ALASKA NON-NATIVE PLANT INVASIVENESS RANKING FORM

Botanical name: *Phragmites australis* (Cav.) Trin. ex Steud.
Common name: common reed
Assessors:

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Date: 2/15/2011
Date of previous ranking, if any: 6T

OUTCOME SCORE:

CLIMATIC COMPARISON
This species is present or may potentially establish in the following eco-geographic regions:

Pacific Maritime	Yes
Interior-Boreal	Yes
Arctic-Alpine	Yes

INVASIVENESS RANKING	**Total** (total answered points possible[1])	**Total**
Ecological impact	40 (40)	36
Biological characteristics and dispersal ability	25 (25)	16
Ecological amplitude and distribution	25 (25)	23
Feasibility of control	10 (10)	8
Outcome score	100 (100)[b]	83[a]
Relative maximum score[2]		**83**

[1] For questions answered "unknown" do not include point value for the question in parentheses for "total answered points possible."
[2] Calculated as a/b × 100

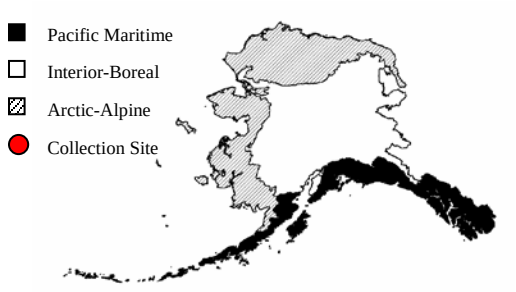
A. CLIMATIC COMPARISON

1.1. Has this species ever been collected or documented in Alaska?

☐ Yes - continue to 1.2
☒ No - continue to 2.1

1.2. From which eco-geographic region has it been collected or documented (see inset map)? Proceed to Section B. INVASIVNESS RANKING

☐ Pacific Maritime
☐ Interior-Boreal
☐ Arctic-Alpine



Documentation: *Phragmites australis* has not been documented from Alaska.

Note on Taxonomy: The taxonomy of the *Phragmites* genus is unclear. Recently, *Phragmites* has been considered both monotypic (Allred 2003) and composed of three (Mal and Narine 2004) or four species (Saltonstall et al. 2004). Multiple native genotypes and a non-native genotype of *Phragmites australis* are present in North America (Saltonstall 2002). The species has recently been split into three subspecies: *Phragmites australis* ssp. *americanus*, which is native to North America, *Phragmites australis* ssp. *berlandieri*, which has an unclear origin, and *Phragmites australis* ssp. *australis*, which is non-native and highly aggressive in North America (Saltonstall et al. 2004, Klinkenberg 2010, Barkworth and Allred 2011). No *Phragmites* taxa are native to Alaska, and all are included here.

2.1. Is there a 40 percent or higher similarity (based on CLIMEX climate matching, see references) between climates where this species currently occurs and:

a. Juneau (Pacific Maritime region)?
☒ Yes – record locations and percent similarity; proceed to Section B.
☐ No

b. Fairbanks (Interior-Boreal region)?
☒ Yes – record locations and percent similarity; proceed to Section B.
☐ No

c. Nome (Arctic-Alpine region)?
☒ Yes – record locations and percent similarity; proceed to Section B.
☐ No

If "No" is answered for all regions; reject species from consideration

Documentation: *Phragmites australis* has been documented from sites near Brønnøysund, Bergen, and Kristiansand, Norway, which have 60%, 73%, and 60% climatic similarities with Juneau, respectively (CLIMEX 1999, Agder Naturmuseum 2010, University Museums of Norway 2010, Vascular Plant Herbarium Oslo 2011). It is known to grow in many locations in Russia, Estonia, Latvia, Lithuania, Belarus, and Ukraine that have 40% or greater climatic similarities with Nome and many locations in Russia, Estonia, and Belarus that have 40% or greater climatic similarities with Fairbanks (CLIMEX 1999, Luneva and Budrevskaya 2004). This species may not grow well in the Interior-Boreal or Arctic-Alpine ecogeographic regions because seedlings are sensitive to frost, cold weather can halt growth, and severe frost can kill

shoots. However, this species can survive temperatures as low as -20°C (Haslam 1972, Mal and Narine 2004).

