NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Tussilago farfara L.	USDA Plants Code: TUFA
Common names:	Coltsfoot	
Native distribution:	Eurasia, North Africa	
Date assessed:	April 24, 2009	
Assessors:	Steve Glenn, Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	May 13, 2009	Form version date: 3 March 2009

New York Invasiveness Rank: Moderate (Relative Maximum Score 50.00-69.99)

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	Moderate
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 (20)	6
2	Biological characteristic and dispersal ability	25 (25)	16
3	Ecological amplitude and distribution	25 (25)	19
4	Difficulty of control	10 (10)	5
	Outcome score	100 (80)[b]	46[a]
	Relative maximum score †		57.50
	New York Invasiveness Rank §	Moderate (Relative Maximum Score 50.00-69.99)	

* 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:
Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

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
Unlikely	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):
While this species is reported along coastal and saline areas in its native range, these study sites are neutral to alkaline. All studies suggest coltsfoot is better adapted to this pH regimen (with the exception of Mann, 1939). Supporting this- a report of coltsfoot colonizing a modified (chemical residue dump) saline but basic habitat in upstate New York (Young, 1936). Another study further suggests that low pH inhibits germination (Myerscough & Whitehead, 1966). Furthermore, research indicates acidity sharply decreases shoot height and the amount of aboveground mass (Krylova & Kaporova, 1981). A survey of the Nassau and Suffolk Co. Soil Surveys show only four out of 44 (9.1%) soil series with a pH greater than 6.0. The one area covered on Staten Island exhibited pHs ranging from 5-6.4.
This is further supported by regional distribution of Tussilago, showing a sharp decrease in occurrence along all coastal areas of the CT-NJ-NY region (Brooklyn Botanic Garden, 2009). While sporadic populations of coltsfoot will probably remain in the Long Island PRISM, significant expansion of distribution and abundance is probably unlikely.

Turner, 1928; Young, 1936. ; Locket, 1946; Mann, 1939; Myerscough & Whitehead, 1966; Warner, 1975; Krylova & Kaporova, 1981; Krylova & Kaporova, 1983; Wulforst, 1987; Andersen, 1993; Margules et al., 1994; Hernandez & Galbraith, 1997; Hendrickson, 2005; Brooklyn Botanic Garden, 2009.

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, 2009.

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:
Forest margins, ballast/waste areas, bank of lake, river banks and river mud flats; sub-alpine (Europe).

Documentation:
Sources of information:
Brown, 1881; Bostock, 1980; Andersen, 1993; Luken & Thieret, 2001; Rose & Hermanutz, 2004; Gravuer, 2005; Brooklyn Botanic Garden, 2009.

B. INVASIVENESS RANKING

Questions apply to areas similar in climate and habitats to New York unless specified otherwise.

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)
No studies on the impact on ecosystem processes located.
Sources of information:
Gravuer, 2005.

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:
Can form near monospecific stands changing the density of the herbaceous layer. No evidence of significant or major alteration of structure.
Sources of information:
Gravuer, 2005.

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: 3

Documentation:
Identify type of impact or alteration:
Can form large stands and reduce the numbers of native species in the herb layer. No evidence of significant or major alteration of community composition.
Sources of information:
Rose & Hermanutz, 2004; Gravuer, 2005.

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:
No studies on the impact on other species located.
Sources of information:
Gravuer, 2005.

Total Possible: 20
Section One Total: 6

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):
Adaptable reproductive system- studies suggest Tussilago farfara in situations of harsh environments or interspecific competition allocates less biomass to seed production and more biomass to rhizome production; and conversely allocates more biomass to seed production in nutrient rich sites and little competition. When seeds are produced, each plant is reportedly capable of producing about 3500 (Gravuer, 2005) to 4600 (Bostock & Benton. 1979) seeds. Can also exhibit effective clonal reproduction via rhizomes.
Sources of information:
Bostock & Benton. 1979; Bostock, 1980; Namura-Ochalska, 1987; Namura-Ochalska, 1993; Gravuer, 2005; Pfeiffer et al., 2008.

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 2

Documentation:

Identify dispersal mechanisms:
The achenes have a pappus (albiet "readily falling or fragile") of bristle 8-12mm which might facilitate anemochory (wind dispersal) (Flora of North America Editorial Committee, 2006). Mysersough & Whitehead (1966) cite another study stating achenes traveling 4km from the parent plant. However, another study found the greatest dispersal distance to be only 6 meters (Skarpaas & Stabbetorp, 2003).

