NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Salix atrocinerea/cinerea	USDA Plants Code: SAAT2/SACI
Common names:	Large gray willow, European gray willow	
Native distribution:	Eurasia	
Date assessed:	October 17, 2008	
Assessors:	Steve Glenn, Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	10-22-2008	Form version date: 25 August 2008

New York Invasiveness Rank: Very High (Relative Maximum Score >80.00)

Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4	Finger Lakes	Not Assessed	Not Assessed
5	Long Island Invasive Species Management Area	Widespread	Very High
6	Lower Hudson	Not Assessed	Not Assessed
7	Saint Lawrence/Eastern Lake Ontario	Not Assessed	Not Assessed
8	Western New York	Not Assessed	Not Assessed

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	24
2	Biological characteristic and dispersal ability	25 (25)	21
3	Ecological amplitude and distribution	25 (25)	25
4	Difficulty of control	10 (10)	6
	Outcome score	100 (90)[b]	75[a]
	Relative maximum score †		84.44
	New York Invasiveness Rank §	Very High (Relative Maximum Score >80.00)	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00−80.00; Moderate 50.00−69.99; Low 40.00−49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

A1.1. Has this species been documented to persist without cultivation in NY? (reliable source; voucher not required)	
☒	Yes – continue to A1.2
☐	No – continue to A2.1
A1.2. In which PRISMs is it known (see inset map)?	
☒	Adirondack Park Invasive Program
☒	Capital/Mohawk
☐	Catskill Regional Invasive Species Partnership
☐	Finger Lakes
☒	Long Island Invasive Species Management Area
☒	Lower Hudson
☐	Saint Lawrence/Eastern Lake Ontario
☐	Western New York

Documentation:
Sources of information:
Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

A2.1. What is the likelihood that this species will occur and persist given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form)

Not Assessed	Adirondack Park Invasive Program
Not Assessed	Capital/Mohawk
Not Assessed	Catskill Regional Invasive Species Partnership
Not Assessed	Finger Lakes
Very Likely	Long Island Invasive Species Management Area
Not Assessed	Lower Hudson
Not Assessed	Saint Lawrence/Eastern Lake Ontario
Not Assessed	Western New York

Documentation:
Sources of information (e.g.: distribution models, literature, expert opinions):
Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

If the species does not occur and is not likely to occur with any of the PRISMs, then stop here as there is no need to assess the species.

A2.2. What is the current distribution of the species in each PRISM? (obtain rank *from PRISM invasiveness ranking forms*)

	Distribution
Adirondack Park Invasive Program	Not Assessed
Capital/Mohawk	Not Assessed
Catskill Regional Invasive Species Partnership	Not Assessed
Finger Lakes	Not Assessed
Long Island Invasive Species Management Area	Widespread
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

Documentation:
Sources of information:
Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats	Wetland Habitats	Upland Habitats
☐ Salt/brackish waters	☒ Salt/brackish marshes	☐ Cultivated*
☐ Freshwater tidal	☒ Freshwater marshes	☒ Grasslands/old fields
☐ Rivers/streams	☐ Peatlands	☒ Shrublands
☐ Natural lakes and ponds	☒ Shrub swamps	☐ Forests/woodlands
☐ Vernal pools	☒ Forested wetlands/riparian	☐ Alpine
☐ Reservoirs/impoundments*	☒ Ditches*	☒ Roadsides*
	☒ Beaches and/or coastal dunes	

Other potential or known suitable habitats within New York:
Lake, pond, reservoir and river margins.

Documentation:
Sources of information:
Willis, et al., 1959; Barnes et al., 1971; Brooklyn Botanic Garden, 2008.

B. INVASIVENESS RANKING

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes and System-Wide Parameters (e.g. fire regime, geomorphological changes (erosion, sedimentation rates), hydrologic regime, nutrient and mineral dynamics, light availability, salinity, pH)

A.	No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years.	0
B.	Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
C.	Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl)	7
D.	Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology and/or hydrology, affects fire frequency, alters soil pH, or fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)	10
U.	Unknown	

Score: U

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
Reported to alter the hydrology of streams in Australia but data are lacking for United States. May also be significantly impacting light availability in habitats but solid data are lacking
Sources of information:
Cremer, 2003; Maybury, 2007; Rawinski in Maybury, 2007.