B. INVASIVENESS RANKING

1. Ecological Impact

1.1. Impact on Natural Ecosystem Processes

a.	No perceivable impact on ecosystem processes	0
b.	Has the potential to influence ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
c.	Has the potential to cause significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, degrades habitat important to waterfowl)	7
d.	Has the potential to cause major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology, hydrology, or affects fire frequency thereby altering community composition; species 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
e.	Unknown	U

Score **9**

Documentation: Infestations of *Phragmites australis* reduce concentrations of dissolved and particulate nutrients in wetlands. In some wetlands, this species increases sedimentation while in others it increases subsidence (Chambers et al. 1999). The root and rhizome networks generally reduce soil erosion. Dead stems decompose slowly and increase the risk of fires in wetlands (Mal and Narine 2004).

1.2. Impact on Natural Community Structure

a.	No perceived impact; establishes in an existing layer without influencing its structure	0
b.	Has the potential to influence structure in one layer (e.g., changes the density of one layer)	3
c.	Has the potential to cause significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
d.	Likely to cause major alteration of structure (e.g., covers canopy, eliminating most or all lower layers)	10
e.	Unknown	U

Score **8**

Documentation: Because stems can grow up to 6 m tall, *Phragmites australis* can establish a new tall graminoid layer and outshade layers underneath, thereby reducing the density of or eliminating lower layers (Haslam 1972, Mal and Narine 2004, eFloras 2008, Million pers. obs.).

1.3. Impact on Natural Community Composition

a.	No perceived impact; causes no apparent change in native populations	0
b.	Has the potential to influence community composition (e.g., reduces the population size of one or more native species in the community)	3
c.	Has the potential to significantly alter community composition (e.g., significantly reduces the population size of one or more native species in the community)	7

d. Likely to cause major alteration in community composition (e.g., results in the extirpation of one or more native species, thereby reducing local biodiversity and/or shifting the community composition towards exotic species) 10

e. Unknown U

Score **9**

Documentation: *Phragmites australis* is capable of displacing native species in wetland communities (Catling 2005), and infestations are known to reduce plant biodiversity (Chambers et al. 1999, Mal and Narine 2004). Populations can significantly reduce the amount of light that reaches the ground, and they reduce populations of surrounding shade intolerant species (Mal and Narine 2004).

1.4. Impact on associated trophic levels (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades)

a. Negligible perceived impact 0

b. Has the potential to cause minor alteration (e.g., causes a minor reduction in nesting or foraging sites) 3

c. Has the potential to cause moderate alteration (e.g., causes a moderate reduction in habitat connectivity, interferes with native pollinators, or introduces injurious components such as spines, toxins) 7

d. Likely to cause severe alteration of associated trophic populations (e.g., extirpation or endangerment of an existing native species or population, or significant reduction in nesting or foraging sites) 10

e. Unknown U

Score **10**

Documentation: Dense stands of *Phragmites australis* decrease the quality of wetland habitats for migratory waterfowl and reduce the overall diversity of bird species (Chambers et al. 1999, Blossey et al. 2002). *Phragmites australis* is consumed by a variety of mammals, including deer, voles, and muskrats (Mal and Narine 2004). This species reduces habitat quality for larval and juvenile fish (Hudon et al. 2005). It provides a food source to a large number of insects and is associated with many fungi (Haslam 1972). Dense populations accumulate litter and can create anoxic conditions, reducing the efficiency of decomposition (Mal and Narine 2004).