A study by Sheldon & Burrows (1973) suggests that coltsfoot's early season achene maturation and release (March and April) is benefited by higher wind velocities at that time of the year, and the absence of adjoing vegetation which would intercept propgules on the wind.
Sources of information:
Myerscough & Whitehead, 1966; Sheldon & Burrows, 1973; Skarpaas & Stabbetorp, 2003; Flora of North America Editorial Committee, 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: 2

Documentation:
Identify dispersal mechanisms:
One source states that coltsfoot has been considered potential species to be used in surface-mine reclamation. Previously used in folk medicine. Not extensively grown today. Seeds no doubt can be readily moved by roadside maintenance equipment.
Sources of information:
Melhuish et al, 1987; Gravuer, 2005.

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, some shade tolerance.
Adaptable reproductive system- studies suggest Tussilago farfara in situations of harsh environments or interspecific competition allocates less biomass to seed production and more biomass to rhizome production; and conversely allocates more biomass to seed production in nutrient rich sites and little competition.
Seedlings and juveniles are reported fast growing and tolerant to a wide range of changeable external conditions (Namura-Ochalska, 1993) and low nutrient environments (Myerscough & Whitehead, 1966).
Possibly facultatively autogamous; although other studies indicate self-incompatiblity and depend on cross-pollination (Myerscough & Whitehead, 1966; Myerscough & Whitehead, 1967; Wild et al., 2003).
Reported to be relatively resistant to air pollution (Sweiboda & Brunarska, 1975).

Sources of information:
Myerscough & Whitehead, 1966; Myerscough & Whitehead, 1967; Ogden, 1974; Sweiboda & Brunarska, 1975; Bostock & Benton, 1979; Bostock, 1980; Namura-Ochalska, 1993; Wild et al., 2003; Flora of North America Editorial Committee, 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: 0

Documentation:
Describe growth form:
While coltsfoot can form monospecific stands, it does not have a smothering of climbing habit.
Sources of information:
Gravuer, 2005; 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:
Studies indicated coltsfoot seeds were highly germinable under laboratory conditions (up to 97-100%, Shlyapyatis, 1977, Gorobets, 1979), but did not germinate "effectively" under natural conditions and were short-lived. Low pH inhibits germination (Myerscough & Whitehead, 1966). Readily regenerates from rhizomes.
Sources of information:
Myerscough & Whitehead, 1966; Ogden, 1974; Shlyapyatis, 1977; Bostock, 1979; Gorobets, 1979; Melhuish et al, 1987; Gravuer, 2005; Pfeiffer et al., 2008.

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:
No, montypic genus. Flora of North America Editorial Committee, 2006.; U.S.D.A., 2009.

Total Possible 25
Section Two Total 16

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 0

Documentation:
Identify reason for selection, or evidence of weedy history:
Large patches observed along roadways and forest margins in the New York area; but none known to be over over 1/4 acre.
Sources of information:
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:
Brooklyn Botanic Garden, 2009.

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:
Studies suggest Tussilago is generally unable to colonize undisturbed native vegetation, preferring areas with high light intensity, increased bare ground, absence of duff cover. No evidence that it requires anthropogenic disturbance to establish.
Sources of information:
Gilbert & Lechowicz, 2005; Hendrickson, 2005.

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:
Eurasia, as far north as Norway.
Sources of information:
Skarpaas & Stabbetorp, 2003; Flora of North America Editorial Committee, 2006.

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:
Reported from all northeastern states and provinces.
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
U.S.D.A., 2009.

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:
Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

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: 0

Documentation:
Identify longevity of seed bank:
Seed viability in the soil is reported to be less than one year. One European study found coltsfoot seeds germinate shortly after being shed and apparently do not form seed banks (Firbank, 1993).

Sources of information:
Firbank, 1993; Gravuer, 2005.

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:
Exhibits effective clonal reproduction via rhizomes some of which can obtain a length of up to 1 meter.New plants can regenerate from very small rhizome fragments when the soil is disturbed.
Sources of information:
Myerscough & Whitehead, 1966; Ogden, 1974; Gravuer, 2005; Pfeiffer et al., 2008.

