Oregon Department of Agriculture
Plant Pest Risk Assessment for
Common Reed, *Phragmites australis subsp. australis*
2009 (Revised 2013)

Common name: Common reed
Scientific name: *Phragmites australis* (Cav.) Trin. ex Steud. subsp. *australis*
Family: Grass, *Poaceae*

Findings of This Review and Assessment: Common reed, *Phragmities australis* subsp *australis* was evaluated and determined to be a category **"B"** rated noxious weed, as defined by the Oregon Department of Agriculture (ODA) Noxious Weed Policy and Classification System. This determination was based on a literature review and analysis using two ODA evaluation forms. Using the Noxious Qualitative Weed Risk Assessment version 3.8, common reed scored **49** indicating a Risk Category of **B**; and a score of **15** with the Noxious Weed Rating System version 3.2, indicating a **"B"** rating. This lower ranking than the original assessment score reflects the accumulation of additional site data. Surveys now indicate that *Phragmities* is more widespread and in locations that would not be suitable for large-scale control programs.

Introduction: Common reed, *Phragmites australis* is a large, perennial grass with creeping rhizomes and stolons often forming dense stands in shallow water and on moist ground. Terminal, plume-like flowering stalks can be green or reddish, thin or robust but are often very showy on the introduced variety. Common reed has woody hollow stems that can grow to 1-4 meters tall with stem diameters of 0.5-1.5 cm. Leaves are 15-40 cm long with an open leaf sheath. The morphological characteristics that distinguish native from non-native *Phragmities* are found on page 3.

Recent genetic studies indicate there are various lineages of common reed present in the United States; one of these is native to the Pacific Northwest while another is introduced and has recently begun to spread (Saltonstall 2003, Saltonstall et al. 2004). Accurately distinguishing these from one another is important for the purposes of habitat conservation and/or restoration as well as reducing the impact and spread of invasive species. The focus of this risk assessment is on the introduced Eurasian *Phragmites australis* subsp. *australis*, which has become highly invasive in other regions of the United States.

Photo by Glenn Miller, ODA

Botanical records indicate that *Phragmites* was present though uncommon on the eastern seaboard during the 1800''s, but the distribution and density expanded rapidly during the 1900's. Although it often occurs in areas of human disturbances (i.e., roadside ditches, water treatment ponds, etc.), the range expansion of common reed cannot be attributed to anthropogenic forces alone. East coast *Phragmites* populations historically consisted of 11 different genotypes – comprising the native lineage of *P. australis* subsp. *americanus*. These native stands are now largely dominated by the introduced Eurasian lineage of *P. australis* subsp. *australis* (Saltonstall 2003, Saltonstall et al. 2004). The introduced genotype has competitive advantages over the native including increased salinity tolerances, greater rate of above ground growth, higher growth rates along salinity gradients, and lower water content in its shoots, allowing for osmotic regulation (Vaquez et al. 2005). It is evident that the continued spread and domination of the plant in freshwater marshes will occur throughout the rest of the country.

Growth and Development: *Phragmites* is a clonal grass species that reproduces both vegetatively and by seed dispersal. Seeds are shed from November through January and are dispersed by wind, water and animals. Once seeds germinate and become established, young plants usually persist for at least two years in a small, inconspicuous stage where they resemble many other grass species. When seedlings establish in inland or low salinity areas, the infestation will typically expand radially, resulting in distinct circular patches. In higher salinity areas, infestations established at the water's edge expand inward toward the center of the marsh. Plants tend to grow taller and exhibit fewer dead leaves the further from shore they grow (down the salinity gradient) (Adams and Bate, 1999). Reproduction is primarily vegetative, through an extensive network of rhizomes, which can grow horizontally up to 1.8 m per year depending on the climate. Stolons are produced in young stands or over open water, growing up to 11cm per day, and further aid in rapid stand expansion and dispersal during storm events.