Total Possible 40

Total **36**

2. Biological Characteristics and Dispersal Ability

2.1. Mode of reproduction

a. Not aggressive (produces few seeds per plant [0-10/m^2] and not able to reproduce vegetatively). 0

b. Somewhat aggressive (reproduces by seed only [11-1,000/m^2]) 1

c. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed [<1,000/m^2]) 2

d. Highly aggressive (extensive vegetative spread and/or many seeded [>1,000/m^2]) 3

e. Unknown U

Score **3**

Documentation: *Phragmites australis* reproduces sexually by seeds and vegetatively from rhizomes and occasionally from stolons (Haslam 1972, Allred 2003, Mal and Narine 2004, eFloras 2008). Although many seeds are produced (Luneva 2009), most do not mature (Allred 2003). Each shoot can produce from 500 to 2,000 seeds, but germination rates are often low (Haslam 1972, Gucker 2008). Although seeds are important for establishing new populations, existing populations primarily expand vegetatively (Chambers et al. 1999, Hudon et al. 2005). Vegetative spread is extensive and populations can have up to 200 stems per square meter (Haslam 1972, Blossey et al. 2002). Populations damaged by frost can produce up to 400 stems per square meter, and burned populations can produce up to 600 stems per square meter (Haslam 1972). Rhizomes normally survive for three to seven years, and populations can persist by vegetative spread for hundreds of years (Mal and Narine 2004).

2.2. Innate potential for long-distance dispersal (wind-, water- or animal-dispersal)

a.	Does not occur (no long-distance dispersal mechanisms)	0
b.	Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations)	2
c.	Numerous opportunities for long-distance dispersal (species has adaptations such as pappus, hooked fruit coats, etc.)	3
d.	Unknown	U

Score **3**

Documentation: Seeds are plumed and are primarily dispersed by wind. However, they can also be transported on birds. Seeds and rhizome fragments can be transported in waterways or by flooding (Haslam 1972, Mal and Narine 2004).

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sale of species, use as forage or for revegetation, dispersal along highways, transport on boats, common contaminant of landscape materials, etc.).

a.	Does not occur	0
b.	Low (human dispersal is infrequent or inefficient)	1
c.	Moderate (human dispersal occurs regularly)	2
d.	High (there are numerous opportunities for dispersal to new areas)	3
e.	Unknown	U

Score **2**

Documentation: *Phragmites australis* is sold in nurseries in North America for planting in water gardens (Mal and Narine 2004). This species spreads along roads and highways in Canada and the U.S. (Jodoin et al. 2008, Brisson et al. 2010), suggesting that it can be spread by vehicles or human activities.

2.4. Allelopathic

a.	No	0
b.	Yes	2
c.	Unknown	U

Score **0**

Documentation: Evidence suggests that *Phragmites australis* is not allelopathic (Gucker 2008).

2.5. Competitive ability

a.	Poor competitor for limiting factors	0
b.	Moderately competitive for limiting factors	1
c.	Highly competitive for limiting factors and/or able to fix nitrogen	3
d.	Unknown	U

Score **3**

Documentation: Few species can survive growing in infestations of *Phragmites australis* because this species prevents light from reaching the ground, produces a thin mat of litter, crowds topsoil with roots, and produces dense rhizome networks (Haslam 1972). It grows rapidly and outcompetes and displaces native vegetation (Mal and Narine 2004).

2.6. Forms dense thickets, has a climbing or smothering growth habit, or is otherwise taller than the surrounding vegetation.

a.	Does not grow densely or above surrounding vegetation	0
b.	Forms dense thickets	1
c.	Has a climbing or smothering growth habit, or is otherwise taller than the surrounding vegetation	2
d.	Unknown	U

Score **2**

Documentation: *Phragmites australis* can form dense, monospecific stands that exclude other species (Haslam 1972). Stems can grow up to 6 m tall (Mal and Narine 2004, eFloras 2008) and can overtop surrounding vegetation, reducing the amount of light that reaches the ground (Haslam 1972, Mal and Narine 2004).

