Management Strategy: Invasive Species Removal/Treatment

Invasive species pose a significant threat to the health and resilience of a marsh. Invasive species can outcompete native vegetation, which can have various cascading effects on the ecosystem, and can create barriers to marsh migration.[1] To support a healthy marsh and to facilitate marsh migration on their properties, land managers may need to remove and/or treat any invasive plant species present in the marsh or in the transition zones between marsh and upland areas that may act as a barrier to migrating marsh vegetation. One of the most common invasive vegetation species found in wetlands in the Chesapeake Bay region is *Phragmites* (*Phragmites australis)*.[2] Phragmites is a wetland grass originally from Europe that grows in dense stands and can quickly outcompete native vegetation in a marsh. This management strategy highlights three invasive plant species removal techniques: herbicide, mechanical control, and prescribed burns- with a particular emphasis on Phragmites removal. Ideally, a land manager would use a combination of these management strategies for the most effect invasive species treatment. [1]

It is important to note that the removal of an invasive plant species in a marsh area, specifically *Phragmites,* is not always the best management option.[2] In some cases, the invasive species may be providing services that outweigh the harmful impact of the species. For example, *Phragmites* stands can protect eroding shorelines, sequester carbon, and filter excess nutrients from the water. Therefore, it is important for a land manager to first consider the advantages and disadvantages this invasive species poses before conducting treatment.

- **Mechanical and Physical Control**

Mechanical/Physical control of invasive species involves cutting, pulling, and mowing the above-ground shoots of an invasive plant species with equipment or by hand. [1] This method limits the disturbance on native plants, although it is typically only effective when done frequently and when it is combined with other strategies. When conducting mechanical control efforts, land managers should take special care to collect all the cut plant material and dispose of it to prevent any invasive seed dispersal.

One mechanical control technique that has been effective for *Phragmites* removal is cutting underwater also known as cut-to-drown.[3] This technique involves cutting the *Phragmites* below the water line with either hand tools or with amphibious machinery to essentially suffocate the plant. When the plant is submerged under water, it cannot access oxygen and therefore cannot continue to grow. This technique is most effective when cutting is done during the growing phase (mid-spring to late summer) and the translocation phase (late summer to mid-fall). Of course, this method is only possible in areas where the invasive plant grows within a body of water.

This approach has proven to be effective at Lighthouse Point in Collingwood, Canada.[4] By implementing the cut-to-drown method, management at Lighthouse Point was able to significantly reduce the amount of invasive *Phragmites* on their shoreline within four years.

Figure 1. Progress of cut-to-drown technique for Phragmites removal in Collingwood, Canada. Images from Phragmites Management Control in Collingwood Report. [4]

- **Herbicide**

Herbicide application is a commonly used invasive plant removal technique that uses chemicals to kill undesired plants. Herbicides can be used to remove invasive plant species inside of a marsh or stands of invasive species in transition zones that act as barriers to marsh migration.[1] The proper herbicide selection will depend on the type of vegetation targeted for removal. Although, Rodeo and Habitat are the recommended herbicides that have been approved by the Maryland Department of Agriculture for use in aquatic environments.[2] Herbicide should be used carefully and according to established guidelines to avoid harming non-target species and minimize the potential negative impacts on the environment. In Maryland certain, restricted use herbicides must be applied by certified practitioners.[5] Review the requirements on the Maryland Department of Agriculture's website. Likewise, a toxic chemicals application permit is required to spray herbicides near water and a wetland permit may be required before disturbing a wetland.[2] Contact the Maryland Department of the Environment to learn more. The cost of herbicide treatment varies depending on the type used and the amount of land that is being treated but will typically fall within the range of $6-$23 per acre**.** [6] As an example, the US Fish and Wildlife service routinely uses herbicides to treat *Phragmites* in wetlands on their Blackwater National Wildlife Refuge in Cambridge, Maryland.[7,8]

Figure 2. Herbicide application to control Phragmites at Times Beach Buffalo, New York. Photo credit: US Army Corps of Engineers, Buffalo District.[9]

- **Prescribed Burns**

Prescribed burning is a management tool that involves the use of fire to control non-native vegetation and encourage native plant growth. When combined with other management strategies, prescribed burns can facilitate the removal of invasive species.[1] In wetlands, root and cover burns are the most common burning techniques. Root burns refer to fires that are hot enough to kill plant roots by burning roots several centimeters below the marsh surface. Cover burns do not burn below the surface but consume a considerable amount of above-ground biomass. While root burns have the greatest impact on plant mortality, they are least commonly done by fire practitioners in marshes because they require a dry and drained marsh. Post-burn, land managers may decide to re-seed a burned area with native plants to encourage native plant regeneration. To be most effective at invasive species removal, an area may need to be burned routinely and used in tandem with chemical or mechanical treatments.[10]

Prescribed burns must be conducted and supervised by a qualified Burn Boss. [11] Likewise, a site-specific burn plan must be written and approved by the MD DNR Forest Service to conduct a prescribed burn in Maryland. Landowners without the qualifications to write a burn plan and conduct a burn can request the DNR Forest Service to conduct a prescribed burn on their private property. The cost of a prescribed burn varies depending on the size of the burn unit, the availability of prescribed fire crews, terrain, and vegetation types. In the southeast US, the average cost of a prescribed burn is around $32/acre but can be as high as $400/acre in regions where prescribed fire is a less common management practice. [10]

The US Fish and Wildlife Service has conducted annual prescribed burns at its Maryland Blackwater National Wildlife Refuge since the 1970s to meet several management objectives. [12]

Figure 3. Prescribed burn at the Blackwater National Wildlife Refuge in Cambridge, MD. [13]

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