Limitations to Growth: Salinity and depth to the water table are two factors that control the distribution and vigor of *Phragmites*. Conversion from native plant communities to *Phragmites* dominated ones can occur three times as fast in low salinity areas compared to those with higher salinity (Warren et al. 2001). It should be noted, however, that *Phragmites* has proven to be a "pseudo-halophyte" in that it can tolerate areas of higher salinity as long as its active root system is located in deeper, less saline soils (Adams and Bate 1999). Salinity tolerances are variable throughout different populations though it does thrive in stagnant waters with poor aeration. *Phragmites* has a low tolerance for wave and current action, which can break its stems and impede bud formation in the rhizomes.

Distinguishing Native from Non-native Stands: Differences between the two subspecies can be subtle and may partially depend on ecological conditions. Morphological work has focused on ligule length, lower glume length and stem characteristics such as sheath persistence and internode color. The native has a reddish-purple lower internode color as opposed to yellow-brown for the non-native *P. australis* subsp. *australis*. Native plants have longer lower glumes as well as longer ligules (on middle leaves) compared to non-native plants. For specifics on these and other characteristics, see the table below (modified from Saltonstall 2008 and Blossey 2002).

Table 1. Morphological characteristics used to distinguish native and non-native Phragmites stands

	Native, *P. australis subsp. americanus*	**Non-native,** *P. australis subsp. australis*
Stand density	Less dense	More dense
Leaf sheaths	Mostly absent or easily removed	Tightly clasped; difficult to remove, even on dead stems
Leaf color	Yellow green	Blue green typically; yellow-green in brackish water
Ligule length	1.0-1.7 mm	0.4-0.9 mm
Flower	Less dense, possibly blooming and senescing earlier	More dense, larger plumes, blooming and senescing later
Lower glume length	3.0-6.5 mm	2.5-5.0 mm
Upper glume length	5.5-11.0 mm	4.5-7.5 mm
Stem spots	Often present in summer on dead stems	Absent or rare
Stem color	Spring/Summer: Green to maroon Winter: Yellow to brown	Spring/Summer: Green w/ yellow nodes Winter: Yellow

Environmental Importance: Non-native *Phragmites* is frequently regarded as an aggressive, unwanted invader. Studies have shown *Phragmites* dominated areas, exclude large wading birds, exhibit decreased overall species richness of birds (Chambers et al. 1999) and reduce feeding grounds for birds through increased bank steepness (Teal and Peterson 2005). *Phragmites* increases land elevation, reducing habitat for important fish species and disrupts trophic transfers within the marsh itself as well as the greater estuary. Both small and large fish suffer from low biomass and decreased body lengths as a result of *Phragmites* infestations (Hagan et al. 2007). *Phragmites* can block fish passage by bridging marsh creeks and reduce refuge by steepening creek banks (Teal and Peterson 2005).

Native decomposition rates are slowed because of the high concentration of lignin in *Phragmites* stems yet the fast rates of leaf decomposition can alter soil invertebrate communities. Marsh specialists are often replaced with generalists in *Phragmites* dominated areas (Chambers et al. 1999) and native plant diversity is dramatically reduced. In addition, *Phragmites* can have adverse impacts on waterfront property values and recreation such as hunting and fishing. Disturbances or stresses such as pollution, dredging, and increased sedimentation favor invasion and spread of non-native *Phragmites*.

Native *Phragmites* is a useful plant with a long association with humans. Ethnobotanical sources reveal that the native *Phragmites* was used for food, sweeteners, decoration, weapons, weaving material and for making musical instruments. Across the world, people have used *Phragmites* to make boats, sleeping mats, baskets, harpoons, arrow shafts, and in the construction of houses. Native Americans used it to treat digestive ailments and headaches. Various Western, Native American groups have used the reed as a fiber plant, pipe stems and arrow shafts, and basketry materials.

Native *Phragmities* is also thought to be the sole known host plant for the Yuma Skipper butterfly (*Ochlodes yuma*). This skipper is the largest most conspicuous of the tawny, grass–feeding Hesperiine skippers. The skipper is distributed in the Great Basin area ranging from Arizona to south-central Washington. The occurrence of this obligate herbivore indicates the potential presence of a native *Phragmites* species. It is not known if the introduced genotype also serves as a host for the insect. No uses have been identified for the introduced non-native Phragmities.

