NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Poa pratensis L.	USDA Plants Code: POPR
Common names:	Kentucky bluegrass	
Native distribution:	Eurasia	
Date assessed:	May 5, 2009	
Assessors:	Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	May 20, 2009	Form version date: 3 March 2009

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

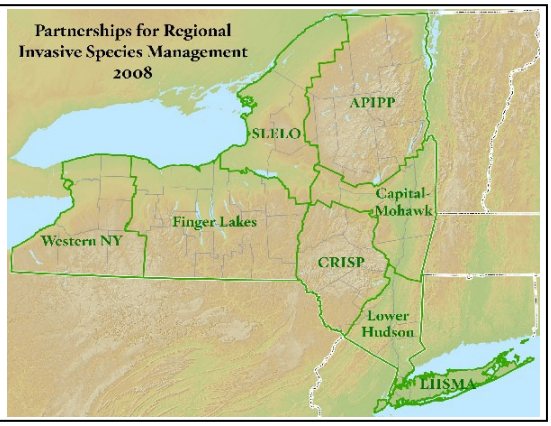
Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4	Finger Lakes	Not Assessed	Not Assessed
5	Long Island Invasive Species Management Area	Widespread	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 (30)	13
2	Biological characteristic and dispersal ability	25 (25)	19
3	Ecological amplitude and distribution	25 (25)	21
4	Difficulty of control	10 (10)	8
	Outcome score	100 (90)[b]	61[a]
	Relative maximum score †		67.78
	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
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, 2009; Weldy & Werier, 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	Widespread
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

Documentation:
Sources of information:
Brooklyn Botanic Garden, 2009; Weldy & Werier, 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:

Documentation:
Sources of information:
Tomaino & Oliver, 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: 3

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
Maybury (2005): "Some minor impacts assumed since this species can form dense sods and retard or cause long-term alterations in successional patterns (Butterfield et al. 1996). May also increase soil water content in sod (Glenn and Welker 1996 as cited in Lapina and Carlson, not dated)." Author has also noted turfs of P. pratensis seem to hold more water.

Sources of information:
Maybury, 2005; author's pers. comm.

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:
P. pratensis can significantly alter the structure of the herb layer in native grasslands by filling in the spaces between the native bunch grasses (e.g., Schizachyrium, Andropogon, Panicum) . In Hempstead Plains (Nassau Co.) its frequency of occurrence ranged 1-7% in 0.1 sq. m. plots (Jordan, unpub. data). In Roosevelt County Park, Montauk (Suffolk Co.) frequencies ranged from 5-35% in 1.0 sq. m. plots (Jordan unpub. data).
Sources of information:
Maybury, 2005; Jordan unpub. data; author's pers. comm.

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:
Reported to outcompete native vegetation thus reducing their numbers. Could not find hard evidence of significant or major alteration in community composition from New York or similar regions. More study on the impacts of this turf forming grass on native species is needed.
Sources of information:
Slather, 1996; Maybury, 2005 author's pers. comm.

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:
Impact on other species groups not known. Reported to hybridize with native Poa species, but more study is needed. Species does serve as host plant for some butterfly species (e.g., common ringlet, Coenonympha tullia); more data needed on impacts to butterfly populations.
Sources of information:
Uchytil, 2003; Maybury, 2005; author's pers. obs.

Total Possible: 30
Section One Total: 13

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	2

vegetative spread documented)

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):
Individual can produce over 1000 seeds.
Sources of information:
Slather, 1996; author's pers. obs.

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:
Small seeds readily dispersed by wind and attach to animals.
Sources of information:
Slather, 1996; Maybury, 2005.

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:
Originally introduced in to U.S. as a forage and turf plant and continues to be widely grown as turf grass in all temperate areas. Now widespread and small seeds readily dispersed by humans and roadside maintenance equipment.
Sources of information:
Slather, 1996; Maybury, 2005; author's pers. obs.

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 habit; able to grow on poor soils; some shade tolerance.
Sources of information:
Prather, 1996; Maybury, 2005; author's pers. obs.

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:
Does not form thickets or exhibit a smothering growth habit.
Sources of information:
Prather, 1996; Maybury, 2005; author's 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 2

Documentation:
Describe germination requirements:
Poa seeds in general are relatively easy to germinate. However, seeds of P. pratensis do not readily germinate in existing vegetation. The species does best in pH ranges from 5.5 to 6.5, does not do well in shady sites, and is not drought tolerant . In Roosevelt County Park in Montauk (Suffolk Co.) it is much more abundant in moister soils and less abundant in drier areas (Jordan, unpub. data.). Individuals readily regenerate upon mowing.
Sources of information:
Slather, 1996; U.S.D.A. N.R.C.S., 1996; Maybury, 2005; Jordan unpub. data.

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:
Poa bulbosa, P. compressa; neither tracked as invasive. U.S.D.A., 2009.

