Part IV. Plant Assessment Form

For use with "Criteria for Categorizing Invasive Non-Native Plants that Threaten Colorado's Wildlands and Agriculture"

By the Colorado Noxious Weed Advisory Committee

Electronic version: December 4, 2008

Table 1. Species and Evaluator Information

Species name (Latin binomial)**:**	Phragmites australis (Cav.) Trin. ex Steud.
Synonyms:	Phragmites australis (Cav.) Trin. ex Steud var. berlandieri (Fourn.) C.F. reed; P. communis Trin.; P. communis Trin. ssp. berlandieri (Fourn.) A. Love & D. Love; P. communis Trin. var. berlandieri (Fourn.) Fernald; P. australis (L.) Karst.
Common names:	Common reed
Evaluation date (mm/dd/yy)**:**	4/19/2010
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Section below for list committee use—please leave blank

List committee members:	enter text here
Committee review date:	enter text here
List date:	enter text here
Re-evaluation date(s):	enter text here

General comments on this assessment:

* NOTE: Phragmites australis (common reed) is a notable species in North America in that genotypes (at least two varieties are recognized) exist that are historically 'native' to the continent, while there are also non-native European genotypes that have been introduced to the Atlantic Coast since the late 1800s. The dictinction between non-native and native genotypes is significant because it is the non-native type that is problematic and behaves as an 'invasive' or 'noxious' plant. However, in western US states the distinction is perhaps more difficult because native populations are more abundant here historically. Native populations are often ecologically "benign," and according to Marks et al. (1993) and other authors can be important, stable components of natural ecosystems. More often than not distribution reports do not specify whether exotic or native types are being referred to (although it should be noted that exotic populations can be relatively reliably distinguished based on morphological characteristics), therefore the following assessment should be digested with this caveat in mind (though every attempt was made to separate impacts and reports due to the native versus non-native genotypes).

The following are combinations of morphological characteristics that can generally be used reliably to distinguish more invasive non-native Phragmites from native genotypes (Blossey 2002; Saltonstall 2005):

- Leaf sheaths of plants of native genotypes typically fall off in the fall, or are very easily removed if they remain on the stem; ligules are 0.04-0.07" in width; stem color is green-maroon during the growing season, but fades to yellow-light brown in the winter; stems are smooth, shiny, highly flexible, and weak; stem densities are normally relatively low, and populations will flower in late summer (July-August); leaves are yellow-green; rhizomes are also yellowish, under 1/2 " (15 mm) in diameter, and almost perfectly round; lower glumes 0.12-0.26" in length, and upper glumes 0.22-0.43" in length.

- The leaf sheaths of non-native genotypes tend to remain on plants through the winter; ligules are 0.015-0.035" in width; stems are green in color during the summer and yellow-tan in winter, are rough (ribs are usually visually obvious) an dull; stems are inflexible, but very tough; stem and rhizome densities within stands are very high relative to native genotypes; plants flower in early fall (August-September), inflorescences consist of a dense panicle; plants will senesce relatively late; leaves are dark green to grey; rhizomes are white to light yellow and will noticeably darken in color after excavation, they are normally greater than 1/2 " (15 mm) in diameter and oval in shape; lower glumes are 0.1-0.2" in length, and upper glumes 0.18-0.3" in length.

Phragmites australis is listed as a 'noxious' weed in the following locations: Alabama, Class C; Connecticut, 'Invasive, Banned'; Massachusetts, 'Prohibited'; South Carolina, 'Plant Pest'; Vermont, Class B; and Washington, Class C.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

*NOTE: Agricultural/Human Impact score = 1, D; Overall Agricultural Score = LIMITED

