid, and R.H. Carpenter

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Figure 2.1 Physiography of North Carolina

Supporting information associated with the criteria will be recorded on the species'

Dataform and Score Sheet (Table 2.1).

Table 2.1 Species Dataform and Scoresheet

<i>Species Dataform and Scoresheet</i>		
Species:		
Native range:		
Date evaluated:		
	Answer Choices	Response
Introductory Questions		
1. Current federal and state regulations	Y/N	
Comments:		
2. Occurrence in the horticultural trade	Y/N	
Comments:		
3. North Carolina nativity	Y/N	
Comments:		
4. Presence in natural areas	Y/N	
Comments:		
5. Non-invasive cultivars	Y/N	
Comments:		
	Maximum Point Value	Number of Points Assigned
Section 1. Ecological Impact		
1a. Impact on abiotic ecosystem processes	10	
Comments:		
1b. Impact on plant community structure	20	
Comments:		
1c. Impact on species of special concern	5	
Comments:		
1d. Impact on higher trophic levels	5	
Comments:		
Section 1. Subrank	40	
Section 2. Current Distribution and Potential for Expansion		
2a. Local range expansion	7	
Comments:		
2b. Long-distance dispersal potential	13	
Comments:		
2c. Reproductive characteristics	8	
Comments:		

Table 2.1 Continued

2d. Range of communities	6	
Comments:		
2e. Similar habitats invaded elsewhere	6	
Comments:		
<i>Section 2. Subrank</i>	40	
Section 3. Management Difficulty		
3a. Herbicidal control	5	
Comments:		
3b. Nonchemical control methods	2	
Comments:		
3c. Necessity of individual treatments	2	
Comments:		
3d. Average distribution	2	
Comments:		
3e. Likelihood for reestablishment	2	
Comments:		
3f. Accessibility of invaded areas	2	
Comments:		
3g. Impact on native species and environment	5	
Comments:		
<i>Section 3. Subrank</i>	20	
Section 4. Benefits and Value		
4a. Estimated wholesale value	-7	
Comments:		
4b. Percentage of total sales	-5	
Comments:		
4d. Ecosystem services	-1	
Comments:		
4e. Wildlife habitat	-1	
Comments:		
4f. Cultural and social benefits	-1	
Comments:		
<i>Section 4. Subrank</i>	-15	
Overall Score	100	
Overall Recommendation:		
Summary:		
References:		

INDEX CATEGORIES AND POINT VALUES

Table 2.2 Index categories and associated maximum point values in the North Carolina Invasive Species Assessment System

Index Category	Maximum Points
1. Ecological Impact	+40
2. Distribution and Invasive Potential	+40
3. Management Difficulty	+20
4. Benefits and Value	-15

OVERALL TAXON EVALUATION SCORES AND RECOMMENDATIONS

Highly invasive and not recommended for horticultural use: These species present relatively high ecological impact, distribution and invasive potential, and management difficulty in relation to economic value. (Overall Score: 67 – 100)

Moderately weedy and recommended for use with specific guidance: These species have less than high ecological impact, distribution and invasive potential, and management difficulty in relation to economic value. These plants should not be grown in close proximity to natural areas that have communities similar to those where this plant has been found to naturalize or near natural areas that have sensitive or threatened plants and/or natural communities. (Overall Score: 34 – 66)

Noninvasive and recommended for use: These species have limited ecological impact, distribution and invasive potential, and management difficulty in relation to economic value. They may be locally problematic but their reproductive biology and other traits limit their rate of invasion to natural areas. (Overall Score: 0 – 33)

Evaluated but not listed - These species may be potentially invasive, but additional information is necessary for further evaluation and conclusions.

KEY DEFINITIONS AND TERMS USED IN THE ASSESSMENT

Alien/Non-native Species: A species found outside their natural range as a result of human activity.

Naturalized: A non-native species that establishes self-perpetuating populations.

Invasive: According to the National Invasive Species Council (2006), invasive species are non-native species whose introduction causes or is likely to cause economic or environmental harm or harm to human health that outweighs any benefits.