Habitat: *Phragmites* grows in a wide range of sites that hold shallow water, including roadside ditches, marshes, swamps, brackish estuaries and alkaline wetlands. *Phragmites* will inhabit any slight depression that has an ability to hold water. It has become increasingly common along railroad tracks, roadsides, and dredge spoils.

Reproduction and Dispersal: Long distance seed dispersal is accomplished by water, wind and wildlife. Seed fecundity is low though and variable from season to season. Asexual reproduction occurs during flood events and tidal exchanges, which undercut root masses dispersing the root fragments downstream and onto flood plains. In rivers systems, this tends to be the dominant means of expansion and dispersal. There is no evidence of hybridization between native and introduced lineages (Saltonstall et al. 2004).

Probability of Detection: Phragmities is an easy plant to identify. The difficulty in locating *Phragmities* patches is related to survey access. Many infestations occur in marshes requiring shallow running boats to approach them. Wind and tides often make survey difficult. Once identified, treatment can also be challenging.

Geographic Distribution: *Phragmites australis* subsp. *australis* is native to Africa, temperate portions of Asia and Europe; it has been widely introduced and is naturalized in New Zealand, United States, Canada, Melanesia and Polynesia. *P. australis* subsp. *americanus* is native to much of North America, including Canada, New England south through mid-Atlantic states and west to Oregon and Washington.

Oregon Distribution: Historic locations for the native *Phragmites australis* subsp. *americanus* have primarily been in inland marshes and wetland areas of the west coast, with few known in tidal marshes (Chambers et al. 1999). Large populations of *Phragmites* can be observed at Klamath Lake, Summer Lake, Garrison Lake, John Day River, and in North Portland adjacent to Smith and Bybee Lakes. Recently, morphological characteristics from populations on the lower Columbia River islands, on the tidal flats and Willamette River suggest many dense stands are non-native (V. Morgan, pers comm 2012). Many of these non-natives *Phragmites* stands on the Columbia River may have initially come from propagules washed down from infestations on the Lower Snake river and near Moses Lake, Washington (M. Systma pers. comm. January 24, 2008).

Phragmities population in Clatskanie River, Columbia County, photo by Glenn Miller, ODA

Hardiness Zones: *Phragmities* thrives in 2-4 hardiness zones. See attachment A.

Control: Early detection and treatment is crucial to prevent massive stands from developing. Small patches can be manually removed by digging, but this is an extremely labor intensive method and requires every rhizome fragment be removed to prevent spread. Repeated mowing or cutting could reduce stand vigor, but would require yearly treatments and would not be expected to kill the roots. Spraying with Imazapyr early in the season (June) has been shown most effective, but concerns of high water levels and non-target effects are warranted (Mozdzer et al. 2008). The aquatic formulations Habitat™ (active ingredient Imazapyr) or Rodeo™ (active ingredient glyphosate) are very effective in mid to late summer when water levels are lower. Mowing, disking, and goats have proved ineffective unless used in conjunction with herbicide (Teal and Peterson 2005).

No active biological control program is currently available for treatment of non-native *Phragmites*. However, host specificity screening is underway and, of four stem-borers studied, *Archanara geminipuncta* shows promise in its impact, field abundance, and distribution in its native range (Häfliger et al. 2006).

Noxious Weed Qualitative Risk Assessment
Oregon Department of Agriculture

Common name: Common reed
Scientific name: *Phragmities australis* subspecies *australis*
Family: Grass, *Poacea*

For use with plant species that occur or may occur in Oregon to determine their potential to become serious noxious weeds. For each of the following categories, select the number that best applies. Numerical values are weighted to increase priority categories over less important ones. Choose the best number that applies, intermediate scores can be used.

Total Score: 49 **Risk Category: B**

GEOGRAPHICAL INFORMATION

1) 6 Invasive in Other Areas

0 Low- not known to be invasive elsewhere.
2 Known to be invasive in climates dissimilar to Oregon's current climates.
6 Known to be invasive in geographically similar areas.

Comments: Known to be invasive in similar areas.

2) 5 Habitat Availability: Are there susceptible habitats for this species and how common or widespread are they in Oregon?