Table 2. Criteria, Section, and Overall Scores

1.1	Impact on abiotic ecosystem processes	B	Rev'd, Sci. Pub'n	**Impact** *Enter four characters from Q1.1-1.4 below:* **BBBB** *Using matrix, determine score and enter below:* **B**		
1.2	Impact on plant community	B	Rev'd, Sci. Pub'n			
1.3	Impact on higher trophic levels	B	Rev'd, Sci. Pub'n			
1.4	Impact on genetic integrity	B	Rev'd, Sci. Pub'n			
2.1	Role of anthropogenic and natural disturbance	B (2 pts)	Rev'd, Sci. Pub'n	**Invasiveness** *Enter the sum total of all points for Q2.1-2.7 below:* **16** *Use matrix to determine score and enter below:* **B**		
2.2	Local rate of spread with no management	A (3 pts)	Rev'd, Sci. Pub'n			**Wildlands Plant Score** *Using matrix, determine Overall Score and Alert Status from the first, second, and third section scores and enter below:* **Moderate** **No Alert**
2.3	Recent trend in total area infested within state	B (2 pts)	Other Pub. Mat'l			
2.4	Innate reproductive potential Wksht A	A (3 pts)	Other Pub. Mat'l			
2.5	Potential for human-caused dispersal	A (3 pts)	Rev'd, Sci. Pub'n			
2.6	Potential for natural long-distance dispersal	B (2 pts)	Other Pub. Mat'l			
2.7	Other regions invaded	C (1 pt)	Rev'd, Sci. Pub'n			
3.1	Ecological amplitude/Range	A	Other Pub. Mat'l	**Distribution** *Using matrix, determine score and enter below:* **B**		
3.2	Distribution/Peak frequency Wrksht B	D	Other Pub. Mat'l			

4.1	Poisonous to livestock	**D (0 pts)**	**Other Pub. Mat'l**
4.2	Detrimental to economic crops	**D (0 pts)**	**No Information**
4.3	Detrimental to management of agricultural system, rangeland and pasture	**D (0 pts)**	**Other Pub. Mat'l**
4.4	Human impacts Wrksht C	**C (1 pt)**	**Other Pub. Mat'l**

Table 3. Documentation

Question 1.1 Impact on abiotic ecosystem processes B Rev'd, Sci. Pub'n back
Identify ecosystem processes impacted: Phragmites infestations alter historical and/or natural hydrological regimes in marshes and other affected wetlands; reduce light availability in the understory due to their dense growth habit; and are known to increase winter fire potentials of invaded sites due to the abundance of dried biomass. Particularly in brackish marshes common reed stands can alter nitrogen cycling by tying up large amounts of the nutrient in standing biomass.
Rationale: Impacts on ecosystem processes are not irreversible, and studies have demonstrated that normal functioning can be restored with removal; overall impacts on native species appear to be mixed. Normal hydro-period in riparian areas, marshes, etc., is decreased due to the high biomass of dense stands. Additional abiotic impacts include alteration of salinity levels, the elevating and flattening of marsh surface substrates, as well as reduced standing water levels and the filling in of shallow depressions, all due to sediment accumulation in dense stems and litter. In one population in the Cheasapeake Bay, annual sediment accretion in a 20-year old common reed stand was measured to be 0.1-0.2" annually compared to neighboring, un-invaded sites.
Sources of information: Able, K.W., S.M. Hagan and S.A. Brown. 2003. Mechanisms of marsh habitat alteration due to Phragmites: response of Young-of-the-year Mummichog (Fundulus heteroclitus) to treatment for Phragmites removal. Estuaries 26: 484-494. Chambers, R.M., L.A. Meyerson and K. Saltonstall. 1999. Expansion of Phragmites australis into tidal wetlands of North America. Aquatic Botany 64: 261-273. Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010. Meyerson, L.A., K. Saltonstall, L. Windham, E. Kiviat and S. Findlay. 2000. A comparison of Phragmites australis in freshwater and brackish marsh environments in North America. Wetlands Ecology and Management 8: 89-103. Rooth, J.E., J.C. Stevenson and J.C. Cornwell. 2003. Increased sediment accretion rates following invasion by Phragmites australis: the role of litter. Estuaries 26: 475-483. Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.
Question 1.2 Impact on plant community composition, structure, and interactions B Rev'd, Sci. Pub'n back
Identify type of impact or alteration: Tall (up to 15 ft), impenetrable, monotypic stands of non-native Phragmites are known to lead to the decreased abundance and diversity of native riparian species, such as Spartina species. Also, physical and chemical site alterations caused by Phragmites invasions can lead to decreases in sediment microbial diversity and thus negatively impact important microbial biogeochemical interactions with wetland plant species.
Rationale: Impacts on plant communities can be severe, but are not irreversible, and there are examples of intact, stable native plant communities resisting invasion. High biomass of dense stands blocks light penetration to plants in the understory; density of stems and rhizomes physically crowds out other species from establishing. Litter layer decomposes more slowly than other wetland vegetation, and results contain fewer nutrients than is typical in such systems. Physical alterations to marsh habitats also make sites less ideal for survival by and

recruitment of native wetland species that are more sensitive to soil conditions and native hydrological regimes.