1.2. Impact on Natural Community Structure

A.	No perceived impact; establishes in an existing layer without influencing its structure	0
B.	Influences structure in one layer (e.g., changes the density of one layer)	3
C.	Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
D.	Major alteration of structure (e.g., covers canopy, eradicating most or all layers below)	10
U.	Unknown	

Score: 7

Documentation:
Identify type of impact or alteration:
Can increase the density of shrub/understory layer; can also create such a layer in open habitats, such as old fields.
Sources of information:
Cremer, 2003; Maybury, 2007; authors' personal observations

1.3. Impact on Natural Community Composition

A.	No perceived impact; causes no apparent change in native populations	0
B.	Influences community composition (e.g., reduces the number of individuals in one or more native species in the community)	3
C.	Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community)	7
D.	Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community)	10

U. Unknown

Score 7

Documentation:
Identify type of impact or alteration:
Can form dense thickets, significantly reducing/displacing native shrubs and trees; evidence for extirpation of native populations is currently lacking. Evidence that it is shading out populations of the rare native Carex polymorpha (Rawinski in Maybury, 2007).
Sources of information:
Cremer, 2003; Maybury, 2007; Authors' personal observations.

1.4. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades. Examples include reduction in nesting/foraging sites; reduction in habitat connectivity; injurious components such as spines, thorns, burrs, toxins; suppresses soil/sediment microflora; interferes with native pollinators and/or pollination of a native species; hybridizes with a native species; hosts a non-native disease which impacts a native species)

A. Negligible perceived impact 0
B. Minor impact 3
C. Moderate impact 7
D. Severe impact on other species or species groups 10
U. Unknown

Score 10

Documentation:
Identify type of impact or alteration:
Hybridization with native species of Salix that are also in Salix section Cinerella. Frequently misidentified as a native willow, leading Rawinski (in Maybury, 2007) to refer to this group as a "stealth invader". Rawinski (in Maybury, 2007) also reports it to occur in rare habitats (e.g., Coastal Plain ponds) and shading globally-rare plants, such as Carex polymorpha.
Sources of information:
George Argus, 2004, 2007, pers. comm.; Maybury, 2007; Brooklyn Botanic Garden, 2008.

Total Possible 30
Section One Total 24

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction (provisional thresholds, more investigation needed)

A. No reproduction by seeds or vegetative propagules (i.e. plant sterile with no sexual or asexual reproduction). 0
B. Limited reproduction (fewer than 10 viable seeds per plant AND no vegetative reproduction; if viability is not known, then maximum seed production is less than 100 seeds per plant and no vegetative reproduction) 1
C. Moderate reproduction (fewer than 100 viable seeds per plant - if viability is not known, then maximum seed production is less than 1000 seeds per plant - OR limited successful vegetative spread documented) 2
D. Abundant reproduction with vegetative asexual spread documented as one of the plants prime reproductive means OR more than 100 viable seeds per plant (if viability is not known, then maximum seed production reported to be greater than 1000 seeds per plant.) 4
U. Unknown

Score 4

Documentation:

Describe key reproductive characteristics (including seeds per plant):
Tree can produce millions of seeds per year; low branches and detached branches readily root .
Sources of information:
Cremer, 2003; Maybury, 2007; authors' personal observations.

2.2. Innate potential for long-distance dispersal (e.g. bird dispersal, sticks to animal hair, buoyant fruits, pappus for wind-dispersal)

A.	Does not occur (no long-distance dispersal mechanisms)	0
B.	Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations)	1
C.	Moderate opportunities for long-distance dispersal (adaptations exist for long-distance dispersal, but studies report that 95% of seeds land within 100 meters of the parent plant)	2
D.	Numerous opportunities for long-distance dispersal (adaptations exist for long-distance dispersal and evidence that many seeds disperse greater than 100 meters from the parent plant)	4
U.	Unknown	

Score 4

Documentation:
Identify dispersal mechanisms:
Chiefly by wind, with seeds reported to travel 50-100 km. from infestations in Australia (Cremer, 2003). Dispersal by water is also likely.
Sources of information:
Cremer, 2003; authors' personal observations.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contaminated compost, land and vegetation management equipment such as mowers and excavators, etc.)

A.	Does not occur	0
B.	Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient)	1
C.	Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent)	2
D.	High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful)	3
U.	Unknown	

Score 3

Documentation:
Identify dispersal mechanisms:
Possibly sold commercially either as Salix atrocinerea or S. cinerea or possibly misidentified under another name. Small, light seeds readily transported by indirect means. Branches from yard yaste can also root.
Sources of information:
Maybury, 2007; authors' personal observations.

2.4. Characteristics that increase competitive advantage, such as shade tolerance, ability to grow on infertile soils, perennial habit, fast growth, nitrogen fixation, allelopathy, etc.