Natural Areas: Ecosystems that are primarily managed to be in a natural state. Areas immediately adjacent (<10 meters) to roads and trails should not be included in assessments of natural areas.

Noxious Weed: According to the 1974 Federal Noxious Weed Act, a noxious weed is any plant in any stage of development, including parasitic plants whose presence whether direct or indirect, is detrimental to crops or other desirable plants, livestock, land, or other property, or is injurious to the public health. Noxious weeds are regulated by the federal government and state governments.

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

In North Carolina, Endangered, Threatened, and Special Concern species have legally protected status in North Carolina through the North Carolina Plant Conservation Program (NC PCP), a unit of the North Carolina Department of Agriculture and Consumer Services. The NC PCP acts to maintain state lists of rare plant taxa, manage conservation programs, develop regulations, and issue permits concerning protected plants (Buchanan and Finnegan 2008).

Endangered, threatened, and species of special concern are defined according to the guidelines of

the North Carolina Plant Protection and Conservation Act of 1979 (General Statutes, Article 19B, 106: 202.12_22).

North Carolina Species Status Definitions

Endangered: Any species of higher taxon of plant whose continued existence as a viable component of the State's flora is determined to be in jeopardy. Endangered species may not be removed from the wild except when a permit is obtained for research, propagation, or rescue which will enhance the survival of the species.

Threatened: Any resident species of plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Removal regulations are the same as for Endangered species.

Special Concern: Any species of plant in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of the Plant Protection and Conservation Act.

The North Carolina Natural Heritage Program maintains a database of state-level and federal legal status information (Buchanan and Finnegan 2008). Federally-listed Endangered and Threatened species and Species of Concern are defined according to the guidelines of the Endangered Species Act of 1973 (Section 3) and determined by the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Marine Fisheries Services.

United States Species Status Definitions

Endangered: Taxa that are in danger of extinction throughout all or a significant portion of its range.

Threatened: Taxa that are likely to become endangered within the foreseeable future throughout all or a significant portion of the occupied range.

Species of Concern: A species under consideration for listing, for which there is insufficient information to support listing at this time. The USFWS works with the States and other private and public interests to assess their need for protection under the Endangered Species Act.

ASSESSMENT QUESTIONS

INTRODUCTORY SCREENING QUESTIONS

Complete the following five questions to determine whether a species should be evaluated. To be eligible for assessment, a species must be currently not listed as a federal or state noxious weed, non-native and sold in the horticultural trade in North Carolina, and present or suspected to be present in natural areas in North Carolina.

1. Current Federal and State Regulations

Is this species listed on a federal or North Carolina noxious or prohibited plant list?

Yes = Stop. If this species is listed as a noxious weed, do not evaluate. Instead, list this plant as an invasive species not recommended for use.

No = Continue with the assessment.

2. Occurrence in the Horticultural Trade

Is this species sold in the horticultural trade in North Carolina?

Yes = Continue with the assessment.

No = Stop. A species must be sold in the horticultural trade to be eligible for evaluation.

3. North Carolina Nativity

Is this species native to North Carolina?

Yes = Stop. A species must be non-native in North Carolina to be eligible for evaluation.

No = Continue with the assessment.

4. Presence in Natural Areas

Is this species known or suspected to be present in natural areas within any of the four Physiographic Provinces (Blue Ridge Province, Piedmont Province, Inner Coastal Plain, Outer Coastal Plain) of North Carolina? Counties contained in each Province are identified in Figure 2.1.

Yes = If this species is present in two or more nonadjacent provinces, assess this species on a state-wide level. However, if this species is present in natural areas in only one of the four province or two adjacent provinces, complete the assessment for this province or region only.

No = Stop. A species must be present or suspected to be present in natural areas to be eligible for evaluation. The assessment model is designed to evaluate horticultural species that may escape cultivation and invade undisturbed natural vegetation.

5. Non-Invasive Cultivars

Is this a specific cultivar that has been rigorously tested and determined to be seedless and does not produce viable seeds or vegetative propagules that disperse widely under natural conditions?