Sources of information: Able, K.W., S.M. Hagan and S.A. Brown. 2003. Mechanisms of marsh habitat alteration due to Phragmites: response of Young-of-the-year Mummichog (Fundulus heteroclitus) to treatment for Phragmites removal. Estuaries 26: 484-494.

Blossey, B. 2003. "Phragmites: Common reed – Native to North America or introduced (or both)?" Ithaca, NY: Cornell University, Department of Natural Resources, Ecology and Management of Invasive Plants Program. Last updated 2003. Available at: http://www.invasiveplants.net/phragmites/phrag/natint.html. Accessed 11:13 AM 19 April, 2010.

Lavoie, C., M. Jean, F. Delisle and G. Letourneau. 2003. Exotic plant species of the St. Lawrence River wetlands: a spatial and historical analysis. Journal of Biogeography 30: 537-549.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Ravit, B., J.G. Ehrenfeld and M.M. Haggblom. 2003. A comparison of sediment marsh communities associated with Phragmites australis and Spartina alterniflora in two brackish wetlands of New Jersey. Estuaries 26: 465-474.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 1.3 Impact on higher trophic levels B Rev'd, Sci. Pub'n back

Identify type of impact or alteration: On the US Atlantic coastline, common reed populations in wetlands are associated with declines in waterbirds and other wildlife, including fish species. However, the species is also reported to provide nesting and cover value for some wildlife, in particular, numerous waterfowl species. Common reed stands are not preferred habitat for many native fish, crustaceans and other aquatic invertebrates - especially juveniles - therefore dense populations can displace or lead to reductions in the populations of such fauna.

Rationale: Vertically homogenous Phragmites stands offer poor habitat to waterfowl species that rely on native, structurally-diverse, vegetation communities. Detritus is of lower quantity and quality compared to native wetland and marsh species, leading to reduced nutrient content in litter layer. Physical alterations in marshes can deleteriously affect fish populations, such as the filling in of water-filled depressions ideal for tadpole development and the overall reduction in standing water levels due to sediment accumulation. Indeed, Phragmites removal efforts (including re-vegetation with native cordgrass species) have led to substantial increases in the abundance and survival of previously indigenous fish populations. However, overall, negative impacts in fish and macroinvertebrate abundances and diversity appear to be due mostly to reductions in breeding habitats as a result of abiotic ecosystem alterations. Numerous studies have found that adult populations of aquatic fauna do not differ significantly in composition or numbers between Phragmites-infested sites and others that dominated by native wetland plants.

Sources of information: Able, K.W., S.M. Hagan and S.A. Brown. 2003. Mechanisms of marsh habitat alteration due to Phragmites: response of Young-of-the-year Mummichog (Fundulus heteroclitus) to treatment for Phragmites removal. Estuaries 26: 484-494.

Blossey, B. 2003. "Phragmites: Common reed – Native to North America or introduced (or both)?" Ithaca, NY: Cornell University, Department of Natural Resources, Ecology and Management of Invasive Plants Program. Last updated 2003. Available at: http://www.invasiveplants.net/phragmites/phrag/natint.html. Accessed 11:13 AM 19 April, 2010.

Fell, P.E., R.S. Warren, J.K. Light, R.L. Rawson, Jr. and S.M. Fairley. Comparison of fish and macroinvertebrate use of Typha angustifolia, Phragmites australis, and treated Phragmites marshes along the lower Connecticut River. Estuaries 26: 534-551.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Myers, J.H. and D.R. Bazely. 2002. Case study – Phragmites australis – a story of successful vegetative reproduction. In Ecology and Control of Introduced Plants. Cambridge, UK: Cambridge University Press. Pp. 110-111.

