

NEW YORK

NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Lepidium latifolium L.	USDA Plants Code: LELA2
Common names:	Broadleaved Pepperweed	
Native distribution:	Central Eurasia	
Date assessed:	4 June 2008	
Assessors:	Steve Glenn	
Reviewers:	LIISMA SRC	
Date Approved:	2008-9-10	Form version date: 25 August 2008

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

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


Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (<u>40</u>)	31
2	Biological characteristic and dispersal ability	25 (<u>25</u>)	20
3	Ecological amplitude and distribution	25 (<u>25</u>)	20
4	Difficulty of control	10 (<u>7</u>)	6
	Outcome score	100 (<u>97</u>) ^b	77 ^a
	Relative maximum score †		79.38
	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

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

Adirondack Park Invasive Program	Distribution
Capital/Mohawk	Not Assessed
Catskill Regional Invasive Species Partnership	Not Assessed
Finger Lakes	Not Assessed
Long Island Invasive Species Management Area	Restricted
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
<input type="checkbox"/> Salt/brackish waters	<input checked="" type="checkbox"/> Salt/brackish marshes	<input checked="" type="checkbox"/> Cultivated*
<input type="checkbox"/> Freshwater tidal	<input checked="" type="checkbox"/> Freshwater marshes	<input checked="" type="checkbox"/> Grasslands/old fields
<input type="checkbox"/> Rivers/streams	<input type="checkbox"/> Peatlands	<input type="checkbox"/> Shrublands
<input type="checkbox"/> Natural lakes and ponds	<input type="checkbox"/> Shrub swamps	<input type="checkbox"/> Forests/woodlands
<input type="checkbox"/> Vernal pools	<input checked="" type="checkbox"/> Forested wetlands/riparian	<input type="checkbox"/> Alpine
<input type="checkbox"/> Reservoirs/impoundments*	<input type="checkbox"/> Ditches*	<input checked="" type="checkbox"/> Roadsides*
	<input checked="" type="checkbox"/> Beaches and/or coastal dunes	

Other potential or known suitable habitats within New York:

Documentation:

Sources of information:

Maybury, 2003; Francis & Warwick. 2007; Renz 2000; Brooklyn Botanic Garden, 2008.

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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)
 Roots grow deeper than 3 m, and can increase soil salinity by moving salt from deep in a soil profile closer to the surface. Can impede tidal circulation (with a resulting increase in mosquito populations).
 Sources of information:
 Blank & Young, 1997; Maybury, 2003; Francis & Warwick, 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 form dense stands up to 1.5 m tall, increasing the structure in one layer. Dense litter layer (up to 10cm deep) under large infestations blocks light and inhibits the emergence of annual plants, thus reducing or possibly eliminating the lower growing herbaceous layer. In riparian areas it interferes with regeneration of willows and cottonwoods, which would alter the tree layer. Very dense stands at West Meadow Beach with nothing growing below.
 Sources of information:
 Maybury, 2003; Francis & Warwick. 2007; Renz 2000; Schwager pers. obs.

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

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several native species, reducing biodiversity or change the community composition towards species exotic to the natural community)

U. Unknown

Score

7

Documentation:

Identify type of impact or alteration:

Outcompetes many native plant species. Dense monospecific stands shown to reduce the number of individuals of native species. In California it threatens populations of several rare plant species, and poses a threat to the endangered salt marsh harvest mouse, the California black rail, and California clapper rail (Howald, not dated, cited by Maybury 2003). hard evidence lacking showing significant reduction or extirpation of native species populations, especially from the Northeastern United States but very dense stands at West Meadow Beach with nothing growing below.

Sources of information:

Maybury, 2003; Francis & Warwick 2007; Schwager per. obs.

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

7

Documentation:

Identify type of impact or alteration:

Interferes with the regeneration of willows and cottonwoods, reducing food and cover for bird species in riparian areas (Krueger and Sheley 1999, Morisawa 1999). The species' semi-woody stems inhibit nesting of waterfowl (Trumbo 1994 as cited in Renz 2000) and it outcompetes the native grasses that provide food for native waterfowl (Howald, not dated). Outcompetes many native plant species. Dense litter layers form under big infestations, inhibiting the emergence of annual plants (Renz 2000) (Copied from Maybury 2004).