2.7. Germination requirements

a.	Requires sparsely vegetated soil and disturbance to germinate	0
b.	Can germinate in vegetated areas, but in a narrow range of or in special conditions	2
c.	Can germinate in existing vegetation in a wide range of conditions	3
d.	Unknown	U

Score **0**

Documentation: Seeds germinate in open or sparsely vegetated areas but do not germinate well under vegetation or litter cover (Mal and Narine 2004). The natural disturbances that create openings in wetland habitats can favor the establishment of *Phragmites australis* (Chambers et al. 1999).

2.8. Other species in the genus invasive in Alaska or elsewhere

a.	No	0
b.	Yes	3
c.	Unknown	U

Score **0**

Documentation: No other *Phragmites* species are known to be invasive.

2.9. Aquatic, wetland, or riparian species

a.	Not invasive in wetland communities	0
b.	Invasive in riparian communities	1

c.	Invasive in wetland communities	3
d.	Unknown	U
	Score	**3**

Documentation: *Phragmites australis* is known to invade wetlands, including tidal wetlands and estuaries, throughout much of North America (Chambers et al. 1999, Gucker 2008).

Total Possible	25
Total	**16**

3. Ecological Amplitude and Distribution

3.1. Is the species highly domesticated or a weed of agriculture?

a.	Is not associated with agriculture	0
b.	Is occasionally an agricultural pest	2
c.	Has been grown deliberately, bred, or is known as a significant agricultural pest	4
d.	Unknown	U
	Score	**4**

Documentation: Stems have been used as a source of cellulose and for thatching or fodder in Europe, and *Phragmites australis* is associated with several manufacturing processes (Haslam 1972, Mal and Narine 2004). This species is an agricultural weed in Russia (Luneva 2009). It is sold in nurseries in North America for planting in water gardens (Mal and Narine 2004). However, this species is not grown in Alaska.

3.2. Known level of ecological impact in natural areas

a.	Not known to impact other natural areas	0
b.	Known to impact other natural areas, but in habitats and climate zones dissimilar to those in Alaska	1
c.	Known to cause low impact in natural areas in habitats and climate zones similar to those in Alaska	3
d.	Known to cause moderate impact in natural areas in habitat and climate zones similar to those in Alaska	4
e.	Known to cause high impact in natural areas in habitat and climate zones similar to those in Alaska	6
f.	Unknown	U
	Score	**5**

Documentation: *Phragmites australis* threatens native biodiversity in natural areas in North America, especially on the Atlantic coast of the U.S but also in regions similar to Alaska, such as British Columbia (Chambers et al. 1999, Blossey et al. 2002, Klinkenberg 2010). This species degrades wetland habitats for migratory waterfowl as well as some insects, mammals, and other animals (Mal and Narine 2004). In Connecticut, rare and threatened bird species are excluded by stands of *Phragmites australis* (Blossey et al. 2002). It displaces native vegetation in the species-rich saltmarshes of the St. Lawrence River and Estuary, and threatens the habitats of rare plant species in Eastern Canada (Catling 2005).

3.3. Role of anthropogenic and natural disturbance in establishment

a.	Requires anthropogenic disturbance to establish	0

b.	May occasionally establish in undisturbed areas, readily establishes in naturally disturbed areas	3
c.	Can establish independently of natural or anthropogenic disturbances	5
e.	Unknown	U

Score **4**

Documentation: *Phragmites australis* can establish in naturally disturbed areas, such as sites disturbed by geomorphic processes (Chambers et al. 1999, Mal and Narine 2004). Although seeds do not germinate in vegetated areas (Mal and Narine 2004), established populations can spread by rhizomes into vegetated areas.

3.4. Current global distribution

a.	Occurs in one or two continents or regions (e.g., Mediterranean region)	0
b.	Extends over three or more continents	3
c.	Extends over three or more continents, including successful introductions in arctic or subarctic regions	5
e.	Unknown	U

Score **5**

Documentation: *Phragmites australis* has a worldwide distribution (Saltonstall 2002, Allred 2003), including North America, South America, Europe, Asia, Africa, Australia, and New Zealand (Haslam 1972, Mal and Narine 2004). Some genotypes are native to North America. The non-native *Phragmites australis* ssp. *australis* was introduced to North America likely from contaminated ship ballast in the 19th century along the Atlantic coast of the U.S. (Saltonstall 2002, Barkworth and Allred 2011). This species grows in arctic regions of Russia and as far north as 70.5°N in Norway (Luneva and Budrevskaya 2004, Vascular Plant Herbarium Oslo 2011).