Raichel, D.L., K.W. Able and J.M. Hartman. 2003. The influence of Phrgamites (Common reed) on the distribution, abundance, and potential prey of a resident marsh fish in the Hackensack Meadowlands, New Jersey. Estuaries 26: 511-521.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 1.4 Impact on genetic integrity B Rev'd, Sci. Pub'n back

Identify impacts: Although numerous genotypes (both exotic and native) are known to be present in North America, at this time there is no evidence of hybrids occuring. Non-native haplotypes are known to dominate and exclude less vigorous native genotypes from habitats, reducing their occurrence. There is considerable evidence that native haplotypes - particularly in the midwestern and western US - can spread quickly in localized areas and otherwise appear to behave 'invasively.'

Rationale: Eleven distinct native North American haplotypes are known, in addition to a numerous (16) European haplotype. Of those thought to be indigenous, haplotypes 'A, B, C and D' are found in the InterMountain West (as well as the southern US); while type 'M' is the most common and widespread exotic haplotype found in the region.

Sources of information: Blossey, B. 2003. "Phragmites: Common reed – Native to North America or introduced (or both)?" Ithaca, NY: Cornell University, Department of Natural Resources, Ecology and Management of Invasive Plants Program. Last updated 2003. Available at: http://www.invasiveplants.net/phragmites/phrag/natint.html. Accessed 11:13 AM 19 April, 2010.

Saltonstall, K. 2002. Cryptic invasion by a non-native genotype of the common reed, Phragmites australis, into North America. Proceedings of the National Academy of Sciences 99: 2445-2449.

Saltonstall, K. 2003. Genetic variation among North American populations of Phragmites australis: implications for management. Estuaries 26: 444-451.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 2.1 Role of anthropogenic and natural disturbance in establishment B Rev'd, Sci. Pub'n back

Describe role of disturbance: Plant material propagules are commonly spread by aquatic disturbances (waves, tidal action) as well as when soil and equipment is moved. Eutrophication, especially of nitrates, is known to lead to significant increases in the abundance of Phragmites populations. Furthermore, agricultural drainages and diking, urban, industrial and infrastrsuctural expansions in sensitive wetland areas have all led to the creation of disturbed habitats that are more prone to invasions by common reed or rapid growth in existing populations.

Rationale: Newly opened substrates are readily colonized by available seed or vegetative fragments; colonization and spread is aided by disturbances (pollution, alteration in hydrologic regimes, dredging, increased sedimentation) that stress native vegetation communities. For example, newly installed water impoundments that result in lowered water levels in waterways and lakes can create ideal habitat for invasion by Phragmites. The spread of non-native Phragmites genotypes in southern Quebec has been tied to a period of great highway expansion in the province, which fragmented rhizomes and displaced them over large distances. Finally, urbanization and industrial development destabilizes landscapes and can create flashy watersheds whose margins are susceptible to erosion; all conditions which open up additional sites to colonization by aggressive invaders like common reed.

Sources of information: Chambers, R.M., L.A. Meyerson and K. Saltonstall. 1999. Expansion of Phragmites australis into tidal wetlands of North America. Aquatic Botany 64: 261-273.

Delisle, F., C. Lavoie, M. Jean and D. Lachance. 2003. Reconstructing the spread of invasive plants: taking into account biases associated with herbarium specimens. Journal of Biogeography 30: 1033-1042.

Global Invasive Species Database (GISD). 2006. Phragmites australis. Available at http://www.issg.org/database/species/ecology.asp?si=301&fr=1&sts=sss&%20ang=EN&ver=print&prtflag=false. Accessed 1:17 PM 19 April 2010.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Myers, J.H. and D.R. Bazely. 2002. Case study – Phragmites australis – a story of successful vegetative reproduction. In Ecology and Control of Introduced Plants. Cambridge, UK: Cambridge University Press. Pp. 110-111.

Uva, R.H., J.C. Neal and J.M. DiTomaso. 1997. Weeds of the Northeast. Ithaca, NY: Cornell University Press. 397 pp.

Question 2.2 Local rate of spread with no management A Rev'd, Sci. Pub'n back

Describe rate of spread: Local rates of spread can be very high; lateral spread of rhizomes can average 16 - 80" per year, while stolons can grow almost five inches per day.

Rationale: Effectiveness of vegetative reproduction leads to quite rapid (populations doubling in less than ten years) local rates of spread. In one example in Quebec, a monitored population along the St. Lawrence River grew in size from roughly 2.5 to 62 acres over a nineteen year period (1980-1999).