Sources of information:

Blank & Young, 1997; Maybury, 2004; Francis & Warwick, 2007.

	Total Possible	<table border="1" style="display: inline-table;"><tr><td style="width: 40px; text-align: center;">40</td></tr></table>	40
40			
	Section One Total	<table border="1" style="display: inline-table;"><tr><td style="width: 40px; text-align: center;">31</td></tr></table>	31
31			

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 |

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- 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):

Abundant seed production and rhizomes.

Sources of information:

Maybury, 2003; Francis & Warwick, 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:

Mucilaginous seed coat allows for adhesion to mammals and birds. Seeds dispersed in manure of grazing animals. Also salt-water tolerance in seeds suggests dispersal by tidal currents. Also extensive vegetative spread by root fragments (e.g. in flowing waters).

Sources of information:

Renz, 2000; Maybury, 2003; Francis & Warwick. 2007.

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:

Both seeds and root fragments can be transported through indirect means, such as: in contaminated soil and beach goers by attachment to socks, pants, etc. May have been introduced at West Meadow Beach through horse shows (hay, horses or equipment)

Sources of information:

Renz, 2000; Maybury, 2003; Francis & Warwick, 2007.

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

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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

Documentation:

Evidence of competitive ability:

Perennial habit; tolerates a wide variety of soils and salinities from fresh to salt; shown tolerance to flooding for up to 50 days as well as seasonal aridity; rapid vegetative growth, rhizome penetration is deep and have large nutrient storage capacity; few natural enemies in North America.

Sources of information:

Renz, 2000; Maybury, 2003; Francis & Warwick, 2007.

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

Documentation:

Describe growth form:

Forms dense stands. Standing dead stems are slow to decay, and combined with dense litter layer inhibit growth of shorter plants.

Sources of information:

Maybury, 2004; Schwager pers. obs.

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

Documentation:

Describe germination requirements:

Seeds most likely to germinate on exposed soil surface with soil moisture conditions maintained near field capacity for 4-5 days, but can germinate with some vegetation present.

Sources of information:

Renz, 2000; Maybury, 2004; Francis & Warwick, 2007

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

- A. No 0
- B. Yes 3
- U. Unknown

Score

Documentation:

Species:

Several non-native *Lepidium* species are ubiquitous in New York, but none identified as invasive.

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Total Possible	25
Section Two Total	20

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:
 Species spread in the Northeast too recent to evaluate this for New York. West Meadow Beach site is over 1/4 acre, disturbed landscape.
 Sources of information:
 Brooklyn Botanic Garden, 2008; Schwager pers. obs.

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:
 Maybury, 2004; Francis & Warwick, 2007

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:

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Identify type of disturbance: Areas where established (e.g., salt marshes, riparian) have natural disturbances from tides and flooding. Sources of information: Francis & Warwick. 2007	
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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: Native to central Eurasia, spreading into Siberia and northwest China. Maybury (2003): "There seems to be no climatic reason why this plant could not invade the Mid-Atlantic and southeastern U.S." Sources of information: Maybury, 2003; Francis & Warwick, 2007.	
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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, IL, IN, MA, MO, NY; Quebec, Canada. Considered Invasive in CT and MA Sources of information: <ul style="list-style-type: none"> • See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces. U.S.D.A., 2008.	
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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 3

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Documentation: Describe distribution: Adirondack, Lower Hudson, and Long Island. See A1.1. Sources of information: Weldy & Werier, 2005; Brooklyn Botanic Garden. 2008.	
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Total Possible	25
Section Three Total	20

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 U

Documentation: Identify longevity of seed bank: Seed viability is probably less than one year; plant is transported by root fragments but it is not clear how long these can persist. Sources of information: Renz, 2000; Maybury, 2003; Francis & Warwick. 2007	
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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: Extensive perennial rhizome system. Sources of information: Renz, 2000; Maybury, 2003; Francis & Warwick. 2007	
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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 ft²). 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

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<p>Documentation: Identify types of control methods and time-term required: Herbicidal, mechanical, controlled burning, prolonged flooding; control measures have had mixed success in the western US. Sources of information: Renz, 2000; Maybury, 2003; Francis & Warwick. 2007</p>	
Total Possible	7
Section Four Total	6
Total for 4 sections Possible	97
Total for 4 sections	77

C. STATUS OF CULTIVARS AND HYBRIDS:

At the present time (May 2008) there is no protocol or criteria for assessing the invasiveness of cultivars. Such a protocol is needed, and 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.