3.5. Extent of the species' U.S. range and/or occurrence of formal state or provincial listing

a.	Occurs in 0-5 percent of the states	0
b.	Occurs in 6-20 percent of the states	2
c.	Occurs in 21-50 percent of the states and/or listed as a problem weed (e.g., "Noxious," or "Invasive") in one state or Canadian province	4
d.	Occurs in more than 50 percent of the states and/or listed as a problem weed in two or more states or Canadian provinces	5
e.	Unknown	U

Score **5**

Documentation: *Phragmites australis* grows in 49 states of the U.S. and throughout much of Canada (USDA 2011). It is considered a noxious weed in Alabama, New Hampshire, Vermont, and Washington. It is also considered invasive and banned in Connecticut, prohibited in Massachusetts, and a plant pest in South Carolina (Invaders 2011, USDA 2011).

Total Possible	25
Total	**23**

4. Feasibility of Control

4.1. Seed banks

a.	Seeds remain viable in the soil for less than three years	0

b.	Seeds remain viable in the soil for three to five years	2
c.	Seeds remain viable in the soil for five years or longer	3
e.	Unknown	U

Score **2**

Documentation: Seeds can remain viable for up to five years (Mal and Narine 2004). However, *Phragmites australis* does not appear to form large or long-lived seed banks (Gucker 2008, Luneva 2009).

4.2. Vegetative regeneration

a.	No resprouting following removal of aboveground growth	0
b.	Resprouting from ground-level meristems	1
c.	Resprouting from extensive underground system	2
d.	Any plant part is a viable propagule	3
e.	Unknown	U

Score **2**

Documentation: Plants can regenerate from rhizome fragments as short as 20 cm (Haslam 1972, Mal and Narine 2004, Luneva 2009).

4.3. Level of effort required

a.	Management is not required (e.g., species does not persist in the absence of repeated anthropogenic disturbance)	0
b.	Management is relatively easy and inexpensive; requires a minor investment of human and financial resources	2
c.	Management requires a major short-term or moderate long-term investment of human and financial resources	3
d.	Management requires a major, long-term investment of human and financial resources	4
e.	Unknown	U

Score **4**

Documentation: Individual plants and small populations can be dug out as long as the rhizomes are removed (King County 2010); however, rhizomes commonly reach depths of 40 to 100 cm (Haslam 1972). Populations have been effectively controlled by covering with polypropylene shading fabric for 12 weeks (Mal and Narine 2004). Burning and mowing do not control common reed, but these methods do allow native seeds to germinate (Mal and Narine 2004). Populations should not be burned in spring or summer because this may stimulate regrowth. Burning is most effective following herbicide treatment (Saltonstall 2010). Herbicide applications provide effective control (Mal and Narine 2004). Foliar applications of 2% glyphosate solution with 0.25% nonionic surfactant or 1% imazapyr with 0.25% nonionic surfactant in summer or fall can be effective for large and dense populations. Applications of 3% fosamine with 0.25% ionic surfactant are moderately effective when applied in fall (Derr 2008). Applications are most effective when applied on foliage or cut stems (Saltonstall 2010). Herbicides applied after mowing a population provided 95% to 98% control in the first year and required minimal retreatment during the following two years (Million pers. obs.). Control efforts will likely need to be repeated for several years, as herbicide treatments do not completely eliminate populations (Mal and Narine 2004, Derr 2008). Several biological control agents have been accidentally introduced to the Northeastern U.S., and many potential biological control

agents have been identified (Blossey et al. 2002), but none are currently approved for use in the U.S. (Saltonstall 2010).

Total Possible	10
Total	**8**

Total for four sections possible	100
Total for four sections	**83**

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