UNIVERSITY OF MARYLAND EXTENSION

extension.umd.edu EBR-59 | July 2021

What Happens after Phragmites is Killed?

An Experimental Study on the Role of Native Plantings in Marsh Restoration

What is *Phragmites* and why is it a problem?

Phragmites australis ssp. *australis*, also known as common reed or "Phrag," is a tall, fast-spreading perennial grass (Family Poaceae). This non-native *Phragmites* is an aggressive wetland invader which outcompetes native plants and displaces native animals. Areas where *Phragmites* dominate have also been shown to alter wetland hydrology, increasing the potential for fire hazard.

Phragmites is tall with distinctive, fluffy inflorescences, or seedheads (Figure 1). Its growth occurs in the spring and summer with clonal spread of plants through underground stems. New plants also arise from seeds produced the previous year. Most new stands start from seeds.

Figure 1. Project research scientists evaluating a stand of Phragmites on the Severn River to determine if conditions meet the project's criteria for restoration and monitoring.

According to the U.S. Department of Agriculture, *Phragmites* now grows in all 50 states and most Canadian provinces. Although it first reached the U.S. East Coast from Europe in the 1800s, it has spread rapidly across the country in recent decades.

Stands of *Phragmites* can provide some beneficial ecosystem services, as they trap sediment, utilize nutrients, reduce wave energy along shorelines, and serve as habitat for some species of birds and mammals. However, researchers and wetlands restoration professionals see value in controlling *Phragmites'* spread to protect native wildlife and plant diversity.

Phragmites Control Methods Include Mowing, Using Herbicides, Burning, Grazing, and Flooding

As each *Phragmites*-invaded site has its own unique characteristics and constraints, the appropriate control method should be consistent with the extent of the infestation and local or state requirements. The Resource Links section provides information from University of Maryland Extension, the Maryland Department of Natural Resources, and the Maryland Department of the Environment on *Phragmites* control and permits.

Role of Native Plantings in *Phragmites'* Management

Eliminating *Phragmites* can have some undesirable impacts, resulting in poor recolonization by native plant species, changes in carbon cycling and sediment deposition, and even marsh surface collapse. To evaluate ways to offset some negative impacts of *Phragmites* eradication, researchers from the Smithsonian Environmental Research Center (SERC), the University of Maryland, and Utah State University received funding from Maryland Sea Grant College and the Smithsonian

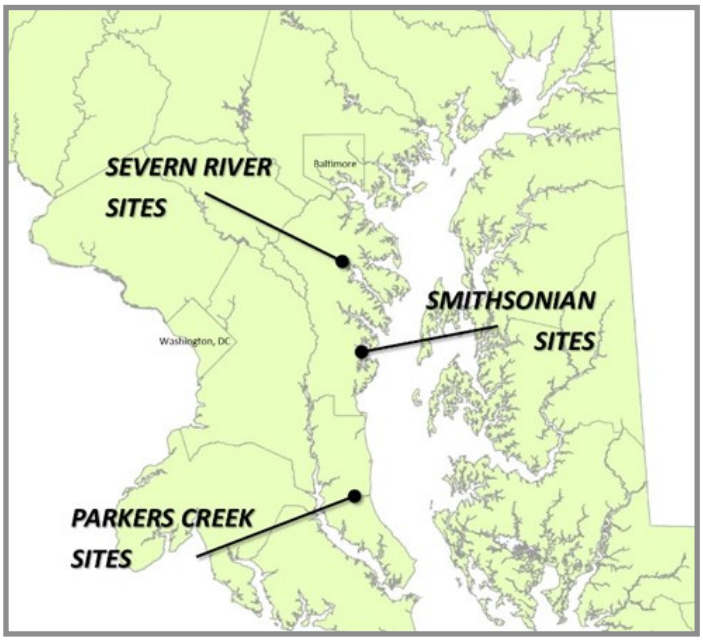

Figure 2. Location of the three Maryland wetland research sites. Within each wetland site, multiple study areas are assessed across a range of tidal flooding and salinity levels.

Institution to investigate the potential of native plantings in restoring native plant communities following *Phragmites*' removal. As part of an ongoing two-year project, the researchers planted native wetland species at tidal marshes in Maryland's Chesapeake Bay region where *Phragmites* had been removed (Figures 2 and 3, Table 1).

Year 1 Preliminary Results

During the first year of the experiment, the growth and survival of the native species was variable across study sites. At three Smithsonian study sites in the Rhode River, the native plantings grew well and are continuing to expand in year 2. The native plantings also thrived at one Severn River study site but mortality was higher at a more frequently flooded site nearby. In general, native plantings at frequently inundated sites at Parkers Creek in Calvert County did not flourish.

