NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Lespedeza cuneata	USDA Plants Code: LECU
Common names:	Chinese bushclover	
Native distribution:	Asia, Australia	
Date assessed:	November 19, 2008; edits Feb. 11, 2009	
Assessors:	Steve Glenn, Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	December 8, 2008	Form version date: 22 October 2008

New York Invasiveness Rank: High (Relative Maximum Score 70.00-80.00)

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	Common	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)	20
2	Biological characteristic and dispersal ability	25 (25)	19
3	Ecological amplitude and distribution	25 (25)	17
4	Difficulty of control	10 (10)	9
	Outcome score	100 (90)[b]	67[a]
	Relative maximum score †		74.44
	New York Invasiveness Rank §	High (Relative Maximum Score 70.00-80.00)	

* 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 outside of cultivation, 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):
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	Common
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

Documentation:
Sources of information:
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:
Open forests, open riparian areas, power-line cuts, rr tracks, other naturally open communities.

Documentation:
Sources of information:
Author's personal observations; Tu et al., 2002; Heffernan, 2007; 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 10

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
May reduce water availability. Increases soil nitrification. At riverscour bedrock prairie sites, establishes in cracks and appears to be altering the natural sedimentation by trapping more sediment than the natural vegetation does; this may lead to increased rooting medium for habitat generalists and possibly other exotics.
Sources of information:
Heffernan, 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 3

Documentation:
Identify type of impact or alteration:
Forms dense monotypic herb layer thus impacting structure in one layer. Also prevents forest regeneration, but evidence lacking that it elimnates a layer.
Sources of information:
Heffernan, 2007.

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:
Outcompetes native species in herb layer resulting in significant alterations in community composition at several Long Island natural areas (Connetquot State Park, Hempstead Plains, Pine Meadows).
Sources of information:
Tu et al., 2002; Heffernan, 2007; SRC 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 U

Documentation:
Identify type of impact or alteration:
Data lacking for impacts on other species. Its ability to nitrify the soil probably impacts soil microflora but published data are not known.
Sources of information:

Total Possible 30
Section One Total 20

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):
Prolific seed production- greater numbers of seeds are generally produced in years with high rainfall and in years when bee populations are high; also spreads vegetatively.

Sources of information:
Tu et al., 2002; Heffernan, 2007.

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:
Dispersal is aided by animals consuming the fruits and passing the seeds. Seeds can also stick to the outside of animals (furs, feathers)..
Sources of information:
Remaley, 2006.

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:
Seed sold for wildlife plantings. Used for erosion control and soil conservation on roadways, waterways and outlets, dams, field borders, and strip mine spoils. Fruits (loments) can adhere to clothing. Also spread by mowing.
Sources of information:
Tu et al., 2002; Heffernan, 2007.

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:
Long-lived, allelopathic perennial. Tolerates a wide range of soil, temperature, and moisture

conditions. It is drought resistant, establishes readily on eroded and disturbed soils, or in nutrient poor soils, and can survive flooding for up to ten days. Rarely bothered by insects or diseases - one investigation found L. cuneata experienced 50% lower ambient levels of herbivory than its native congener L. virginica (Schutzenhofer, 2008).

One study found that significant genetic variation existed among the different populations (Sundberg et al., 2002), perhaps enhancing ecological amplitude? Species is also fire tolerant.

Sources of information:
Sundberg et al., 2002; Tu et al, 2002;Heffernan, 2007; Guenther & Roberts 2004; Schutzenhofer, 2008; Munger 2004

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 0

Documentation:
Describe growth form:
Forms dense stands in herb layer above herbs, but not known to form thickets or smothering growth.
Sources of information:
Heffernan, 2007.

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:
The seeds produced from by chasmogamous (outcrossed) flowers do not germinate well unless they are scarified. Temperature and daylength affect rates of seedling emergence and rates of seedling growth. The optimum temperature range for germination is 20° to 30° C. Research needed on cleistogamous flowers.
Sources of information:
Tu et al., 2002.

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:
Lespedeza bicolor reported in NY, listed as invasive in Georgia, but not in Northeast. (Evans et al., 2005; Weldy & Werier, 2005).

