PHRAGMITES CONTROL PLAN

By

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BACKGROUND

Common reed, *Phragmites australis*, is a tall, native, warm-season, sod-forming grass. It has a worldwide distribution (Tucker 1990) and is endemic to North America (Niering & Warren 1977). The culms are erect, rigid, smooth, and hollow. The culms may be nearly 1 inch in diameter and from 6 to 13 feet tall, terminating in a 12-inch-long dense panicle. Common reed has an extensive rhizome network and occasionally produces stolons as well.

A Phragmites stand at Bear River Migratory Bird Refuge

Common reed grows on level ground in freshwater marshes, oxbow lakes, swales, and backwater areas of river and streams. It also grows around springs and along pond and lake margins, stream banks, and irrigation ditches. It does not grow in permanently standing water but rather is found on sites with high water tables or sites that are seasonally flooded with not more than 20 inches of water. Water control that lowers the water level, but does not drain the area, increases production (USDA PLANTS Database 2007). Throughout most of its range, common reed typically forms closed, monotypic stands along marsh and slough edges. These stands are often dense, with up to 19 stems (live and dead) per square foot.

REPRODUCTION

In wetlands, *P. australis* (henceforth *Phragmites*) is generally a nuisance species because it is an efficient colonizer of disturbed soils and acts as a climax species thereby forming extensive monocultures that reduce plant and animal biodiversity (Ailstock, unpublished report). Ailstock reported that the aggressive nature of *Phragmites* is a direct reflection of the adaptive features of its life cycle. *Phragmites* is an efficient colonizer of disturbed environments because

it seeds profusely and spreads vegetatively by a vigorous system of rhizomes and stolons (Best et al. 1981; Hara et al. 1993; Marks et al. 1994 *in* Ailstock et al 2001).

When *Phragmites* becomes established, whether by seeds or rhizome segments, colony expansion occurs primarily by rhizomes in wet organic soils and rhizomes and stolons in sandy soils. Under optimal conditions, growth in excess of 30 feet is common within a single growing season. Such rapid growth is possible because the horizontal stems of *Phragmites* exhibit strong apical dominance. Growth is channeled to the extension of these stems rather than the production of new aerial stems from subtending nodes (Ailstock unpublished report).

Growth begins in Utah between April and June. The period of shoot emergence may last from 1 to 3 months (Cross et al 1989). New shoots grow from buds at nodes of old stems, stolons and rhizomes (http://plant-materials.nrcs.usda.gov/intranet/pfs.html). Cross (1989) reported time of flowering in Utah to be mid-July through August. Foliage stays green until frost in the fall, and thereafter becomes brittle and turns a pale yellow. Stems remain standing throughout the winter (Cross et al 1989 and author personal observation).

On Bear River Migratory Bird Refuge (Refuge), *Phragmites* is apparently able to out-compete more desirable aquatic emergent species, especially alkali bulrush, *Schoenoplectus maritimus.* Several wetland management units that historically included a mix of aquatic emergent species have, over a period of less than 5 years, become a monotypic stand of *Phragmites* (author, personal observation). *Phragmites'* ability to supplant more desirable species has also been noted in Utah by Cross et al (1989) and in North Dakota (Dix and Smeins 1967).

In general, small, sparse stands of common reed in Refuge wetlands are considered a source of biological diversity. However, due to it's aggressive growth, dispersal, and ability to displace aquatic vegetation with higher wildlife values, common reed needs to be controlled in wetlands managed for beneficial use by migratory birds.

WILDLIFE VALUE

Nesting Cover

Common reed often grows in vast, unbroken stands along marsh edges. These stands are typically dense and impenetrable, and except for the stand edge, are of little value to nesting waterfowl. Ward (1942) reported that the interior of large common reed stands at the Delta Marsh, Manitoba, were practically void of nesting ducks. Stand edges, however, were frequently used; 31 percent of 147 duck nests were found there. The most common duck species nesting in common reed edges were the mallard, lesser scaup, canvasback, ruddy duck, and redhead. Conversely, Cross (1989) found that both the interior and edges of common reed stands provided poor waterfowl nesting habitat. She cited studies at Fish Springs National Wildlife Refuge, Utah, and at the Delta Marsh in Manitoba, where only 4 to 6 percent of duck nests were found in common reed, all near the stand edge. At Fish Springs, only snowy egrets, black-crowned night herons, and yellow-headed blackbirds nested in the interior of common reed stands.