A.	Possesses no characteristics that increase competitive advantage	0
B.	Possesses one characteristic that increases competitive advantage	3
C.	Possesses two or more characteristics that increase competitive advantage	6
U.	Unknown	

Score 6

Documentation:
Evidence of competitive ability:
Perennial, shade tolerant, can grow on infertile soils. Exhibits wide range of soil pH tolerance. Recorded occuring on soils with a pH as low as 4.1 to 4.2; but another study states that colonization occurrs only in soils with a pH of 5 or greater. Also reported from "highly alkaline" soils (Oliveira, et al., 2006). Develops a wide-ranging root system; with a low mycorrhizal dependency (Oliveira, et al., 2006). Well adapted to the stress of periodic or permanent waterlogging (Koncalova & Jicinska, 1985; Iremonger & Kelly,1988). One 4 ha study site in Wales (Alliende & Harper, 1989) found an increase from 2 plants in 1967 to almost 500 plants by 1984. Often observed in mesic sites, can perhaps tolerate drier conditions than native S. discolor (authors' personal observations).
Sources of information:
Pearsall, 1938; Wilkinson, 1946; Loach, 1966; Koncalova & Jicinska, 1985; Iremonger & Kelly, 1988; Alliende & Harper, 1989; Oliveira, Castro, Dodd & Vosatka, 2006.

2.5. Growth vigor

A.	Does not form thickets or have a climbing or smothering growth habit	0
B.	Has climbing or smothering growth habit, forms a dense layer above shorter vegetation, forms dense thickets, or forms a dense floating mat in aquatic systems where it smothers other vegetation or organisms	2
U.	Unknown	

Score 2

Documentation:
Describe growth form:
Thickets have been observed.
Sources of information:
Cremer, 2003; Maybury, 2007; authors' personal observations.

2.6. Germination/Regeneration

A.	Requires open soil or water and disturbance for seed germination, or regeneration from vegetative propagules.	0
B.	Can germinate/regenerate in vegetated areas but in a narrow range or in special conditions	2
C.	Can germinate/regenerate in existing vegetation in a wide range of conditions	3
U.	Unknown (No studies have been completed)	

Score 2

Documentation:
Describe germination requirements:
Seeds need moist substrate and ample light and have not been observed germinating in exisiting vegetation in a wide range of conditions.
Sources of information:
Schopmeyer, 1974; Argus, 1986; author's (Moore's) personal observations.

2.7. Other species in the genus invasive in New York or elsewhere

A.	No	0
B.	Yes	3
U.	Unknown	

Score 0

Documentation:
Species:
Other non-native species occur (S. alba, S. caprea, S. purpurea) but none reported as invasive.

Total Possible 25
Section Two Total 21

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Density of stands in natural areas in the northeastern USA and eastern Canada (use same definition as Gleason & Cronquist which is: "The part of the United States covered extends from the Atlantic Ocean west to the western boundaries of Minnesota, Iowa, northern Missouri, and southern Illinois, south to the southern boundaries of Virginia, Kentucky, and Illinois, and south to the Missouri River in Missouri. In Canada the area covered includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude")

A.	No large stands (no areas greater than 1/4 acre or 1000 square meters)	0
B.	Large dense stands present in areas with numerous invasive species already present or disturbed landscapes	2
C.	Large dense stands present in areas with few other invasive species present (i.e. ability to invade relatively pristine natural areas)	4
U.	Unknown	

Score: 4

Documentation:
Identify reason for selection, or evidence of weedy history:
Large stands have been observed with few other invasives present.
Sources of information:
Maybury, 2007; authors' personal observations.

3.2. Number of habitats the species may invade

A.	Not known to invade any natural habitats given at A2.3	0
B.	Known to occur in two or more of the habitats given at A2.3, with at least one a natural habitat.	1
C.	Known to occur in three or more of the habitats given at A2.3, with at least two a natural habitat.	2
D.	Known to occur in four or more of the habitats given at A2.3, with at least three a natural habitat.	4
E.	Known to occur in more than four of the habitats given at A2.3, with at least four a natural habitat.	6
U.	Unknown	

Score: 6

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
See A2.3.
Sources of information:
Willis et al., 1959; Barnes et al., 1971; Argus, 1986; Brooklyn Botanic Garden, 2008.

3.3. Role of disturbance in establishment

A.	Requires anthropogenic disturbances to establish.	0
B.	May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances.	2
C.	Can establish independent of any known natural or anthropogenic disturbances.	4
U.	Unknown	

Score: 4

Documentation:
Identify type of disturbance:
Observed in a variety of undisturbed moist-mesic environments.
Sources of information:
Authors' personal observations.