Yes = Stop. If the cultivar is considered to be non-invasive, this assessment is not relevant. Data and/or reviewed scientific publications must be provided to substantiate this claim.

No = Continue with the assessment.

SECTION 1. ECOLOGICAL IMPACT

Consider the known ecological impacts in natural areas where it is most prevalent (worst case) without, or before, any control effort.

1a. Impact on Ecosystem Processes and System-Wide Parameters – 10 points

Does this species substantially alter abiotic ecosystem processes and system-wide parameters in ways that may diminish the survival of native species?

Examples of abiotic processes include:

- Fire occurrence, frequency, and intensity
- Geomorphological changes such as erosion and sedimentation rates
- Hydrological regimes, including soil water table
- Nutrient and mineral dynamics, including salinity, alkalinity, and pH
- Light availability

_____ Not known to impact ecosystem processes (**0 points**)

_____ Influences ecosystem processes (e.g., has perceivable, but mild influence on soil nutrient availability) (**4 points**)

_____ Significant alteration in ecosystem processes (e.g., increases sedimentation rates along coastlines, reducing open water areas that are important for waterfowl, alters nutrient and mineral dynamics to levels that favor non-native potentially invasive plants at the expense of native species) (**7 points**)

_____ Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., changes fire regimes, plant reduces water level from open water or wetland system, changing habitats) (**10 points**)

1b. Impact on Plant Community Structure and Composition – 20 points

Does this species alter the plant community, composition, or vegetation structure?

_____ No significant impact. Scattered presence, but no substantial effect on species composition or structure (**0 points**)

_____ Minor effect on species composition or structure (e.g., found in patches, but represents <10% cover throughout any vegetation layer of any one successional state) (**5 points**)

_____ Influences community composition. Wide spread (e.g., > 10% cover throughout one vegetation layer of at least one successional stage, reduces the number of individuals in one or more native plant species) (**10 points**)

_____ Significantly alters community composition. Prevalent (e.g., > 25% cover throughout one vegetation layer over multiple successional stages, substantially reduces the number of individuals in one or more native plant populations) (**15 points**)

_____ Causes major alterations in community composition (e.g., > 50% cover throughout one vegetation layer over multiple successional stages, results in the extirpation of one or more native species, reducing biodiversity) **(20 points)**

1c. Impact on Species of Special Concern or Threatened or Endangered Plants – 5 points

Does this species impact rare plants, species of special concern or threatened or endangered plants?

_____ Not known to impact rare/endangered native plant species or unique plant communities.

(0 points)

_____ Co-habits with species of special concern, threatened, or endangered native plant species, but not known to have a direct impact on them. **(2 points)**

_____ Known to inhabit vulnerable communities and displace or negatively impact species of special concern, threatened, or endangered native species. **(5 points)**

1d. Impacts on Higher Trophic Levels – 5 points

Does this species have a cumulative effect on animals (nesting or foraging sites, habitat connectivity, migration corridors), including pollinators? Does this species act as a host plant or provide overwintering for insect pests or pathogens that damage crop plants or native vegetation in North Carolina? Does this species act as a host plant for insect pests that present a threat to human health?

_____ Not known to impact higher trophic levels **(0 points)**

_____ May modify some animal behavior or health, reduces food, reproduction, or cover. (1 point)

_____ Impacts animal species composition displaces certain species. May act as a host plant for insect pests or pathogens that damage crop plants or present a threat to human health (3 points)

_____ Known to act as a host plant for insect pests or pathogens that damage crop plants, native species or present a threat to human health. (5 points)

SECTION 2. CURRENT DISTRIBUTION AND POTENTIAL FOR EXPANSION (INVASIVE POTENTIAL)

On a state level, an assessment is made for zones where the plant has and has not invaded.

2a. Local Range Expansion or Change in Abundance – 7 points

Is the overall range (extent of distribution) of this species increasing? Consider whether the range of the species is expanding, not is it filling in at higher infestation densities within its known range. Document any management activity that may be controlling the species.