Phragmites is also used for nesting strata at Bear River Refuge. In 2002, a colony of nesting waterbirds was discovered using the *Phragmites*/alkali bulrush stand in Unit 5B. The unit has been used annually (2002-2007) by breeding white-faced ibis, black-crowned night heron, cattle egret, great egret, snowy egret, and great blue heron. Franklin's gulls utilized only the alkali bulrush component of the emergent vegetation for nesting 2002-2005. By 2006, virtually all the alkali bulrush stands that once occupied this unit had been replaced by *Phragmites*. After this time, no Franklin's gull nests have been found.

Waterbird colony and nest in Phragmites, Bear River Refuge.

On the Refuge, the secretive marsh wrens, *Cistothorus palustris*, frequently build their dome-shaped nests among the stout stalks of *Phragmites* stands.

Hiding and Thermal Cover

Common reed provides good cover for flightless adult ducks during their molting period (Swanson and Duebbert 1989).

This phenomenon has also been noted at Bear River Refuge. The Refuge hosts a number of molting dabbling duck species, notably northern pintail and mallard in mid-July. Many flightless ducks are observed escaping to large stands of *Phragmites* when disturbed or found within the open water pockets that dot the *Phragmites* stands.

The Utah Division of Wildlife Resources routinely conducts aerial surveys of the Refuge during the late fall and winter (October-January). Large concentrations of over-wintering American green-winged teal (~ 10,000 birds) utilizing dense stands of *Phragmites* on the Refuge have been reported (Tom Aldrich, personal communication).

Wildlife Food

Common reed is not an important wildlife food. Occasionally, seeds are eaten by waterfowl, and rhizomes and stems by muskrats (Martin et al 1957).

MANAGEMENT AREA

Bear River Migratory Bird Refuge is located in the northeast arm of the Great Salt Lake in Box Elder County near Brigham City, Utah. The Refuge, situated at the mouth of the Bear River, is the largest freshwater component of the Great Salt Lake ecosystem.

The Refuge encompasses about 71,000 acres of the Bear River delta and an additional 3,000 acres of uplands. The delta is a mosaic of freshwater marshes, river channels and alkali

salt flats. The Bear River delta interrupts the shrub lands of the arid Great Basin acting as a freshwater oasis that hosts high populations of nesting waterbirds and attracts large flights of migrant grebes, waterfowl, and shorebirds.

Bear River Migratory Bird Refuge was established by a 1928 Presidential Proclamation and Public Law 304 of the 70th Congress as "a suitable refuge and feeding, and breeding grounds for migratory wild fowl". The scope of the original establishing purposes has been broadened to include all migratory birds.

The mission of Bear River Migratory Bird Refuge is to: *provide the feeding, breeding, and resting habitat for migratory birds and other wildlife while maintaining the natural diversity of plants and animals native to the Bear River Basin.*

To fulfill the Refuge mission, the goal for the habitat program at Bear River Migratory Bird Refuge is to: *provide a spatial and temporal distribution of habitats to meet breeding, feeding and resting needs for species using the refuge with an emphasis on the priority species (USFWS 1997).*

MANAGEMENT UNITS

The Refuge wetlands consist of 26 wetland management units surrounded by dikes Totaling about 40,000 acres of marsh and mudflat habitat. There are another five wetland units totaling 30,400 acres, downstream of the perimeter dike (D-Line) which have limited management capabilities, but are important to wildlife (Figure 1). These units are influenced by water directed through D-Line into the Great Salt Lake.