Sources of information: Lavoie, C., M. Jean, F. Delisle and G. Letourneau. 2003. Exotic plant species of the St. Lawrence River wetlands: a spatial and historical analysis. Journal of Biogeography 30: 537-549.

Mayall, D. 2005. Part IV. Plant Assessment Form - Phragmites australis (Cav.) Trin ex. Steud. Berkeley, CA:

California Invasive Plant Council. Available at: http://www.cal-ipc.org/ip/inventory/PAF/Phragmites%20australis.pdf. Accessed 9:53 PM 19 April 2010.

Question 2.3 Recent trend in total area infested within state B Other Pub. Mat'l back

Describe trend: Based on published reports and anecdotal observations by the authors, Phragmites is widespread throughout Colorado, though it is difficult to quantify its rate of spread due to a lack on information on current populations. Most significantly, it is not clear how many recorded populations are actually native haplotypes (which are known to be common in western states) or non-native varieties. The authors of this assessment have observed that at least along the lower Arkansas River (between La Junta and Lamar) many populations that are present seem - based on morphological and anatomical features - to be of native varieties. At this time there have been no reported genetic studies on populations from Colorado, so it is not possible to ascertain for certain what the origins are of populations resident in and expanding in the state.

Rationale: In Weber's 1976 'Rocky Mountain Flora' the following description is given: "Introduced and established along irrigation ditches on the plains and piedmont valleys. The stout culms were used to make arrow shafts." According to more recent reports, common reed is present in almost half of Colorado's counties: Adams; Alamosa; Bent; Boulder; Chaffee; Conejos; Costilla; Crowley; Delta; Eagle; El Paso; Fremont; Garfield; Gunnison; Jefferson; La Plata; Larimer; Las Animas; Logan; Mesa; Moffat; Montezuma; Montrose; Otero; Pitkin; Prowers; Pueblo; San Miguel; Sedgwick and Weld.

Sources of information: Colorado Herbarium. 2010. Vascular Plant Species of Colorado: County Lists (Online). Boulder, CO: University of Colorado Museum of Natural History. Available at http://cumuseum.colorado.edu/Research/Botany/Databases/county_species.html. Accessed 10:52 AM 19 April, 2010.

EDDMapS. 2009. Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Athens, GA: University of Georgia, Warnell School of Forestry and Natural Resources, Center for Invasive Species and Ecosystem Health. Last updated 11:57 AM 23 October 2009. Available at: http://www.invasive.org/weedus/subject.html?sub=3062#maps. Accessed 11:34 AM 19 April 2010.

US Department of Agriculture, Natural Resources Conservation Service (NRCS). 2010. The PLANTS Database (Online). Baton Rouge, LA: National Plant Data Center. Available at http://plants.usda.gov. Accessed 10:16 AM 19 April 2010.

Weber, WA. 1976. Rocky Mountain Flora. Niwot, CO: University Press of Colorado. P. 300.

Question 2.4 Innate reproductive potential A Other Pub. Mat'l back

Describe key reproductive characteristics: Primarily spreads vegetatively via thick, white, hollow rhizomes as well as stolons; and is a perennial species whose rigid, erect stems and leaves die back over the winter, retaining seedheads. Literature is mixed on the degree to which sexual reproduction and the production of viable seed is signficant. Some sources (DiTomaso and Healy 2007) note that viable seeds are produced in the fall and will germinate in early to mid spring when water levels begin receding; although, seeds reportedly are short-lived and most sources seem to agree that overall recruitmet from seeds is negligible.

Rationale: Underground rhizome system can make up two-thirds of a common reed plant's total biomass. Stolons can be up to 40 ft in length, and are typically produced during periods of drought. Vegetative reproduction can result in rates of spread of up to 10 feet per year. Clones, or large stands derived from a single plant, are known to be long-lived (reportedly there are some surviving populations whose origins are 1,000 years old). As noted, sexual reproduction can occur, and plants are wind-pollinated but self-incompatible. While stands can produce large quantities of seeds, most of what is produced is not viable. Water depths greater than two inches, and salinity levels greater than 2% can decrease germination of viable seeds. Higher ambient

temperature can increase overall germination and rate of germination.