1 *Low* – Habitat is very limited, usually restricted to a small watershed or part of a watershed (e.g., tree fern in southern Curry County).
3 *Medium* – Habitat encompasses 1/4 or less of Oregon (e.g., oak woodlands, coastal dunes, eastern Oregon wetlands, Columbia Gorge).
6 *High* – Habitat covers large regions or multiple counties, or is limited to a few locations of high economic or ecological value (e.g., threatened and endangered species habitat).

Comments: Currently restricted to wetlands.

3) 0 Proximity to Oregon: What is the current distribution of the species?

0 *Present* – Occurs within Oregon.
1 *Distant* – Occurs only in distant US regions or foreign countries.
3 *Regional* – Occurs in Western regions of US but not adjacent to Oregon border.
6 *Adjacent* – Weedy populations occur adjacent (<50 miles) to Oregon border.

Comments: Occurs in western Oregon.

4) 5 Current Distribution: What is the current distribution of escaped populations in Oregon?

0 *Not present* – Not known to occur in Oregon.
1 *Widespread* – Throughout much of Oregon (e.g., cheatgrass).
5 *Regional* – Abundant (i.e., occurs in eastern, western, central, coastal, areas of Oregon) (e.g., gorse, tansy ragwort).
10 *Limited* – Limited to one or a few infestations in state (e.g., kudzu).

Comments: Regionally abundant in the Columbia River system.

BIOLOGICAL INFORMATION

5) 2 **Environmental Factors**: Do abiotic (non-living) factors in the environment effect establishment and spread of the species? (e.g., precipitation, drought, temperature, nutrient availability, soil type, slope, aspect, soil moisture, standing or moving water).

1 *Low* – Severely confined by abiotic factors.
2 *Medium* – Moderately confined by environmental factors
4 *High* – Highly adapted to a variety of environmental conditions (e.g., tansy ragwort, Scotch broom).

Comments: Confined by availability of shallow water.

6) 6 **Reproductive Traits:** How does this species reproduce? Traits that may allow rapid population increase both on and off site.

0 *Negligible* – Not self-fertile, or is dioecious and opposite sex not present.
1 *Low* – Reproduction is only by seed, produces few seeds, or seed viability and longevity are low.
3 *Medium* – Reproduction is vegetative (e.g., by root fragments, rhizomes, bulbs, stolons).
3 *Medium* – Produces many seeds, and/or seeds of short longevity (< 5 years).
5 *High* – Produces many seeds and/or seeds of moderate longevity (5-10 years) (e.g., tansy ragwort).
6 *Very high* – Has two or more reproductive traits (e.g., seeds are long-lived >10 years and spreads by rhizomes).

Comments: Reproduces by seeds and root fragments.

7) 4 **Biological Factors:** Do biotic (living) factors restrict or aid establishment and spread of the species? (What is the interaction of plant competition, natural enemies, native herbivores, pollinators, and pathogens with species?)

0 *Negligible* – Host plant not present for parasitic species.
1 *Low* – Biotic factors highly suppress reproduction or heavily damage plant for an extended period (e.g., biocontrol agent on tansy ragwort).
2 *Medium* – Biotic factors partially restrict or moderately impact growth and reproduction, impacts sporadic or short-lived.
4 *High* – Few biotic interactions restrict growth and reproduction. Species expresses full growth and reproductive potential.

Comments: Few biotic factors restrict growth and reproduction.

8) 3 **Reproductive Potential and Spread After Establishment - Non-human Factors:** How well can the species spread by natural means?

0 *Negligible* – No potential for natural spread in Oregon (e.g., ornamental plants outside of climate zone).
1 *Low* – Low potential for local spread within a year, has moderate reproductive potential or some mobility of propagules (e.g., propagules transported locally by animals, water movement in lakes or ponds, not wind blown).
3 *Medium* - Moderate potential for natural spread with either high reproductive potential or highly mobile propagules (e.g., propagules spread by moving water, or dispersed over longer distances by animals) (e.g., perennial pepperweed).
5 *High* – Potential for rapid natural spread throughout the susceptible range, high reproductive capacity and highly mobile propagules. Seeds are wind dispersed over large areas (e.g., rush skeletonweed).