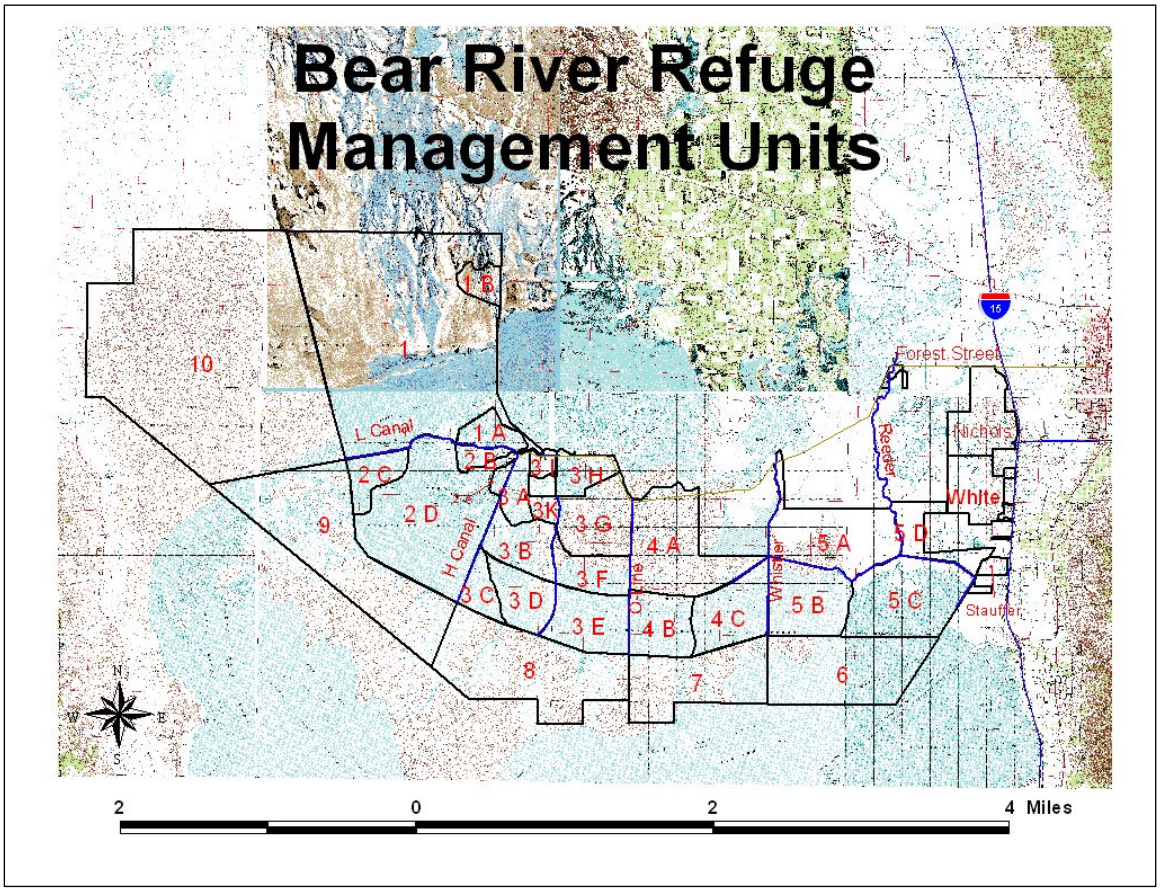

Figure 1. Management units on Bear River Refuge.

DISTRIBUTION OF PHRAGMITES

Phragmites is present in all 26 wetland management units, grassland ponds on the Nichols, White and Stauffer grassland units, and most water delivery canals on the Refuge. *Phragmites* stands are also present on dike slopes surrounding wetland units. The size (area occupied) and density of *Phragmites* stands varies by wetland unit.

OBJECTIVES

The overarching objective of *Phragmites* control is not to completely eradicate the species, as this species does contribute to overall habitat diversity of wetlands. Rather, the objective is to reduce the extent of monotypic stands that have invaded Refuge wetland habitats. Therefore, common reed will be considered a management problem if the stand(s) occupy ≥ 10 % of the total wet acres in a unit.

1) Reduce amount of area occupied by *Phragmites* to $\leq$ 10% of total area in each wetland management unit by 2015.

2) Reduce amount of area occupied by *Phragmites* along water delivery canals and wetland dikes to $\leq$ 5% of linear area by 2015.

MANAGEMENT ACTIONS

Managed wetland units (water control capabilities) meeting or exceeding the 10% area occupied by *Phragmites* and in need of control, include in priority order: 1A, 2B, 2C, 2A, 2D, 3H, 3I, 3J, 3K. Units 6-10 that are south of D-Line dike, but have no direct water level management capability, also have *Phragmites* infestations in need of control efforts. The worst infestation areas of *Phragmites* in Units 6-10 are parallel to D-line along the “borrow area”.

