Assessment of Treatments and Long-Term Success in Restoring Common Reed (*Phragmites Australis*) Dominated Marshes on Delaware Bay, 1996-2017

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Project Background

The Salem Generating Station, in response to its New Jersey Pollutant Discharge Elimination System (NJPDES) permit, embarked on an unprecedented effort to help restore a portion of the Delaware Estuary in New Jersey and Delaware (USA) by establishing the Estuary Enhancement Program (EEP) in 1994. Today, the EEP is recognized as the largest privately funded program of its kind in the US, with more than 20,000 acres of salt marsh and adjacent uplands being restored, enhanced and/or preserved.

Pre-Restoration Conditions

Included in the areas that are being restored under the EEP restored are 4,200 acres of brackish marsh located in New Jersey and Delaware that were dominated by monotypic stands of invasive Common Reed (*Phragmites australis*). The objective of the restoration efforts at the *Phragmites*-dominated sites was to induce the re-establishment of smaller channels, improve the quality of fish habitat, decrease the availability of Phragmites seed and the potential for spread of Phragmites by rhizomes, provide a suitable substrate for colonization by more desirable species, such as Spartina alterniflora, and reduce shading of the developing desirable plant species.

Restoration Approach

Initial restoration was achieved by aerial and ground application of glyphosate-based herbicide followed by prescribed burning the following winter to remove standing culms form the prior growing season and expose the marsh plain. Topographic mapping was then completed to assess marsh plain elevations relative to mean tide levels and assess channel geomorphology.

Adaptive Management and IPM

Significant regrowth of Phragmites occurred following initial treatments, triggering the implementation of an extensive Integrated Pest Management (IPM) program that assesses available mechanical and biological alternatives to continued herbicide treatments. The effectiveness of treatments was assessed through collection of ground measurements of percent coverage within quadrats as well as interpretation of aerial photography to assess overall vegetative coverage within Test Areas.

Tragectory of Restoration to Diverse Tidal Marsh Ecosystem

Annual treatments have continued to date in order to maintain Phragmites coverage at the established coverage goal of 4 percent. Annual vegetation cover mapping and geomorphological analysis document the success of this long term Phragmites restoration.