Sources of information: DiTomaso, J.M. and E.A. Healy. 2007. Common reed. In Weeds of California and Other Western States, Vol. 2. Oakland, CA: University of California Agriculture and Natural Resources Communication Services. P. 1038.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Myers, J.H. and D.R. Bazely. 2002. Case study – Phragmites australis – a story of successful vegetative reproduction. In Ecology and Control of Introduced Plants. Cambridge, UK: Cambridge University Press. Pp. 110-111.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Uva, R.H., J.C. Neal and J.M. DiTomaso. 1997. Weeds of the Northeast. Ithaca, NY: Cornell University Press. 397 pp.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 2.5 Potential for human-caused dispersal A Rev'd, Sci. Pub'n back

Identify dispersal mechanisms: Rhizome fragments are often spread with soil or on equipment; the species has been, and is still sometimes actively planted as a wetland or riparian restoration species.

Rationale: Introduction of non-native genotypes to the Atlantic Coast of N America is thought to have occurred as stem fragments transported in ballast materials. Furthermore, continued spread of the species in novel habitats is related to large-scale infrastructure expansions, such as highways in Quebec.

Sources of information: Delisle, F., C. Lavoie, M. Jean and D. Lachance. 2003. Reconstructing the spread of invasive plants: taking into account biases associated with herbarium specimens. Journal of Biogeography 30: 1033-1042.

Global Invasive Species Database (GISD). 2006. Phragmites australis. Available at http://www.issg.org/database/species/ecology.asp?si=301&fr=1&sts=sss&%20ang=EN&ver=print&prtflag=false. Accessed 1:17 PM 19 April 2010.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Uva, R.H., J.C. Neal and J.M. DiTomaso. 1997. Weeds of the Northeast. Ithaca, NY: Cornell University Press. 397 pp.

Question 2.6 Potential for natural long-distance dispersal B Other Pub. Mat'l back

Identify dispersal mechanisms: Rhizome fragments are naturally spread by water currents; seeds are carried by wind and water. Both vegetative propagules and seeds can be carried inadvertently by wildlife and waterfowl.

Rationale: Common reed typically grows adjacent to moving water, and thus dispersal of propagules is frequent and can occur over long distances.

Sources of information: Global Invasive Species Database (GISD). 2006. Phragmites australis. Available at http://www.issg.org/ database/species/ecology.asp?si=301&fr=1&sts=sss&%20ang=EN&ver= print&prtflag=false. Accessed 1:17 PM 19 April 2010.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/ GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Myers, J.H. and D.R. Bazely. 2002. Case study – Phragmites australis – a story of successful vegetative reproduction. In Ecology and Control of Introduced Plants. Cambridge, UK: Cambridge University Press. Pp. 110-111.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Question 2.7 Other regions invaded C Rev'd, Sci. Pub'n back

Identify other regions: P. australis varieties are common throughout the contiguous US states, as well as southern Canada. The species is especially abundant among tidal wetlands of the eastern United States and states bordering the Guld of Mexico (particularly the lower Mississippi River Delta). It is reported to be 'invasive' or 'noxious' in a total of eighteen US states, primarily in the eastern and southeastern regions of the nation. In many locations of North America native genotypes of common reed are widespread, abundant, and have been reported historically.

Rationale: Various genotypes of common reed are found throughout the globe in all temperate zones, and on every continent except for Antartica. Common reed is also abundant in fresh water marshes, swamps, fens and prairie potholes throughout N America.

Sources of information: Chambers, R.M., L.A. Meyerson and K. Saltonstall. 1999. Expansion of Phragmites australis into tidal wetlands of North America. Aquatic Botany 64: 261-273.

Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/ GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 3.1 Ecological amplitude/Range A Other Pub. Mat'l back

Describe ecological amplitude, identifying date of source information and approximate date of introduction to the state, if known: Reported to occur in thirty of Colorado's counties, although these reports do not distinguish between native and non-native genotypes of the species. Was reported in Weber's 1976 flora, though at that time the species distribution appears to have been limited to the Eastern Slope.

Rationale: Found in level, wet, muddy or seasonally flooded (less than 20") sites, such as: roadside ditches, marshes and wetlands, along the periphery of lakes and ponds, and other riparian areas; importantly is found in both fresh- and saltwater habitats. Is found up to 5, 250 ft in California; though DiTomaso and Healy (2007) report that invasive European genotypes are found in more varied habitats - and moreso in higher salinity environments - than the native genotypes. Common reed grows on fine clay to sandy loam soils; non-native genotypes are more tolerant of periodic droughts than are native genotypes, but the former are completely intolerant of shade. Preserved fossil fragments from the American Southwest indicate that native genotypes of common reed have been present in the region since 40,000 years ago.