_____ The range of this species had not increased over the past 10 years. (0 points)

_____ The range of this species has increased slightly over the past 10 years (1 point)

_____ The range of this species has moderately increased, but not doubled, over the past 10 years. (4 points)

_____ The range of this species is increasing rapidly and has doubled statewide in <10 years. (7 points)

2b. Long-Distance Dispersal Potential Within Region – 13 points

What is this species' potential for natural long-distance dispersal? Is this species spread by animals (including unintentionally by people) or abiotic mechanisms that can move seed, roots, stems, or other propagules over a long distance (> 1 km)?

Examples of natural long-distance dispersal mechanisms include:

- the species/fruit or seed is commonly consumed by birds or other animals that travel long distances (fleshy fruit, dispersed by birds)
- the species' fruits or seeds are sticky or burred and cling to feathers or hair of animals;
- the species has buoyant fruit, seeds, or other propagules that promote long-distance wind or water dispersal;
- the species, or parts of it, can detach and disperse seeds as the plants or plant parts are blown long distances.

_____ This species is not dispersed long distances. **(0 points)**

_____ This species exhibits low rates of long distance dispersal **(3 points)**

_____ This species exhibits examples of long-distance dispersal mechanisms. **(8 points)**

_____ This species exhibits examples of long-distance dispersal mechanisms and is known to be dispersed long distances. **(13 points)**

2c. Reproductive Characteristics/Biological Character – 8 points

Does this species have reproductive characteristics typical of invasive plant species? Check all that apply. Note any reproductive factors not listed that may suggest potential aggressiveness.

_____ Populations of this species reproduce readily by seed (**2 points**)

_____ Seeds germinate in a wide range of conditions (**2 points**)

_____ This species fragments easily and fragments can become established elsewhere. (**2 points**)

_____ This species resprouts readily when broken or cut. (**2 points**)

2d. Range of Communities in Which Species is Invading – 6 points

How many community groups or habitats does this species invade in North Carolina?

This question rates the number of primary natural community systems a species has invaded in North Carolina as an indication of the diversity of ecological types affected. Species that invade a variety of natural communities are more likely to have broad environmental tolerances and wide-ranging impacts compared with species that are restricted to a limited number of communities. The natural communities of North Carolina listed below are characterized by plant and animal composition, topography, substrate, hydrology, and soil characteristics (Shafale and Weakley 1990).

Complete Table 2.3 below by marking presence or absence of a species in each of the primary systems. A list of the natural communities associated with each system is included for your information.

If the species occurs only along the transportation corridor in any of the natural communities, it is not considered to have yet invaded these systems. However, it should be noted in the summary datasheet that the species has been found adjacent to the ecological type.

_____ This species invades a limited range of communities (1 primary system). (**2 points**)

_____ This species invades a moderate range of communities (2 primary systems). (**4 points**)

_____ This species invades a wide range of communities (≥ 3 primary systems). (6 points)

Table 2.3 Natural Communities of North Carolina, as defined by Shafale and Weakley (1990)

	Primary Systems	Natural Communities	Status
1	High mountain communities	Fraser fir forest, red spruce-fraser fir forest, grassy bald, heath bald, high elevation red oak forest, montane white oak forest, northern hardwoods forest, boulderfield forest	
2	Low elevation mesic forests	Rich cove forest, acidic cove forest, Canada hemlock forest, mesic mixed hardwood forest, basic mesic forest	
3	Low elevation dry and dry-mesic forest and woodlands	Carolina hemlock bluff, white pine forest, pine/oak heath, chestnut oak forest, piedmont forest, mountain oak-hickory forest, dry oak-hickory forest, dry-mesic oak-hickory forest, basic oak-hickory forest, xeric hardpan forest, piedmont longleaf pine forest	
4	Rock outcrop communities	High elevation rocky summit, high elevation granitic dome, low elevation rocky summit, low elevation granitic dome, montane acidic cliff, piedmont/coastal plain acidic cliff, piedmont/coastal plain heath bluff, montane or piedmont cliff, montane or piedmont calcareous cliff, coastal plain marl outcrop	
5	Communities of the coastal zone	Dune grass, maritime dry grassland, maritime shrub, maritime evergreen forest, maritime deciduous forest, coastal fringe evergreen forest, coastal fringe sandhill	
6	Sandy woodlands of the coastal plain	Mesic pine flatwoods, pine/scrub oak sandhill, xeric sandhill scrub	
7	River floodplains	Sand and mud bar, rocky bar and shore, coastal plain levee forest, cypress--gum swamp, coastal plain bottomland hardwoods, coastal plain small stream swamp, piedmont/mountain swamp forest, piedmont/mountain bottomland forest, floodplain pool, piedmont/low mountain alluvial forest, montane alluvial forest	
8	Nonalluvial wetlands of the mountains and Piedmont	Swamp forest-bog complex, Southern Appalachian bog, Southern Appalachian fen, high elevation seep, spray cliff, upland pool, upland depression swamp forest, hillside seepage bog, low elevation seep	

