

# *Phragmites australis* (Common Reed), A Looming Threat to Florida Wetlands

by Daniel B. Ward and Colette C. Jacono

The giant grass, *Phragmites australis*, is represented by two native strains in North America — one northern, one along the Gulf Coast. A foreign strain has become well established in northeastern states and is moving southward, with the potential of occupying and severely altering Florida wetlands. A description and history of these native and non-native strains is here provided.

*Phragmites australis* (Gramineae), or Common Reed, is a large grass of marshlands found in many regions of the United States. It is native to Florida, for it was known to J. K. Small in 1923 (J. NY. Bot. Gard. 29: 189. 1928) in the “wilderness east of Lake Okeechobee” and even earlier by A. W. Chapman (Flora of the Southern United States, ed. 1. 1860) from “deep river marshes near the coast,” perhaps from near his Apalachicola home in the central panhandle. It is found in tidal marshes, estuaries, and along canals and streambanks. Though locally it forms dense clones, rarely in the past has the plant been considered a threat to other wetland species in Florida.

In the northeastern states a foreign strain of *Phragmites australis* has become the dominant variant. Its behavior is quite unlike the native plant, forming a monoculture that displaces not only other wetland species but even the native *Phragmites*. But its physical appearance is so similar that only careful observation will disclose which variant is involved. The introduced plant is now appearing in mid- to west-continent and onto the lower Atlantic and Gulf Coast plains. Though the invasive strain seems not yet to be in Florida, for early detection and conservation management it is useful to have an understanding of the present distribution of these grasses, the correct names by which they are known, and the features by which they may be distinguished.

In Florida, *Phragmites* is unevenly distributed within the state. It is a familiar species of fresh to brackish wetlands and coastal bays of the western and central panhandle. Eastward it becomes less frequent, absent from many areas. It is established along canal banks of the lower Suwannee River (Dixie and Levy counties) and in the Matanzas Inlet region of northeastern Florida. In the northern peninsula it occurs along Juniper Run (Marion County), where it grows alongside the giant fern, *Acrostichum danaeifolium*, another salt-tolerant species. Southward, it is found in marshes along the Gulf and on waterfront roadbanks in the upper St. Johns River drainage. In southern Florida it becomes almost common, lining



Introduced strain of *Phragmites* in roadside ditch, Hampton, Virginia. The non-native, invasive strain has slender stems and erect inflorescences. With Forrest S. Ward, November 2008.

the Okeechobee dikes, Janes Drive in the Fakahatchee Strand, Anhinga Trail in the Everglades, and elsewhere.

Plants identical to those in Florida extend westward along the Gulf Coast to Texas, along irrigation canals of Arizona, into California, and presumably deep into coastal Mexico. In states immediately to the north, *Phragmites* is largely absent. In Georgia, only a single station has been known, from the southeastern corner. Historically, no *Phragmites* occurred in northern Georgia or the Carolinas, and just a few stations were known in eastern Virginia; only in the marshes of the middle and northern Atlantic states was the plant common. Thus the northern and southern US populations were separated by many miles of seemingly suitable but unoccupied wetlands.

By the 1980s it had become widely recognized that along the northern and middle Atlantic coasts the familiar *Phragmites* had changed its behavior and had become invasive (G. C. Tucker, J. Arnold Arbor. 71: 156-163. 1990). Expanding populations were decreasing the biodiversity of wetlands and creating management problems. But visible morphological features by which the invasive plants could be distinguished were poorly understood. Thus investigators were uncertain whether the observed changes in plant habit and distribution were a function of anthropogenic



Erect, compact inflorescence of introduced, weedy *Phragmites*. Hampton, Virginia, November 2008.



Native *Phragmites australis* ssp. *berlandieri* grows with stunted pumpkin ash (*Fraxinus profunda*) on elevated spoil islands in the lower tidal regions of East Pass, Lower Suwannee River, Florida. November 2008.

impact (alteration of hydrologic cycles, nutrient loading, or mechanical disturbance in tidal wetlands), or whether they were caused by introduction of a foreign genotype (R. M. Chambers et al., *Aquat. Bot.* 64: 261-273. 1999).