Sources of information: Blossey, B. 2003. "Phragmites: Common reed – Native to North America or introduced (or both)?" Ithaca, NY: Cornell University, Department of Natural Resources, Ecology and Management of Invasive Plants Program. Last updated 2003. Available at: http://www.invasiveplants.net/phragmites/phrag/natint.html. Accessed 11:13 AM 19 April, 2010.

DiTomaso, J.M. and E.A. Healy. 2007. Common reed. In Weeds of California and Other Western States, Vol. 2. Oakland, CA: University of California Agriculture and Natural Resources Communication Services. P. 1038.

Global Invasive Species Database (GISD). 2006. Phragmites australis. Available at http://www.issg.org/database/species/ecology.asp?si=301&fr=1&sts=sss&%20ang=EN&ver=print&prtflag=false. Accessed 1:17 PM 19 April 2010.

Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

US Department of Agriculture, Natural Resources Conservation Service (NRCS). 2010. The PLANTS Database (Online). Baton Rouge, LA: National Plant Data Center. Available at http://plants.usda.gov. Accessed 10:16 AM 19 April 2010.

Uva, R.H., J.C. Neal and J.M. DiTomaso. 1997. Weeds of the Northeast. Ithaca, NY: Cornell University Press. 397 pp.

Weber, WA. 1976. Rocky Mountain Flora. Niwot, CO: University Press of Colorado. P. 300.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 3.2 Distribution/Peak frequency D Other Pub. Mat'l back

Describe distribution: Given the paucity of and lack of clarity in population occurrence reports for Colorado it is difficult to quantify the distribution of Phragmites (and in particular non-native haplotypes). Based on reports and the authors observations we can conclude that the species is widespread, but typically only occurs in a small percentage of sites that are suitable habitats.

Rationale:

Sources of information: US Department of Agriculture, Natural Resources Conservation Service (NRCS). 2010. The PLANTS Database (Online). Baton Rouge, LA: National Plant Data Center. Available at http://plants.usda.gov. Accessed 10:16 AM 19 April 2010.

Weber, WA. 1976. Rocky Mountain Flora. Niwot, CO: University Press of Colorado. P. 300.

Question 4.1 Poisonous to Livestock D Other Pub. Mat'l back

Describe impacts in terms of high probability of death, long-term health impacts, or short-term health impacts: Immature plants are readily eaten (and are actually a high quality source of warm-season forage) by livestock and horses, but palatability and nutritional quality of the plants decreases markedly when they mature.

Rationale:

Sources of information: Magee, P. 2005. Plant Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Baton Rouge, LA: National Plant Data Center. Last updated 20 September 2005. Available at http://plants.usda.gov /factsheet/pdf/fs_phau7.pdf. Accessed 11:53 AM 19 April 2010.

Whetstone, J.M. 2009. Chapter 13.9 Phragmites – Common reed. In Biology and Control of Aquatic Plants: A Best Management Practices Handbook (Online). Marietta, GA: Aquatic Ecosystem Restoration Foundation. Pp. 135 – 139. Available at: http://plants.ifas.ufl.edu/misc/pdfs/AERF_handbook.pdf.

Question 4.2 Detrimental to Economic Crops D No Information back

Describe impacts to all aspects of cropping systems (see guidelines): None reported.

Rationale:

Sources of information:

Question 4.3 Detrimental to Mgmt of Agricultural System, Rangeland and Pasture D Other Pub. Mat'l back

Describe impacts to water diversion systems, increased water use, reduced forage for livestock: None are reported - Phragmites species can not establish in especially flashy waterways, or those with rapidly moving water, such as irrigation ditches and canals.

Rationale:

Sources of information: Marks, M., B. Lapin and J. Randall. 1993. Element Stewardship Abstract for Phragmites australis, Common reed. Arlington, VA: The Native Conservancy. Available at: http://www.imapinvasives.org/ GIST/ESA/esapages/documnts/phraaus.pdf. Accessed 10:30 AM 21 April 2010.