Total Possible	25
Section Two Total	19

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 2

Documentation:
Identify reason for selection, or evidence of weedy history:
Large stands observed in disturbed areas with other invasive species present in natural areas on Long Island (Hempstead Plains, Connetquot State Park, Central Pine Barrens).
Sources of information:
Authors' personal observations; SRC 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:
Authors' personal observations; Tu et al., 2002; Heffernan, 2007; 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 2

Documentation:
Identify type of disturbance:
Establishes readily on eroded and disturbed soils, benefits from fire. Also reported to invade open, natural communities.
Sources of information:

Tu et al., 2002; Heffernan, 2007

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:
Northwest Asia.
Sources of information:
Tu et al., 2002.

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:
All NE states except ME, MN, NH, RI, & VT; also reported in Ontario, Canada.
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
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 2

Documentation:
Describe distribution:
Lower Hudson, Long Island.
Sources of information:
Weldy & Werier, 2005; Brooklyn Botanic Garden, 2008.

Total Possible 25

Section Three Total 19

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 3

Documentation:
Identify longevity of seed bank:
Twenty year seed bank viability.
Sources of information:
Tu et al., 2002; Heffernan, 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:
Resprouts from cutting or fire from extensive underground root system.
Sources of information:
Heffernan, 2007.

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:
L. cuneata is not susceptible to several common herbicides, such as 2,4-D, picloram, and dicamba. Triclopyr, glyphosate, clopyralid, and metsulfuron methyl, however, have been shown to be effective in the control (Tu et al., 2002). Possibility for eradication very low-best controlled by an integrated management approach that combines mechanical and chemical methods. Requires more than 5 years of herbicide treatment combined with mowing or fire (Heffernan, 2007); although another study found L. cuneata may actually

benefit from mowing alone (Brandon et al., 2004).

Biological control- investigations have been scant and mixed- one Kansas study found lespedeza webworm (Tetralopha scortealis Lederer, Family Pyralidae), reduced seed production 98% in infested plants (Eddy et al., 2003); although another study concluded that biological control by a leaf chewing herbivore would not likely be successful (Schutzenhofer & Knight, 2007).

One recent study used airborne hyperspectral imaging to map L. cuneata and its invasiveness (Wang et al., 2008).

Sources of information:

Tu et al., 2002; Eddy et al., 2003; Brandon et al., 2004; Heffernan, 2007; Schutzenhofer & Knight, 2007: Wang et al., 2008.

Total Possible	10
Section Four Total	9
Total for 4 sections Possible	90
Total for 4 sections	67

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:

References for species assessment:

Brandon, A. L., D. J. Gibson, & B. A. Middleton. 2004. Mechanisms for dominance in an early successional old field by the invasive non-native Lespedeza cuneata (Dum. Cours.) G. Don. Biological Invasions. 6(4):483-493.

Brooklyn Botanic Garden. 2008. AILANTHUS database. [Accessed on November 19, 2008].

Eddy, T. A., J. Davidson, & B. Obermeyer. 2003. Invasion dynamics and biological control prospects for sericea lespedeza in Kansas. Great Plains Research. 13(2):217-230.

Evans, C.W., C.T. Bargeron, D.J. Moorhead & G.K. Douce. 2005. Invasive Weeds in Georgia. The Bugwood Network, The University of Georgia. <http://www.gainvasives.org/weeds/lespedeza.html>. [Accessed on November 19, 2008].

Guenther, E.M. & J.M. Roberts.2004.Soil Nitrogen Influences Early Root Allocation of Lespedeza cuneata_Tillers 5:21-23.

Heffernan, K. 2007. Lespedeza cuneata. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed on November 19, 2008].
Munger, Gregory T. 2004. Lespedeza cuneata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [Accesssed 2009, February 11].

Remaley, T. 2006. Lespedeza cuneata. Plant Conservation Alliance, Alien Plant Working Group. <http://www.nps.gov/plants/alien/fact/lecu1.htm>. [Accessed on November 19, 2008].