Comments: Moderate potential for natural spread. Seeds not wind dispersed.

9) 1 **Potential of Species to be Spread by Humans**. What human activities contribute to spread of species? Examples include: interstate or international commerce; contaminated commodities; packing materials or products; vehicles, boats, or equipment movement; logging or farming; road maintenance; intentional introductions of ornamental and horticultural species, or biofuel production.

1 *Low* – Potential for introduction or movement minimal (e.g., species not traded or sold, or species not found in agricultural commodities, gravel or other commercial products).

3 *Medium* – Potential for introduction or off-site movement moderate (e.g., not widely propagated, not highly popular, with limited market potential; may be a localized contaminant of gravel, landscape products, or other commercial products) (e.g., lesser celandine, Canada thistle).

5 *High* – Potential to be introduced or moved within state high (e.g., species widely propagated and sold; propagules common contaminant of agricultural commodities or commercial products; high potential for movement by contaminated vehicles and equipment, or by recreational activities) (e.g., butterfly bush, spotted knapweed, Eurasian watermilfoil).

Comments: Plant not dispersed by human activities.

IMPACT INFORMATION

10) 5 **Economic Impact**: What impact does/can the species have on Oregon's agriculture and economy?

0 *Negligible* – Causes few, if any, economic impacts.

1 *Low* - Potential to, or causes low economic impact to agriculture; may impact urban areas (e.g., puncture vine, pokeweed).

5 *Medium* – Potential to, or causes moderate impacts to urban areas, right-of-way maintenance, property values, recreational activities, reduces rangeland productivity (e.g., English ivy, Himalayan blackberry, cheatgrass).

10 *High* – Potential to, or causes high impacts in agricultural, livestock, fisheries, or timber production by reducing yield, commodity value, or increasing production costs (e.g., gorse, rush skeleton weed, leafy spurge).

Comments: Causes moderate impacts to economic activities. Can impact waterfowl hunting, recreation and marine resources.

11) 5 **Environmental Impact**: What risks or harm to the environment does this species pose? Plant may cause negative impacts on ecosystem function, structure, and biodiversity of plant or fish and wildlife habitat; may put desired species at risk.

0 *Negligible* – None of the above impacts probable.

1 *Low* – Can or does cause few or minor environmental impacts, or impacts occur in degraded or highly disturbed habitats.

4 *Medium* – Species can or does cause moderate impacts in less critical habitats (e.g., urban areas, sagebrush/ juniper stands).

6 *High* – Species can or does cause significant impacts in several of the above categories. Plant causes severe impacts to limited or priority habitats (e.g., aquatic, riparian zones, salt marsh; or T&E species sites).

Comments: Species can cause significant impacts in wetlands depending on location.

12) 0 **Impact on Health:** What is the impact of this species on human, animal, and livestock health? (e.g., poisonous if ingested, contact dermatitis, acute and chronic toxicity to livestock, toxic sap, injurious spines or prickles, causes allergy symptoms.

0 *Negligible* – Has no impact on human or animal health.
2 *Low* – May cause minor health problems of short duration, minor allergy symptoms (e.g., leafy spurge).
4 *Medium* – May cause severe allergy problems, death or severe health problems through chronic toxicity, spines or toxic sap may cause significant injury. (e.g., giant hogweed, tansy ragwort).
6 *High* – Causes death from ingestion of small amounts, acute toxicity (e.g. poison hemlock).

Comments: No impact on health.

CONTROL INFORMATION

13) 5 **Probability of Detection at Point of Introduction**: How likely is detection of species after introduction and naturalization in Oregon?

1 *Low* – Grows where probability of early detection is high, showy and easily recognized by public; access to habitat not restricted (e.g., giant hogweed).
5 *Medium* – Easily identified by weed professionals, ranchers, botanists; some survey and detection infrastructure in place. General public may not recognize or report species (e.g., leafy spurge).
10 *High* – Probability of initial detection by weed professionals low. Plant shape and form obscure, not showy for much of growing season, introduction probable at remote locations with limited access (e.g., weedy grasses, hawkweeds, skeletonweed).