Question 4.4 Human Health Impacts C Other Pub. Mat'l back

Describe key human impacts such as; irritants, property values, recreational values, and industry impacts: In the American Southwest, in particular, native varieties of common reed have been widely used throughout history for: arrow shafts; prayer sticks; weaving tools; and for mats, screens, nets and thatching. The plants have also been used routinely for the restoration and rehabilitation of riparian habitats.

Rationale:
Sources of information: Global Invasive Species Database (GISD). 2006. Phragmites australis. Available at http://www.issg.org/ database/species/ecology.asp?si=301&fr=1&sts=sss&%20ang=EN&ver= print&prtflag=false. Accessed 1:17 PM 19 April 2010. Magee, P. 2005. Plant Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Baton Rouge, LA: National Plant Data Center. Last updated 20 September 2005. Available at http://plants.usda.gov/ factsheet/pdf/fs_phau7.pdf. Accessed 11:53 AM 19 April 2010. Saltonstall, K. 2005. Fact Sheet: Common reed, Phragmites australis (Cav.) Trin. Ex Steud. Washington, DC: US Bureau of Land Management, Plant Conservation Alliance. Last updated 20 May 2005. Available at: http://www.nps.gov/plants/alien/fact/phau1. htm. Accessed 11:57 AM 19 April 2010.

Worksheet A

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Reaches reproductive maturity in 2 years or less		**Yes: 1 pt**
Dense infestations produce >1,000 viable seed per square meter		**No: 0 pts**
Populations of this species produce seeds every year.		**Yes: 1 pt**
Seed production sustained over 3 or more months within a population annually		**Yes: 1 pt**
Seeds remain viable in soil for three or more years		**No: 0 pts**
Viable seed produced with *both* self-pollination and cross-pollination		**No: 0 pt**
Has quickly spreading vegetative structures (rhizomes, roots, etc.) that may root at nodes		**Yes: 1 pt**
Fragments easily and fragments can become established elsewhere		**Yes: 2 pts**
Resprouts readily when cut, grazed, or burned		**Yes: 1 pt**
	7 pts	**Total Unknowns**
		A (6+ pts)

Note any related traits: enter text here

Worksheet B - Colorado Ecological Types and Land Use

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Major Ecological and Land Use Types	Minor Ecological and Land Use Types	Code*
Freshwater and Aquatic Systems	lakes, ponds, reservoirs	**D. present**
	rivers, streams, canals	**D. present**
Riparian and wetlands	Riparian forest	**score**
	Riparian shrublands	**D. present**
	Wet meadows	**D. present**
Grasslands	Shortgrass prairie	**score**
	Tallgrass prairie	**score**
	Sandsage prairie	**score**
	Montane meadows	**score**
Irrigated Agriculture	Hay meadows	**score**
	Irrigated crops (alfalfa, corn, sugar beets)	**score**
Dryland Agriculture	Dryland crops (wheat, corn, millet, dryland grass hay, sunflowers, mustard for biodiesel)	**score**
Developed Lands	Urban, exurban, industrial	**score**
Arid Shrublands	Sagebrush shrublands	**score**
	Foothills shrublands	**score**
	Gambel oak shrublands	**score**
Woodlands	Pinyon - juniper	**score**
	Ponderosa pine	**score**
	Limber pine	**score**
Forest	Lodgepole pine	**score**
	Spruce-fir	**score**
Alpine	Boulder and rock fields	**score**
	Dwarf shrublands	**score**
	Tundra	**score**
Barrens (lower elevation)	Dunes	**score**
	Rock outcrops	**score**
	Canyonlands	**score**

* A. means >50% of type occurrences are invaded; B means >20% to 50%; C. means >5% to 20%; D. means present but ≤5%; U. means unknown (unable to estimate percentage of occurrences invaded).

Worksheet C – Human Impacts

Human health impacts; irritants (sap), spines, poisonous, and/or smoke impacts	**No: 0 pt**
Property values are decreased due to increased risk of fire	**Unknown: 0 pts**
Decreased property value due to moderate to heavy infestations	**Unknown: 0 pts**
Decreased land value for recreational use; boating, fishing, camping, etc.	**Yes: 1 pt**
Impact of listing detrimental to industry; agriculture, horticulture, nursery, and/or seed	**No: 0 pt**
1 pt	**2 unknowns**
C (1-2)	

Note any related traits: enter text here