Table 2.3 Continued

9	Wet nonalluvial forests of the Coastal Plain	Wet Marl forest, nonriverine wet hardwood forest, nonriverine swamp forest	
10	Pocosin and peatland communities of the Coastal Plain	Low pocosin, high pocosin, pond pine woodland, peatland Atlantic white cedar forest, bay forest, streamhead pocosin, streamhead Atlantic white cedar forest,	
11	Wet savanna of the Coastal Plain	Wet pine flatwoods, pine savanna, sandhill seep	
12	Coastal Plain depressions and water bodies	Vernal pool, cypress savanna, small depression pond, natural lake shoreline	
13	Nontidal coastal fringe wetlands	Maritime wet grassland, maritime swamp forest, maritime shrub swamp, interdune pond, estuarine fringe loblolly pine forest	
14	Freshwater tidal wetlands	Tidal freshwater marsh, tidal cypress-gum swamp	
15	Estuarine system	Salt marsh, brackish marsh, salt flat, salt shrub	
16	Marine system	Upper beach	

2e. Similar Habitats Invaded Elsewhere – 6 points

Has the species invaded comparable habitat types elsewhere that exist in North Carolina, but which it has not yet invaded? Identify other areas where this species has been identified as a problem and consider whether this species has invaded ecological types in other states or countries outside its native range that are analogous to ecological types not yet invaded in North Carolina. It is helpful to complete Question 2d above before responding to this question. If a species has been shown to invade a community type in North Carolina, and it was documented above in Question 2d, it does not receive additional points here in Question 2e for invading the same community type in another state. No points are assigned here if a species invades elsewhere but only in ecological types that it has already invaded in North Carolina. This information regarding suitable habitat-types is useful in determining the potential for additional spread within North Carolina.

- _____ This species has not invaded comparable habitat types elsewhere. **(0 points)**
- _____ This species has invaded 1 ecological type, in a similar climate, elsewhere that exists, but is not yet invaded in North Carolina **(2 points)**
- _____ This species has invaded 2 ecological types, in similar climates, elsewhere that exist, but are not yet invaded in North Carolina. **(4 points)**
- _____ This species has invaded 3 or more ecological types, in similar climates, elsewhere that exist, but are not yet invaded in North Carolina. **(6 points)**

SECTION 3. MANAGEMENT DIFFICULTY

This section addresses factors that increase the difficulty of management for potentially invasive species. Responses should be considered for areas without, or before, any efforts to control a species.

Management Difficulty

3a. Is this species well-controlled by herbicides labeled for use in the invaded sites? –

5 points

- _____ This species is well-controlled using herbicide applications. **(0 points)**
- _____ This species is well-controlled using a limited variety of herbicides applied at precise times of the year. Herbicide management must follow a strict protocol to be effective, and control is not consistent **(3 points)**
- _____ This species is not well-controlled by herbicides registered for use in the invaded sites or this species has shown evidence of herbicide tolerance. **(5 points)**