Comments: Plant recognizable by weed professionals. Plant very visible.

14) 2 **Control Efficacy:** What level of control of this species can be expected with proper timing, herbicides, equipment, and biological control agents?

1 *Negligible* – Easily controlled by common non-chemical control measures (e.g., mowing, tillage, pulling, and cutting; biocontrol is very effective at reducing seed production and plant density) (e.g., tansy ragwort).
2 *Low* – Somewhat difficult to control, generally requires herbicide treatment (e.g., mechanical control measures effective at preventing flowering and but not reducing plant density; herbicide applications provide a high rate of control in a single application; biocontrol provides partial control).
4 *Medium* – Treatment options marginally effective or costly. Tillage and mowing increase plant density (e.g., causes tillering, rapid regrowth, spread from root fragments). Chemical control is marginally effective. Crop damage occurs or significant non-target impacts result from maximum control rates. Biocontrol agents ineffective.
6 *High* – No effective treatments known or control costs very expensive. Species may occur in large water bodies or river systems where containment and complete control are not achievable. Political or legal issues may prevent effective control.

Comments: Herbicides effective with single application.

Category Scores:

16 Geographic score (Add scores 1-4)	**16** Biological Score (Add lines 5-9)
10 Impact Score (Add lines 10-12)	**07** Control Score (Add Lines 13-14)

49 Total Score (Add scores 1-14 and list on front of form)

Risk Category: 55-89+ = **A** 24-54 = **B** < 24 = unlisted.

This Risk Assessment was modified by ODA from the USDA-APHIS Risk Assessment for the introduction of new plant species.
1/15/2013 v.3.8

Oregon Department of Agriculture
Noxious Weed Rating System

Common Name: Common reed
Scientific Name: *Phragmities australis*

Points: 15 **Rating: B**

1) 2 **Detrimental Effects:** Circle all that apply, enter number of circles.
1. *Health*: causes poisoning or injury to humans or animals
2. *Competition:* strongly competitive with crops, forage, or native flora
3. *Host*: host of pathogens and/or pests of crops or forage
4. *Contamination*: causes economic loss as a contaminate in seeds and/or feeds
5. *Interference*: interferes with recreation, transportation, harvest, land value, or wildlife and livestock movement

2) 4 **Reproduction & Capacity for Spread:** Circle the number that best describes, enter that number.
1. Few seeds, not wind blown, spreads slowly
2. Many seeds, slow spread
3. Many seeds, spreads quickly by vehicles or animals
4. Windblown seed, or spreading rhizomes, or water borne
5. Many wind-blown seeds, high seed longevity, spreading rhizomes, perennials

3) 3 **Difficulty to Control:** Circle the number that best describes, enter that number.
1. Easily controlled with tillage or by competitive plants
2. Requires moderate control, tillage, competition or herbicides
3. Herbicides generally required, or intensive management practices
4. Intensive management generally gives marginal control
5. No management works well, spreading out of control

4) 3 **Distribution:** Circle the number that best describes, enter that number.
1. Widely distributed throughout the state in susceptible habitat
2. Regionally abundant, 5 or more counties, more than 1/2 of a county
3. Abundant throughout 1- 4 counties, or 1/4 of a county, or several watersheds
4. Contained in only 1 watershed, or less than 5 square miles gross infestation
5. Isolated infestation less than 640 acres, more than 10 acres
6. Occurs in less than 10 acres, or not present, but imminent from adjacent state

5) 3 **Ecological Impact:** Circle the number that best describes, enter that number.
1. Occurs in most disturbed habitats with little competition
2. Occurs in disturbed habitats with competition
3. Invades undisturbed habitats and crowds out native species
4. Invades restricted habitats (i.e. riparian) and crowds out native species

15 TOTAL POINTS

Note: Noxious weeds are non-native plants with scores of 11 points or higher. Any plants in 4.1, 4.2, and 4.3 should not be classified as "A" rated weeds. *Ratings:* 16 + = A, 15 – 11= B
ODA Weed Rating System 8/30/2012 v.3.2

RA produced by Glenn Miller, ODA

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Attachment A