In 2002 Kristin Saltonstall, completing her graduate studies at Yale University, published on the “cryptic invasion” of a non-native strain of *Phragmites australis* (*Proc. Natl. Acad. Sci.* 99: 2445-2449. 2002). Based on chloroplast DNA, she identified 27 different haplotypes (identifiably distinct sequences) within 283 modern samples worldwide and 62 herbarium specimens collected in the Northeast before 1910 (the date of the earliest paper mentioning expansion of *Phragmites* populations). In North America, the haplotypes fell into three recognizable groups: 1) a native strain that extended from New England, across the Midwest, to the Pacific Coast; 2) a second native strain thinly spread along the Gulf Coast, including Florida; and 3) a non-native strain dominant in New England and extending southward to South Carolina and disjunct to Louisiana. The non-native North American plant shared many haplotype matches with specimens from Europe, half as many with Asia/Australia, few with North America prior to 1910 or Africa, and none with South America. The Gulf Coast plant had close haplotype affinities with South America, weaker ties with Asia/Australia, and none with Europe or Africa.

*Phragmites australis* (Cav.) Trin. ex Steud. (*P. communis* Trin., until a nomenclatural revision in the 1960s) has been a familiar species in the northeastern United States and eastern Canada since pioneer days -- and even before, as a staple used by Native Americans for arrow shafts, basketry, cordage, even edible rootstocks and seeds. Most botanists of the Northeast assumed the plant they knew in their local marshes was the same as the southeastern plant known to Small and Chapman. Only a few astute observers suspected the plant of the northeastern marshes differed in some way from the plant native to Europe. In 1930 M. L. Fernald of Harvard visited England, spending a day on the fenlands where *Phragmites* was being harvested for thatch, and became convinced the American plant merited nomenclatural recognition. On his return, Fernald searched for any name given to American plants. He found that in 1877 a French botanist, E. P. Fournier, had named a *Phragmites* from Texas as *Phragmites Berlandieri*. Fernald, apparently without realizing there was a geographic gap in the distribution of the species and that the Texas (and Florida) plant may differ from the northern plant, made the new combination, *P. communis* var. *berlandieri* (Fourn.) Fern., and applied it to his Massachusetts plants (*Rhodora* 34: 211-212. 1932). This new combination was nearly universally disregarded; almost the only place where it appeared in print was Fernald's own *Gray's Manual*, 8th edition (1950). But Fernald's judgment was correct that the European and the American plants were not the same.

Saltonstall's molecular data strongly support a genetic distinction between *Phragmites* native to northeastern America and the *Phragmites* native along the Gulf Coast. They show a closer similarity between the northern native and the northern introduction. They demonstrate the native Gulf Coast plant to be of South American origin. And they indicate the invasive North American plant was probably of European origin. Saltonstall's logical supposition (2002) was that European *Phragmites* had been early introduced at Atlantic seaports, perhaps with ships' ballast, where it persisted for several decades at low densities, unnoticed because of its similarity to the native strain, before exhibiting the aggressive pattern of spread seen over the past century.

Names have now been proposed to represent the three identified groups: *Phragmites australis* ssp. *americanus* Saltonstall, Peterson & Soreng became the northern native population; ssp. *berlandieri* (Fourn.) Saltonstall & Hauber, the native Gulf Coast population; and ssp. *australis*, the non-native population (K. Saltonstall, P. M. Peterson & R. J. Soreng, *Sida* 21: 683-692. 2004; K. Saltonstall & D. Hauber, *J. Bot. Res. Inst. Texas* 1: 385-388. 2007). With a broader perspective, Saltonstall's nomenclature is not certain to remain without challenge. Future study of haplotype diversity elsewhere in the world, and inclusion of the three other taxa presently given specific rank (*P. karka*, *P. mauritanus*, *P. japonicus*), has the potential of significantly reordering the nomenclature of the genus.