The discrepancies in growth and survival seem to be related to the frequency of tidal flooding – drier sites had higher growth and survival. The preliminary results suggest that frequently flooded marshes may be particularly vulnerable following *Phragmites'* removal. The importance of tidal flooding is being examined in a

Table 1. Plant species used in year one

Latin Name	Common Name
Distichlis spicata	Saltgrass
Panicum virgatum	Switchgrass
Peltandra virginica	Arrow Arum
Spartina cynosuroides	Big Cordgrass
Spartina patens	Saltmeadow Cordgrass

Figure 3. Typical research plot where plant growth and other factors are being monitored. The black plastic is used to control the re-emergence of Phragmites.

separate marsh-organ experiments (Figure 4), where the same native species are grown in pots located at different elevations within the tidal regime (Figure 4).

The project also includes studies of soil texture and biochemistry and their relationship to growth and survival. They found that sites with particularly soft, organic, "mucky" soils also had the lowest growth and survival. It is likely that, after *Phragmites* is removed, the decomposition of *Phragmites*' below ground rhizomes changes the soil structure and biochemistry, potentially creating a soil environment less conducive to new plant growth.

In Year 2, researchers are conducting an experiment to determine if a planting technique using sand will enhance plant survival and growth. The use of sand as a planting medium may potentially reduce the stress of

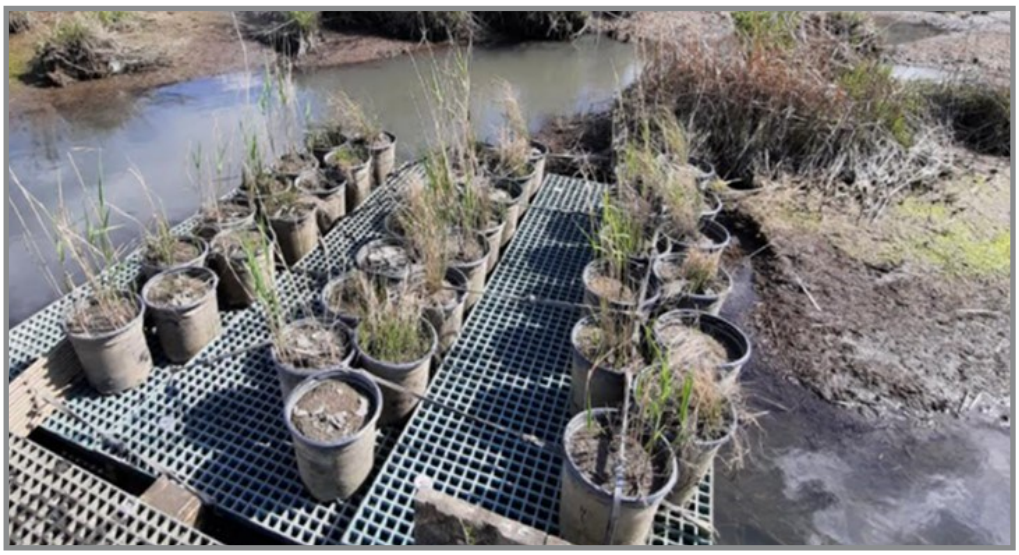

Figure 4. Pot experiment ("marsh organs") at SERC to study the impact of tide depth on plant growth. Image: Dennis Whigham.

placing plants in anaerobic substrates. Sand is commonly added to organic soils in wetland restoration projects and is thought to benefit new plant growth in wetlands. Researchers will compare the growth of species planted with and without sand and continue to track the recovery of marsh vegetation and soils following *Phragmites* eradication throughout year 2 of the experiment.

Resource Links:

University of Maryland Extension Home and Garden Information Center
https://extension.umd.edu/resource/invasive-grass-control

Maryland Department of Natural Resources: Critical Area Commission FAQ
https://dnr.maryland.gov/criticalarea/pages/faqs.aspx

Maryland Department of Natural Resources: A Landowner's Guide for the Control of Phragmites
https://dnr.maryland.gov/wildlife/Pages/plants_wildlife/Phragmites.aspx

Maryland Department of the Environment: Discharges from the Application of Pesticides (17-PE)
https://mde.state.md.us/programs/Water/wwp/Pages
IndustrialSurfaceDischargePermits.aspx

Sources:

USDA Plants Database (accessed January 27, 2021) https://plants.usda.gov/java/

USDA Forest Service. *Fire Effects Information System (FEIS)* (accessed January 27, 2021) https://www.fs.fed.us/database/feis/plants/graminoid/phraus/all.html

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(4): 2445-2449.

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This publication, *What Happens after Phragmites is Killed* (EBR-59), is a series of publications of the University of Maryland Extension and the Department of Environment and Natural Resources within the College of Agriculture and Natural Resources

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