Unit 5B is about 1800 acres in size. When the water elevation is at a target of 4204.6 msl, there about 1100 acres of open water and 300 acres of emergent vegetation in the flooded area. *Phragmites* accounts for 90% of the total area occupied by emergent vegetation. Retired Project Leader Al Trout, indicated that the area of the unit occupied by emergent vegetation used to be about a 50%-50% mix between *Phragmites* and alkali bulrush. A survey in 2003 indicated that alkali bulrush occupied only 10% of the emergent stand. Phragmites once established, appears to out-compete other more desirable emergent species such as alkali bulrush, and perhaps hardstem bulrush, *Schoenoplectus acutus*.

As indicated earlier, *Phragmites* productivity increases when water levels in wetlands are lowered but not necessarily drained. The water levels in the majority of Refuge wetland impoundments naturally decreases or completely dries due to evaporative loss in the summer months as a result of inadequate water supply from the Bear River. This scenario likely facilitates the abundance and rapid expansion of *Phragmites* on the Refuge.

Unit 5B, though over the desirable threshold level of *Phragmites*, supports a large nesting colony of Refuge priority species white-faced ibis as well as black-crowned night heron, great egret, great blue heron, and cattle egret. The number of breeding white-faced ibis in this unit was estimated around 16,000 breeding adults in 2006, making it the largest nesting colony in North America. No action will be taken to reduce the stand of common reed in Unit 5B until either 1) adjacent unit 4C has a comparable size stand of alkali bulrush/harstem bulrush the birds could colonize or 2)the phragmites stand increases in size to occupy an area roughly 50% of the wet acreage of 5B.

CONTROL METHODS

Control strategies include herbicide application of 2% Glyphosate in the fall period (August-October). An aquatic surfactant (2 quarts/100 gallons) is mixed with herbicide. Fall treatment has been found to be most effective, as this is the period when the plant has stopped active stem growth and is instead translocating nutrients to the rhizomes (Capotosto and Wolfe 2007). The upper half of the plant is targeted for spraying in order to cover the largest surface area. Herbicide application is followed up by a prescribed burn.

Utah Waterfowl Management Area Managers, (Utah Division of Wildlife Resources) around the Great Salt Lake, follow up their herbicide application with a spring burn and spot treatment of herbicide in the fall if necessary. The Refuge units are too wet in the spring to conduct an effective burn. Instead, fall burning (September-November) will be used as the follow-up treatment to herbicide application. There should be a period of at least three weeks between herbicide application and prescribed burning to allow for sufficient time for the plant to transport herbicides to the rhizomes.

The use of prescribed fire following herbicide application has several benefits: 1) Fire removes prior year's growth. Removal of the standing vegetation allows for better visual determination of effectiveness of herbicide application (i.e. number of remaining live shoots or stems growing in treated area, the following spring), 2) Allows for more effective follow-up or spot treatment herbicide applications as chemical may be applied directly to remaining live plants and not diluted by chemical falling on standing dead vegetation, 3) Creates open areas or unoccupied niches and decreases shading to encourage colonization and germination by more desirable aquatic plant species from the existing seed bank, and 4) Creates more open space desired by migratory birds.

The Refuge has enough funding to purchase chemical to treat two units annually. In 2007, Units 2B and 2C will be treated. Refuge staff will continue to employ the two-step strategy of fall herbicide application and a fall prescribed burn in two units each year until all areas of the Refuge mentioned above have been treated. The treatment will be repeated in a unit if the amount of *Phragmites* is not reduced to objective levels. We estimate that all areas of the Refuge should be treated at least once by 2015 under this treatment strategy.

Treatment sites or units will be selected each year during the Refuge staff annual habitat planning meeting.

MONITORING

Prior to management actions, the number of acres occupied by *Phragmites* will be determined through the use of hand-held GPS units, in each of the planned treatment units. The following fall, the number of acres of *Phragmites* remaining will be calculated again to determine effectiveness of management actions. If *Phragmites* has not been reduced to the objective level, treatment will be repeated.

Through the use of GIS mapping, the Refuge is currently partnering with Ducks Unlimited staff to estimate the total number of acres occupied by Phragmites on Bear River Refuge. This information will be used to track overall progress toward obtaining the objectives.

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