3.4. Climate in native range

A.	Native range does not include climates similar to New York	0
B.	Native range possibly includes climates similar to at least part of New York.	1
C.	Native range includes climates similar to those in New York	3
U.	Unknown	

Score 3

Documentation:
Describe what part of the native range is similar in climate to New York:
Northern Europe.
Sources of information:
Tutin et al., 1964; Maybury, 2007.

3.5. Current introduced distribution in the northeastern USA and eastern Canada (see question 3.1 for definition of geographic scope)

A.	Not known from the northeastern US and adjacent Canada	0
B.	Present as a non-native in one northeastern USA state and/or eastern Canadian province.	1
C.	Present as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces.	2
D.	Present as a non-native in 4–8 northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem weed (e.g., "Noxious" or "Invasive") in 1 northeastern state or eastern Canadian province.	3
E.	Present as a non-native in >8 northeastern USA states and/or eastern Canadian provinces. and/or categorized as a problem weed (e.g., "Noxious" or "Invasive") in 2 northeastern states or eastern Canadian provinces.	4
U.	Unknown	

Score 4

Documentation:
Identify states and provinces invaded:
CT, DC, DE, KY, MD, ME, MI, NJ, NY, OH, PA, RI, VA, WI, WV; NS, ON, Canada.
Salix atrocinerea and S. cinerea are European members of Salix Section Cinerella. Since there has been long debate among European botanists whether these two entities represent two species or two varieties within a species, logic they are assessed as one entity. Salix Section Cinerella also includes the European S. aurita and S. caprea (not currently appearing widespread in the Northeast), which have also been documented naturalizing in the Northeast; as well as the North American S. discolor, S. humilis, and S. pellita (Argus, G. W. 2004). Most of the species in Salix sect. Cinerella closely resemble each other in gross morphology and habit, making positive identification difficult. In addition, hybridization between members of this section further complicates the identification process. Hybridization between the European species has long been documented (Wilkinson, 1946; Tutin et al, 1964). Recent specimens collected in the New York City area hint at hybridization between the native S. discolor and the non-native S. atrocinerea/cinerea (Argus, G. W. 2008, pers. comm.). Thus, any invasive assessment is further complicated by the distinct possibility that hybrid swarms of Salix sect. Cinerella are occurring in our area. Recent field and herbarium studies by BBG staff have found that S. atrocinerea/cinerea has been in the New York metropolitan area since the 1890s and is currently abundant in the area. Many of the older herbarium vouchers at BKL originally identified as S. discolor were critically re-examined and found to be S. atrocinerea/cinerea. This may be the case for other northeastern regional herbaria. This suddenly recognized abundance of a heretofore unknown non-native species in a flora is a pointed example of a cryptic invasion of a non-native species that so closely mimics a native species that it becomes established and widespread long before detection.
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
Wilkinson, 1946; Tutin, et al., 1964; Argus, 2004, 2007; Maybury, 2007; Brooklyn Botanic

Garden. 2008; U.S.D.A., 2008.

3.6. Current introduced distribution of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)

A.	Present in none of the PRISMs	0
B.	Present in 1 PRISM	1
C.	Present in 2 PRISMs	2
D.	Present in 3 PRISMs	3
E.	Present in more than 3 PRISMs or on the Federal noxious weed lists	4
U.	Unknown	

Score: 4

Documentation:
Describe distribution:
See A1.1.
Sources of information:
Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

Total Possible: 25
Section Three Total: 25

4. DIFFICULTY OF CONTROL

4.1. Seed banks

A.	Seeds (or vegetative propagules) remain viable in soil for less than 1 year, or does not make viable seeds or persistent propagules.	0
B.	Seeds (or vegetative propagules) remain viable in soil for at least 1 to 10 years	2
C.	Seeds (or vegetative propagules) remain viable in soil for more than 10 years	3
U.	Unknown	

Score: 0

Documentation:
Identify longevity of seed bank:
Salix seeds short-lived (less than one year); no seed-banking known for temperate Salix spp.
Sources of information:
Schopmeyer, 1974; Argus, 1986; Maybury, 2007.

4.2. Vegetative regeneration

A.	No regrowth following removal of aboveground growth	0
B.	Regrowth from ground-level meristems	1
C.	Regrowth from extensive underground system	2
D.	Any plant part is a viable propagule	3
U.	Unknown	

Score: 2

Documentation:
Describe vegetative response:
Forms clonal thickets; some spp. of Salix exhibit rooting from broken or layered branches.
Sources of information:
Argus, G. W. 1986.