Native *Phragmites* on bank of canal, Suwannee, Florida. December 2008.

Culms of native *Phragmites*, showing leaf sheaths closely enveloping stem, with blades dehiscent.

Saltonstall's data (2002) are convincing evidence that two native populations exist in North America. Herbarium records demonstrate that these native populations are disjunct, separated by wide geographic gaps. But the non-native strain, in addition to forming monocultures where the native strain once grew with other plant species, has shown the ability to expand into regions never occupied by the native plants. This potential justifies close attention to the present distribution of the introduced strain and the faint morphological markers that permit it to be distinguished from the native Gulf Coast strain.

Saltonstall's keys (2004, 2007) separate *ssp. berlandieri* from *ssp. australis* on a single vegetative character, an observation of the culm: smooth and shiny in *ssp. berlandieri*, or ridged and not shiny in *ssp. australis*. Examination of materials from Florida of the native variant and from the mid-Atlantic region of the non-native variant confirms this distinction. However these materials also suggest that panicle size and form, characters of the leaves, and season of flowering also differ.

**A simple key may be used to distinguish these two haplotype strains:**

Panicle diffuse and partially drooping; leaf blades of lower stem abscising from leaf sheath by mid-season, lightly scabrous on lower surface; culm smooth and glossy; fall-winter flowering. Native.

..... *Phragmites australis* *ssp. berlandieri*.

Panicle erect and relatively compact; leaf blades not abscising from sheath, not scabrous; culm minutely ridged and dull; late summer-fall flowering. Introduced.

..... *Phragmites australis* *ssp. australis*.

Saltonstall's distribution maps (2004, 2007) indicated by shading that *ssp. americanus* extended from the eastern United States and Canada, to the Pacific; *ssp. berlandieri* was mapped as throughout Florida, along the Gulf Coast, and throughout Mexico; and *ssp. australis* presumably occurred throughout the entire United States. No rebuke is found with the distribution given for *ssp. americanus* nor *ssp. berlandieri*. But Saltonstall's map of *ssp. australis* does not agree with available data. The geographic gap still persists between the northern native *ssp. americanus* and the Gulf Coast native *ssp. berlandieri*, though it has been narrowed by movement of *ssp. australis* into coastal Virginia, eastern North Carolina, and locally in South Carolina (R. Stalter, *Rhodora* 77: 159. 1975); *ssp. australis* is also present in quantity in southern

Louisiana (D. P. Hauber et al., *Plant Syst. Evol.* 178: 1-8. 1991).

Saltonstall (pers. comm., Jan 2004) has generously provided the data of her Florida stations. She obtained haplotype determinations from 5 mostly early herbarium specimens, extending the length of the state from Pensacola, Escambia County, to Miami, Dade County; also from 7 modern samples of which 6 were from different locations in Brevard County. She identified all 12 samples as the Gulf Coast haplotype, *ssp. berlandieri*. None of Saltonstall's Florida collections were of *ssp. australis*.

The nearest confirmed approach to Florida of the non-native *Phragmites australis* *ssp. australis* is in the estuaries of the Waccamaw and Santee rivers, eastern South Carolina, and in the marshes of the Mississippi River delta, south of New Orleans, Louisiana. No further records were obtained of its presence in Georgia. And field observation in the present study has failed to find any Florida population that could be assigned to the non-native variant.

The question remains: Does *Phragmites australis* *ssp. australis* occur in Florida, or if not, how close has it come and is it continuing to expand its range southward (or eastward from Louisiana)? The presence of a plant in a given area may be confirmed by observation. But its absence, with anything less than perfect knowledge, is always an assumption. Yet the essentially total obliteration of the native biota from many eastern marshlands where *ssp. australis* has become established makes early detection of the presence of the invasive plant in Florida a critical necessity. It is hoped these observations will alert viewers to closer examination of *Phragmites* whenever it is encountered, and to prompt removal of this non-native strain as an unwanted member of the Florida flora.

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