3b. Are nonchemical control methods effective? – 2 points

- _____ This species is well-controlled using nonchemical control methods such as hand-pulling, mowing, disking, grazing, flame or biological control (**0 points**)
- _____ Nonchemical control methods provide moderate control of this species (**1 point**)
- _____ Nonchemical control methods are not effective treatments for managing this species. (i.e., hand-pulled plants often break and resprout later, the invaded sites should not be disturbed, the invaded sites are too remote for weeding crews and volunteers to easily access the area) (**2 points**)

3c. Are individual treatments necessary? – 2 points

- _____ This species can be controlled broadly and individual plants treatments are not necessary. (**0 points**)
- _____ Individual plant treatments (e.g., cut stem applications) are necessary. (**2 points**)

3d. What is the average distribution pattern of this species? – 2 points

- _____ The average distribution pattern of this species is a discrete patch formation (**0 points**)
- _____ There is often variability in the distribution of this species (**1 point**)
- _____ This species is often distributed in diffuse stands (**2 points**)

3e. What is the likelihood for reestablishment of this species following management treatments? – 2 points

Following the first year of control of this species, it would be expected that sites of former populations would require re-survey or re-treatment, due to recruitment from persistent seeds, spores, or vegetative structures, or by dispersal from outside the site:

_____ Re-treatments are generally not warranted; or regrowth not known. **(0 points)**

_____ Re-treatment may be made in 2 to 3 years, or spot treatments to limited re-growth over the next 2 to 5 years. **(1 point)**

_____ Annual re-treatment is necessary for 3 or more years, skipping a year of treatment may result in a return to the original infestation density. **(2 points)**

3f. Accessibility of Invaded Areas – 2 points

Is this species found in inaccessible areas?

_____ No. **(0 points)**

_____ Yes, and a limited area cannot be reached easily by vehicle or cannot easily be treated by an individual carrying a backpack sprayer or hand-held tool. **(1 point)**

_____ Yes, and much of the area cannot be reached easily by vehicle or cannot easily be treated by an individual carrying a backpack sprayer or hand-held tool. **(2 points)**

Non-Target Impacts

3g. Impacts of Management on Native Species and the Environment – 5 points

Does the management of this species negatively impact native species and the environment?

Species that are difficult to control without significant damage to native species may be:

- widely dispersed (i.e., does not occur within discrete clumps or monocultures);
- attached to native species (e.g., vine, epiphytes or parasite);
- easily mistaken for a native plant;
- significant soil disturbance would result from control measures.

_____ The management of this species does not negatively impact native species or the environment. **(0 points)**

_____ The management of this species may negatively impact native species or the environment. **(2 points)**

_____ The management of this species is known to negatively impact native species and the environment. **(5 points)**

SECTION 4. BENEFITS AND VALUE

This section weighs the economic, environmental, and social benefits of a species against the ecological risk of potential invasiveness. Negative point values subtract from the overall invasiveness scale and likelihood of not recommending a plant for sale.

4a. Estimated Wholesale Value in North Carolina

What is the estimated annual wholesale value attributed to this species?

_____ > \$40 million **(-7 points)**

_____ > \$30 million **(-6 points)**

_____ > \$20 million **(-5 points)**

_____ > \$10 million **(-4 points)**

_____ > \$5 million (-3 points)

_____ > \$1 million (-2 points)

_____ > \$100,000 (-1 point)

4b. Percentage of Wholesale and/or Retail Sales

Among the producers that sell this species, the highest percentage of total sales attributed to this species from any one grower is estimated to be:

_____ > 50% (-5 points)

_____ 26-50% (-4 points)

_____ 11-25% (-3 points)

_____ 6-10% (-2 points)

_____ 1-5% (-1 point)

4c. Ecosystem Services

This plant is currently used for erosion control, storm water management, phyto-remediation, bank stabilization, windbreaks, and/or modifying microclimates.

_____ No (0 points)

_____ Yes (-1 point)

4d. Wildlife Habitat

This plant is currently used for wildlife management (food, cover, etc.)

_____ No (0 points)

_____ Yes (-1 point)

4e. Cultural and Social Benefits.

This plant provides unique cultural and social benefits that provide intrinsic value.

_____ No (**0 points**)

_____ Yes (**-1 point**)

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