1.1. Potential pathways of introduction into and within New York

<p>Describe the potential pathways by which this species may be introduced into New York or may be spread within New York (e.g., natural migration, spread through canal system, movement of contaminated soil, etc): The use of flowers and fruiting stalks in dried arrangements; attachment to construction and farm equipment; contaminated straw used in roadside soil stabilization projects. Epizoochory- mucilaginous seed coat allows for adhesion to mammals and birds. Endozoochory- seeds dispersed in manure of grazing animals. Thalassochory- salt-water tolerance in seeds suggests dispersal by tidal currents.</p> <p>Sources of information: Francis & Warwick. 2007</p>	
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1.2. Likelihood of survival and spread within each pathways

<p>Describe the likelihood of this species to survive and spread within the various pathways mentioned above, including any thoughts about whether multiple introductions may be required before species becomes establish or is a single introduction will likely be successful:</p> <p>Sources of information:</p>	
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2. KNOWN BENEFITS

2.1. Benefits this species provides

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By definition, a non-native species must cause more harm than good before it is considered invasive. Even the worst species may provide some sort of ecosystem service (e.g., nesting habitat for common birds, erosion control, and landscape beautification). To ensure that all the benefits are weighed against the negative impacts, list the potential benefits this species provides. Weigh the benefits of this invasive species against the benefits provided by those native species that would typically be present in the habitat, in the absence of the invasive species:

Can remediate mesic silty caly calcareous soils; rhizome systems break up compacted soils.

Sources of information:

Francis & Warwick. 2007

3. ECONOMIC IMPACTS

3.1. Potential economic impacts (e.g., potential to reduce crop yields, lower commodity values, lower real estate value, limit recreational opportunities, cause loss of markets for US goods, etc)

- A. Negligible perceived impact
- B. Causes minor damage or requires minimal output to prevent economic impacts
- C. Damage significant but economic costs attributed to this species has been estimated at less than \$1 million annually or studies indicate that potential damage could result in impacts less than \$10 million
- D. Damage attributed to this species has been estimated at more than \$1 million annually or studies indicate that the potential damage could result in impacts greater than \$10 million
- U. Unknown

Documentation:

Identify type of impact or alteration:

Economic impacts discussed, but no monetary assessment given.

Sources of information:

Francis & Warwick. 2007

4. HUMAN HEALTH IMPACTS

4.1. Potential human health impacts

- A. Negligible perceived impact
- B. Known to cause human health problems, but full recover
- C. Documented cases where this species has caused permanent bodily harm, health issues, or death.
- U. Unknown

Documentation:

Identify type of impact or alteration:

U

Sources of information:

References for species assessment:

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Blank, R. and J. A. Young. 1997. *Lepidium latifolium*: Influences on soil properties, rates of spread, and competitive stature. Pages 69-80 in J. H. Brock, M. Wade, P. Pysek, and D. Green, eds. *Plant Invasions: Studies from North America and Europe*. Backhuys, Leiden.

Brooklyn Botanic Garden. 2008. AILANTHUS database. [Accessed June 4, 2008].

Francis, A. & S. I. Warwick. 2007. The biology of invasive alien plants in Canada. 8. *Lepidium latifolium*. L. *Canad. J. Pl. Sci.* 87: 639-658.

Krueger, J. and R. Sheley. 1999. Perennial pepperweed (*Lepidium latifolium*). Montguide 9906, May 1999. Montana State University Extension Service. [Contains no citations; source of information not known or verifiable]. Available: <http://http://ipm.montana.edu/Training/CPMS/2008/perennial%20pepperweed.pdf>. (Accessed 2008).

Maybury, K. 2003. *Lepidium latifolium*. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed September 4, 2008.]

Renz, M. J. 2000. Element Stewardship Abstract for *Lepidium latifolium*. The Nature Conservancy, Arlington, VA. <ncweeds.ucdavis.edu/esadoes/documnts/lepilat.html>. [Accessed on September 4, 2008.]

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