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 known in disturbed areas with other invasives usually present.
Sources of information:
Maybury, 2005; Brooklyn Botanic Garden, 2009.

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:
Tomaino & Oliver, 2005; 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:
Readily establishes after disurbance; not known to require anthropogenic disturbance.
Sources of information:
Slather, 1996; Maybury, 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:
Europe, temperate Asia.
Sources of information:
maybury, 2005; Brooklyn Botanic Garden, 2009.

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 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:
All PRISMs; see A1.1.
Sources of information:
rooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

Total Possible	25
Section Three Total	21

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 2

Documentation:
Identify longevity of seed bank:
Seeds can remain viable in soil for up to 4 years. No evidence for viability in soil for more than 10 years.
Sources of information:
Slather, 1996.

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:
Readily regrows from extensive underground rhizomes. Intercalary meristems allow regrowth from above ground stems at the nodes.
Sources of information:
APRS, 2001; Tomaino & Oliver, 2005; auhtor's pers. obs.

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:
Large "turf" stand can be exceedingly difficult to remove. Mechanical, chemical, and or burning treatmments may have to followed up for 4 years due to seed banking.

Sources of information:
Slather, 1996; Maybury, 2005.

Total Possible	10
Section Four Total	8
Total for 4 sections Possible	90
Total for 4 sections	61

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:

Ahlgren, H. L. 1938. Effect of fertilization cutting treatments and irrigation on yield of forage and chemical composition of rhizomes of Kentucky bluegrass (Poa pratensis L.) Jour. Am. Soc. Agron. 30:683-691.

Aiken, S. G. and S. J. Darbyshire. 1984. The morphology of a vegetatively proliferating inflorescence of Kentucky bluegrass, Poa pratensis. Canadian Field Naturalist 95 (2): 249-251.

Akerberg, E. 1939. Apomictic and sexual seed formation in Poa pratensis. Hereditas 25:359-370.

Alverson, W. 1981. Wisconsin's critical plant species. Bulletin Botanical Club of Wisconsin 13(3):1-10.

Anderson, K. L., E. F. Smith, and C. E. Owensby. 1970. Burning bluestem range. Journal of Range Management 23: 81-92.

Beard, J. B. 1964. Effects of ice, snow and water covers on Kentucky bluegrass, annual bluegrass and creeping bentgrass. Crop Science 4: 638-640.

Beetle, A. A. 1980. Vivipary, proliferation and phyllody in grasses. Journal of Range Mangement 33: 256-261.

Bingham, S. W., J. Segura, and C. L. Ofray. 1980. Susceptibility of several grasses to glyphosate. Weed Science 28(5): 579-585.

Biswell, H. H. and J. E. Weaver. 1933. Efffect of frequent clipping on the development of roots and tops of grasses in prairie sod. Ecology 14:368-390.

Bookman, P. 1983. Microsite utilization by Bromus tectorum L. and Poa pratensis L. in a meadow steppe community. Oecologia 56:413-418.

Brittingham, W. H. 1943. Type of seed formation as indicated by the nature and extent of variation in Kentucky bluegrass and its practical implications. Journal of Agricultural Research 67: 225-264.

Brooklyn Botanic Garden. 2009. AILANTHUS database. [Accessed may 5, 2009.]

Brown, E. M. 1939. Some effects of temperature on the growth and chemical composition of certain pasture grasses. Moissouri Agricultural Experiment Station Research Bulletin 299.

Brown, E. M. 1943. Season variation in the growth and chemical composition of Kentucky bluegrass. Missouri Agricultural Experiment Station Research Bulletin 360.

Brown, W. 1941. They cytogenetics of Poa pratensis. Am. No. Bot. Gard. 28:493-522.

Butterfield, C. and J. Stubbendieck, and J. Stumpf. 1996. Species abstracts of highly disruptive exotic plants. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. <greatplains.org/npresource/othrdata/exoticab/exoticab.htm> [Accessed May 5, 2009.]

Curtis, J. T. and M. L. Partch. 1948. Effect of fire on the competition between blue grass and certain prairie plants. American Midland Naturalist 39:437-443.

Dahl, B. E. and D. N. Hyder. 1977. In rangeland plant physiology. (R. E. Sosebee, ed.) Range Science Series No. 4, Denver. p. 258-290.

Darrow, R. A. 1939. Effects of soil temperature pH and nitrogen nutrition on the development of Poa pratensis. Bot. Gaz. 101:109-127.

Ehenreich, J. H. and J. M. Aikman. 1963. An ecological study of the effect of certain management practices on native prairie in Iowa. Ecological Management 33(2): 113-130.

Ehrenreich, J. G. 1959. Effect of burning and clipping on growth of native prairie in Iowa. Journal of Range Management 12: 133-137.

Engle, D. M. and P. M. Bultsma. 1984. Burning northern mixed prairie during a drought. Journal of Rangeland Management 37:398-401.