4.3. Level of effort required

A.	Management is not required: e.g., species does not persist without repeated anthropogenic disturbance.	0

B.	Management is relatively easy and inexpensive: e.g. 10 or fewer person-hours of manual effort (pulling, cutting and/or digging) can eradicate a 1 acre infestation in 1 year (infestation averages 50% cover or 1 plant/100 ft^2).	2
C.	Management requires a major short-term investment: e.g. 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year using mechanical equipment (chain saws, mowers, etc.) for 2-5 years to suppress a 1 acre infestation. Eradication is difficult, but possible (infestation as above).	3
D.	Management requires a major investment: e.g. more than 100 person-hours/year of manual effort, or more than 10 person hours/year using mechanical equipment, or the use of herbicide, grazing animals, fire, etc. for more than 5 years to suppress a 1 acre infestation. Eradication may be impossible (infestation as above).	4
U.	Unknown	

Score	4

Documentation:
Identify types of control methods and time-term required:
Management complicated by wetlands habitat and difficulty in distinguishing between native and non-native species. Once established it cannot be hand-removed; mecanical methods required.
Sources of information:
Argus, G. W. 2004, 2007; Maybury, 2007; authors' personal observations.

Total Possible	10
Section Four Total	6
Total for 4 sections Possible	90
Total for 4 sections	76

C. STATUS OF CULTIVARS AND HYBRIDS:

At the present time (May 2008) there is no protocol or criteria for assessing the invasiveness of cultivars independent of the species to which they belong. Such a protocol is needed, and individuals with the appropriate expertise should address this issue in the future. Such a protocol will likely require data on cultivar fertility and identification in both experimental and natural settings.

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Some cultivars of the species known to be available: S. cinerea 'tricolor', S. cinerea 'variegata'.

References for species assessment:

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Argus, G. W. 1986. The genus Salix (Salicaceae) in the southeastern United States. Systmatic Botany Monographs Vol. 9. 170 pp.

Argus, G. W. 2004. Guide to the identification of the genus Salix (Willow) in New England and New York. Workshop on willow identification. Delta Institute of Natural History, Bowdoin, ME.

Argus, G. W. 2007. Salix (Salicaceae) distribution maps and a synopsis of their classification in North America, north of Mexico. Harvard Papers in Botany 12(2): 335-368.

Barnes, R. S. K., A. E. Dorey & C. Little. 1971. An ecological study of a pool subject to varying salinity (Swanpool, Falmouth). Journal of Animal Ecology, 40(3):709-734.

Brooklyn Botanic Garden. 2008. AILANTHUS database. [Accessed on October 17, 2008].

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Iremonger, S. F. & D. L. Kelly.1988. The responses of four Irish wetland tree species to raised soil water levels. New Phytologist, 109(4):491-497.

Koncalova, M. N. & D. Jicinska. 1985. Differences between ecological niches in juvenile Salix cinerea and S. pentandra. Folia Geobotanica & Phytotaxonomica, 20(3):319-321.

Loach, K. 1966. Relations between soil nutrients and vegetation in wet-heaths: I. Soil nutrient content and moisture conditions. The Journal of Ecology, 54(3):597-608.

Maybury, K. 2007. Salix cinerea. U.S. Inavsive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed October 17, 2008.]

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Pearsall, W. H. 1938. The soil complex in relation to plant communities. II. Characteristic woodland soils. The Journal of Ecology, 26(1):194-209.

Schopmeyer, C. S. 1974. Seeds of woody plants of the United States. Agric. Handb. 450. USDA, Washington, D.C. 883 pp.

Tutin, T. G., V. H. Heywood, S. M. Walters, & D. A. Webb [eds.]. 1964. Flora Europaea, Vol. 1. Cambridge Univ. Press, London.

United States Department of Agriculture, National Resources Conservation Service. 2008. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana. <plants.usda.gov>. [Accesssed on October 17, 2008].

Weldy, T. and D. Werier. 2005. New York Flora Atlas. [S.M. Landry, K.N. Campbell, and L.D. Mabe (original application development), Florida Center for Community Design and Research. University of South Florida]. New York Flora Association, Albany, New York. <atlas.nyflora.org/>. [Accesssed on October 17, 2008].

Wilkinson, J. 1946. Some factors affecting the distribution of the Capreae group of Salix in Gower. The Journal of Ecology, 33(2):214-221.

Willis, A. J., B. F. Folkes, J. F. Hope-Simpson & E. W. Yemm. 1959. Braunton Burrows: The dune system and its vegetation. Journal of Ecology, 47(2): 249-288.

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References for ranking form:

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