State of Connecticut
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Bureau of Natural Resources, Wildlife Division
Wetland Habitat and Mosquito Management (WHAMM) Program

Controlling Invasive Phragmites in Connecticut's Wetlands

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Introduction

Common reed or Phragmites (*Phragmites australis* subsp. *australis*) is a marsh plant with worldwide distribution that has invaded thousands of acres of wetlands in Connecticut. Although there are small populations of a native strain (*P. a.* subsp. *americanus*) around the state, an exotic, invasive form dominates much of our coastal and inland wetlands. The DEEP Wildlife Division's Wetlands Habitat and Mosquito Management (WHAMM) Program has been the lead agency managing Phragmites throughout the state since 1997.

Phragmites will grow up to 20 feet tall. Photo courtesy of Roger Wolfe.

Ecology of Phragmites

Phragmites is a perennial grass that grows 6 to15 feet (2 to 5 meters) tall in tidal and non-tidal freshwater and brackish wetlands. The native form of Phragmites may have been present as a minor component of Connecticut's tidal marshes as early as 3,000 years ago. The native form grows sparsely as a stable component of wetland communities. It is generally accepted that the invasive form was probably introduced to North America during the late 18th and early 19th centuries on ships' ballast. It is genetically different from our native plant stock and, while commonly found in Europe, is believed to have originated in the Middle East. In the last 50 to100 years, the non-native form of Phragmites has begun spreading at rates as high as 1 to 3 percent per year in areas like the lower Connecticut River. Scientists, environmental managers, and conservationists are increasingly concerned about the potential threat the spread of Phragmites poses to wetlands throughout Connecticut.

Phragmites is intolerant of soil salinities greater than 18 parts per thousand (ppt) and is, therefore, not typically found in true salt marshes, unless the salinity regime has been altered through impounding or some other means of restricting tidal saltwater flow. Phragmites is most abundant in brackish and tidal freshwater marshes. Other factors that may contribute to the spread of Phragmites include disturbances, such as excavation, sedimentation, and increasing nutrient concentrations.

New shoots form at each node along Phragmites rhizomes. Photo courtesy of Roger Wolfe.

Phragmites forms dense, monotypic stands. Photo courtesy of Roger Wolfe.

Non-native, invasive Phragmites forms dense, monotypic colonies or clones, spreading mainly through thick underground rhizomes and airborne seeds. New shoots form at the nodes along the rhizomes. The plant is also adept at colonizing disturbed soils and along highways where seeds can be blown great distances. In nutrient rich areas, such as tidal marshes, this simple and rapid method of spread allows Phragmites to out compete native plants for space, nutrients, and sunlight. Studies have shown that plant diversity is greatly reduced following the formation of Phragmites monocultures, and that the overall ecological function of tidal wetlands is diminished. In addition to the threat imposed on native plant communities, the density and slow rate of decomposition of dead Phragmites stems in the winter provide an ample supply of combustible material that creates a serious fire hazard, particularly in urban and suburban areas.

Dead Phragmites can pose a serious fire hazard. Photo courtesy of H. Brown.

Dense stands of Phragmites form nearly impenetrable barriers to the movement of animals and large birds, such as waterfowl, shorebirds, and wading birds. Established stands can build up a thick duff layer, actually raising the marsh elevation and converting open water areas, resulting in further degradation of habitat. This loss of habitat impacts the diversity of bird species using a marsh. Birds, such as seaside (state threatened species) and saltmarsh sparrows (state species of special concern), as well as willets and American bitterns, are less abundant in Phragmites marshes, in part because they are adapted to nesting in native plant-dominated salt and brackish marshes. Although a few wildlife species, such as Virginia rail, red-winged blackbird, white-tailed deer, and muskrat, may take advantage of the cover provided by Phragmites, most birds and animals avoid it. Plus, Phragmites has little nutritional value compared to native wetland plants.

Control Methods

While complete eradication of Phragmites from a wetland may be attainable on a small, local scale, it is very difficult to achieve at the landscape level. In fact, by providing some structure and helping prevent shoreline erosion, its limited presence may contribute to the overall habitat diversity of tidal wetlands. Therefore, on a statewide level, the objective of Phragmites control is not to eradicate the species, but rather to reduce the extent of monotypic stands found in brackish and freshwater wetlands. Presently, two methods are commonly used to control Phragmites:

1) **Restoring Tidal Salt Water Flows**: The Connecticut DEEP uses tidal flow restoration as a method for restoring degraded tidal wetlands. Phragmites is largely intolerant of salinities greater than 18 ppt. Many of Connecticut's tidal creeks and rivers have been impacted by restricted flows caused by the installation of undersized culverts and flood control structures. Where feasible, reintroduction of salt water results in a gradual decline of Phragmites and replacement by native vegetation. This can be accomplished by the outright removal of obstructions, such as berms, culverts, and tide gates (which is seldom feasible in urban or suburban settings); replacing undersized culverts with larger pipes; or, if upstream flooding is a concern, by manipulating tide gates and weirs to allow increased, but limited, tidal flow. While effective, this method may often take 10 to 20 years to see desired results. The enhanced hydrology and salinity will gradually reduce the size and density of Phragmites and allow native vegetation to recolonize. Planting of native vegetation is usually not necessary because of abundant natural seed sources. Since 1980, this technique of restoring tidal flow has been used in over 1,500 acres along Connecticut's coastline.

Self-regulating tide gates (SRTs) increase tidal flow without causing upstream flooding. Photo courtesy of Roger Wolfe.

2) **Herbicide Application and Mowing**: Aquatic herbicides containing glyphosate and imazapyr can be used to control dense stands of Phragmites. An aquatic surfactant (sticking agent) is typically mixed with the herbicide prior to its application to increase contact time with the plant. Application of herbicides is done at label rates and occurs during the mid-summer and fall until the first frost. To apply herbicides in wetlands, an aquatic permit must first be obtained by the DEEP Pesticide Division and the application must be made by a licensed applicator. A month or more after the herbicide application, the dead stems can be mowed with hand-held trimmers or low ground pressure equipment. This encourages faster decomposition of the dead stems and allows sunlight to penetrate the marsh surface for native seed germination. This method of ground spraying and mowing is generally conducted for 3 successive years and has been found to be very effective in controlling Phragmites. Annual monitoring and retreatment of the site may be needed to prevent Phragmites from becoming reestablished beyond a tolerable level.

Applying herbicide to control Phragmites using a high-pressure sprayer. Photo courtesy of Roger Wolfe.

Mowing dead Phragmites stems with an amphibious Marsh Master and deck mower. Photo courtesy of Kurt Ehrhart, Innovative Mosquito Management, LLC.