Etter, A. G. 1951. How Kentucky bluegrass grows. Annals of the Missouri Botanical Garden 38: 293-375.

Evans, D. W. and C. L. Canode. 1971. Influence of nitrogen fertilization, gapping and burning on seed production of Newport Kentucky bluegrass. Agronomy Journal 63:575-580.

Evans, M. W. 1927. The life history of timothy. U.S.D.A. Departmental Bulletin 1450.

Evans, W. W. and J. E. Ely. 1935. The rhizomes of certain species of grasses. J. Am. Soc. Agron. 27:791-797.

Evans, W. W. and J. M. Watkins. 1939. The growth of Kentucky bluegrass and of Canada bluegrass in late spring and in autumn as affected by the length of day. J. Am. Soc. Agron. 31: 767-774.

Gaskin, T. A. 1964. Effect of pre-emergence crabgrass herbicides on rhizome development in Kentucky bluegrass. Agronomy Journal 56: 340-342.

Graber, L. F. 1926. Injury from burning off old grass on established bluegrass pastures. Jour. Am. Soc. Agron. 18:815-819.

Graber, L. F. 1933. Competitive efficiency and productivity of bluegrass with partial defoliations at two levels of cutting. Jour. Amer. Soc. Agron. 25:328-333.

Graber, L. F., N. T. Nelson, W. A. Luekel and W. B. Albert. 1927. Organic food reserves in relation to the growth of alfalfa and other herbaceous plants. Wisconsin Agricultural Experiment Station Research Bulletin 80.

Harrison, C. M. 1934. Responses of Kentucky bluegrass to variations in temperature, light, cutting, and fertility. Plant Phys. 9:83-106.

Henderson, R. A., D. L. Lowell and E. A. Howell. 1983. The flowering resonses of 7 grasses to season timing of prescribed burns in remnant Wisc. prairies. pp. 7-10 in R. Brewer ed. Proc. 8th No. Am. Prairie Conf. Western Mich. Univ., Kalamazoo.

Lapina, I. and M. L. Carlson, assessors. Not Dated. Weed risk assessment form: Poa pratensis ssp. pratensis L. [Assesment for Alaska]
<akweeds.uaa.alaska.edu/pdfs/weed_risk_assess_pdfs/Weed_Risk_asses_POCO.pdf.>
[Accessed May 5, 2009.]

McKell, C. M., B. B. Youngner, F. J. Nudge and J. J. Chatterton. 1969. Carbohydrate accumulation of coastal Bermuda grass and Kentucky bluegrass in relation to temperature regimes. Crop Science 9: 534-537.

Sather, N. 1996. Element Stewardship Abstract for Poa pratensis, Poa compressa. The Nature Conservancy, Minneapolis, MN. <tncweeds.ucdavis.edu/esadocs/documnts/poa_pra.pdf.> {Accessed May 5, 2009.]

Smith, P. C., E. L. Nielson and H. L. Ahlgren. 1946. Variation in ecotypes of Poa pratensis. Botanical Gazette 19(08): 143-166.

Sprague, V. G. and L. F. Graber. 1939. The utilization of water by alfalfa Medicago sativa and by bluegrass Poa pratensis in relation to managerial treatments. Jour. Am. Soc. Agron. 30:986-997.

Steuter, A. 1987. C3/C4 production shift on seasonal burns-northern mixed prairie. J. Range Manage. 40:27-31.

Stuckey, I. H. 1941. Seasonal growth of grass roots. American Journal of Botany 28:486-491.

tallgrass prairie. J. Range Mange.
37:392-397.

Uchytil, Ronald J. 1993. Poa pratensis. In: Fire Effects Information System, [Online U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). <www/fs/fed/is/database/feis> [Accessed May 5, 2009].

United States Department of Agriculture. 1948. Grass: Yearbook of Agriculture. USDA Government Printing Office. Washington.

United States Department of Agriculture, National Resources Conservation Service. 1996. Conservation Plants for the Northeast United States. Conservation Plant Sheet-10. [Accesssed on May 5, 2009.]

United States Department of Agriculture, National Resources Conservation Service. 2009. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana [Accesssed on May 5, 2009.]

Weldy, T. & D. Werier. 2009. New York Flora Atlas. [S. M. Landry and K. N. Campbell (original application development), Florida Center for Community Design and Research. University of South Florida]. New York Flora Association, Albany, New York.

Youngner, V. B., F. Nudge and R. Ackerson. 1976. Growth of Kentucky bluegrass leaves and tillers with and without defoliation. Crop Science 16: 110-113.

Zedler, J. and O.L. Loucks. 1969. Differential burning response of Poa pratensis fields and Andropogon scopari prairies in central Wisconsin American Midland Naturalist 81(2):314.

Maybury, K 2005. Poa pratensis. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed on May 5, 2009.]

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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.