Schutzenhofer, M. R., & T. M. Knight. 2007. Population-level effects of augmented herbivory on Lespedeza cuneata: Implications for biological control. Ecological Applications. 17(4):965-971.

Schutzenhofer, M. R. 2008. The effect of herbivory on the mating system of congeneric native and exotic Lespedeza species. International Journal of Plant Sciences. 168(7):1021-1026.

Sundberg, M. I., D. M. Slaughter, & S. S. Crupper. 2002. Application of randomly amplified polymorphic DNA (RAPD) fingerprinting to detect genetic variation in sericea lespedeza (Lespedeza cuneata). Transactions of the Kansas Academy of Science. 105(1-2):91-95.

Tu, M, B. Rice, & J. Randall. 2002. Element stewardship abstract: Lespedeza cuneata. The Nature Conservancy. < http://tncweeds.ucdavis.edu/esadocs/documnts/lespcun.pdf >. [Accessed November 19, 2008].

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 November 19, 2008].

Wang, C., B. Zhou, & H. L. Palm. 2008. Detecting invasive sericea lespedeza (Lespedeza cuneata) in Mid-Missouri pastureland using hyperspectral imagery. Environmental Management. 41(6):853-862.

Weldy, T. & 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 November 19, 2008].

Citation: This NY ranking form may be cited as: Jordan, M.J., G. Moore and T.W. Weldy. 2008. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY. Note that the order of authorship is alphabetical; all three authors contributed substantially to the development of this protocol.

Acknowledgments: The NY form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of the Long Island Invasive Species Management Area's Scientific Review Committee were incorporated in revisions of this form. Original members of the LIISMA SRC included representatives of the Brooklyn Botanic Garden; The Nature Conservancy; New York Natural Heritage Program, New York Sea Grant; New York State Office of Parks, Recreation and Historic Preservation; National Park Service; Brookhaven National Laboratory; New York State Department of Environmental Conservation Region 1; Cornell Cooperative Extension of Suffolk/Nassau Counties; Long Island Nursery and Landscape Association; Long Island Farm Bureau; SUNY Farmingdale Ornamental Horticulture Department; Queens College Biology Department; Long Island Botanical Society; Long Island Weed Information Management System database manager; Suffolk County Department of Parks, Recreation and Conservation; Nassau County Department of Parks, Recreation and Museums; Suffolk County Soil & Water Conservation District.

References for ranking form:

Carlson, Matthew L., Irina V. Lapina, Michael Shephard, Jeffery S. Conn, Roseann Densmore, Page Spencer, Jeff Heys, Julie Riley, Jamie Nielsen. 2008. Invasiveness ranking system for non-native plants of Alaska. Technical Paper R10-TPXX, USDA Forest Service, Alaska Region, Anchorage, AK XX9. Alaska Weed Ranking Project may be viewed at: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm.

Heffernan, K.E., P.P. Coulling, J.F. Townsend, and C.J. Hutto. 2001. Ranking Invasive Exotic Plant Species in Virginia. Natural Heritage Technical Report 01-13. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 27 pp. plus appendices (total 149 p.).

Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. http://www.natureserve.org/getData/plantData.jsp

Randall, J.M., L.E. Morse, N. Benton, R. Hiebert, S. Lu, and T. Killeffer. 2008. The Invasive Species Assessment Protocol: A Tool for Creating Regional and National Lists of Invasive Nonnative Plants that Negatively Impact Biodiversity. Invasive Plant Science and Management 1:36–49

Warner, Peter J., Carla C. Bossard, Matthew L. Brooks, Joseph M. DiTomaso, John A. Hall, Ann M.Howald, Douglas W. Johnson, John M. Randall, Cynthia L. Roye, Maria M. Ryan, and Alison E. Stanton. 2003. Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands. Available online at www.caleppc.org and www.swvma.org. California Exotic Pest Plant Council and Southwest Vegetation Management Association. 24 pp.

Williams, P. A., and M. Newfield. 2002. A weed risk assessment system for new conservation weeds in New Zealand. Science for Conservation 209. New Zealand Department of Conservation. 1-23 pp.