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: 3

Documentation:

Identify types of control methods and time-term required:

Control of this species once it is well-established is difficult, but possible, and infestations are not known to be large.

Chemical: This species is resistant to many of the more commonly-used and/or selective herbicides (e.g. 2,4-D, dicamba, MCPA, 2-4DB).
One study in England found a mixture of 2-(2,4,5-trichlorophenoxy) propionic acid (silvex) and MCPA (2-methyl-4-chloropheonoxyacetic acid) gave 90% control in a wheat crop (Rademacher et al., 1962).
A 2% solution of glyphosate or triclopyr and water plus a non-ionic surfactant using a tank or backpack sprayer to thoroughly cover all leaves. Treatments should be done in the summer when the leaves of coltsfoot are fully developed (USDA, 2003).

Mechanical: Mechanical removal of plants can be challenging, initial infestations may be controlled by hand pulling. It is critical that all of the underground portions of the plant are removed. Pulling when the ground is moist may make it easier to remove the entire plant. Residual roots left in the soil may resprout and possibly create several new plants. Hand pull before the plant has set seed to reduce the further spread (USDA, 2003).

Sources of information:
Rademacher et al., 1962; USDA, 2003; Gravuer, 2005.

Total Possible	10
Section Four Total	5

Total for 4 sections Possible	80
Total for 4 sections	46

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:

Andersen, U. V. 1993. Dispersal strategies of Danish seashore plants. Ecography. 16(4):289-298.

Bostock, S. J. 1979. Seed germination strategies of 5 perennial weeds. Oecologia (Berlin). 36(1):113-127.

Bostock, S. J. 1980. Variation in reproductive allocation in Tussilago farfara. Oikos. 34(3):359-363.

Bostock, S. J. & R. A. Benton. 1979. The reproductive strategies of 5 perennial Compositae. Journal of Ecology. 67(1):91-108.

Brooklyn Botanic Garden. 2009. AILANTHUS database. [Accessed on 24 April 2009].

Brown, A. 1881. Ballast plants in and near New York City. Bull. Torrey Botanical Club. 8(12):141-142.

Firbank, L. G. 1993. Short-term variability of plant populations within a regularly disturbed habitat. Oecologia. 94(3):351-355

Flora of North America Editorial Committee. 2006. Flora of North America. Vol. 20. Oxford Univ. Press, New York, NY. 666 pp.

Gilbert, B. & M. J. Lechowicz.2005. Invasibility and abiotic gradients: The positive correlation between native and exotic plant diversity. Ecology. 86(7):1848-1855.

Gorobets, A. M. 1979. Experimental ecological study of seed germination. 3. Seed germination in coltsfoot Tussilago farfara. Vestnik Leningradskogo Universiteta Biologiya. 3:30-35.

Gravuer, K. 2005. Tussilago farfara. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed on 24 April 2009].

Hendrickson, C. J. 2005. Disturbance-enabled invasion of Tussilago farfara (L.) in Gros Morne National Park, Newfoundland: Management implications. Natural Areas Journal. 25(3):263-274.

Hernandez, L.A. & J.M. Galbraith. 1997. Soil Survey of South Latourette Park, Staten Island, New York City, NY. USDA-Natural Resources Conservation Service. In Partnership with NYC-Soil & Water Conservation District and Cornell University Agricultural Experiment Station. USDA-NRCS, Syracuse, NY. <http://clic.cses.vt.edu/icomanth/16-NYC_Survey_Data.pdf> [Accessed on 23 April 2009].

Krylova, I. L. & V. I. Kaporova. 1981. Effect of soil acidity on the degree of developoment and yield of some medicinal plants in natural phytocenoses. Rastitel'nye Resursy. 17(4):531-534.

Krylova, I. L. & V. I. Kaporova. 1983. Effect of certain ecological factors on Tussilago farfara, Achillea millifolium, and Equisetum arvense productivity. Rastitel'nye Resursy. 19(4):478-483.

Locket, G. H. 1946. Observations on the colonization of bare chalk. J. Ecology. 33(2):205-209.

Mann, H. N. 1939. The weed herbage of a slightly acid arable soil. J. Ecology. 27(1):89-113.

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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.

NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

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.

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