Phragmites Control and Restoration Strategy

Utah Division of Forestry, Fire and State Lands

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Purpose

The purpose of this document is to outline the strategies and approaches the Division of Forestry, Fire and State Lands (FFSL) is executing to remove invasive Phragmites from the wetlands and lakebed of Great Salt Lake. Additionally, this document provides an overview of the water use of Phragmites, its impacts to hydrology, and what will be gained in terms of available water for Great Salt Lake when Phragmites is removed and controlled.

Introduction

Phragmites australis (common reed), hereafter referred to as Phragmites, is a non-native, invasive perennial wetland grass-like plant that has heavily invaded the wetlands and riparian areas of the Great Salt Lake watershed after the high waters of the 1980s receded. Phragmites forms dense monocultures with extensive, thick root structures. It can grow to over 15 feet tall. It spreads rapidly by seed, rhizome, and stolon. Phragmites decimates migratory bird habitat, outcompetes native plants, reduces biodiversity, reduces water availability, and disrupts hydrology.

It is important to mention that there is a native species of common reed, *Phragmites australis subsp. Americanus*. This is a distinct species from the non-native species that has invaded. The native species is found throughout Utah, but genetic research has shown it is a small component of the Great Salt Lake watershed, with over 90% of the Phragmites in the watershed being the non-native species.

Phragmites Water Use and Impacts to Hydrology

Evapotranspiration

Phragmites can consume a lot of water through evapotranspiration (ET) and also disrupts surface flow of water because it grows so densely. If Phragmites is removed from the watershed, it can be expected that there will be more water available and more efficient flow of water in areas where Phragmites was previously blocking it.

The amount of water gained from the removal of Phragmites is very difficult to quantify. In 2016, FFSL contracted the Division of Water Quality to model an estimate of Phragmites ET within the lake basin. It was estimated that under standard conditions Phragmites consumed, though ET, approximately 3.62 acre-ft of water per acre of Phragmites compared to 1.55 acre-ft

of water per acre of Inland Saltgrass, a native wetland grass species commonly found in Great Salt Lake wetlands. These estimates are theoretical.

The Great Salt Lake Commissioner's office has a goal of a 10% reduction in water depletions by 2034. Using the above water use estimates, the number of acres of Phragmites removal needed in order to reduce depletions from Phragmites by 10% can be roughly estimated. If there is approximately 30,000 acres of Phragmites in the wetlands of Great Salt Lake, removing 5,246 acres of Phragmites and converting those acres to Inland Saltgrass would reduce the amount of water lost through ET by 10%. Following the strategy outlined below, this reduction in Phragmites cover is easily attainable. FFSL and Wildlife Resources have already been working on the Phragmites removal effort in the wetlands for over a decade. From these efforts, more than 5,246 acres have already been removed.

Additional Studies

FFSL is currently working with the Utah Geological Survey (UGS) to measure ET from a patch of Phragmites within the Nature Conservancy and FFSL Miller Pond Restoration Project in order to get an empirical estimate of Phragmites water use. This will be compared to the measured ET from the same location once Phragmites has been removed. In addition to ET estimates, UGS is also characterizing the hydrology and vegetation to better understand how Phragmites removal impacts hydrology and the water budget. These quantitative measurements will help refine the water use estimates of Phragmites so it can be better understood what water is gained for Great Salt Lake with the removal of Phragmites.

It is important to note that regardless of the water use, Phragmites should be removed from the wetlands of Great Salt lake. Doing so will drastically improve the habitat quality and increase the health and function of the wetlands, a vital component of the Great Salt Lake ecosystem. FFSL will continue work on evaluating the water use and hydrology impacts of Phragmites, however, the removal of Phragmites and restoration of the wetlands should take priority over the water use estimation and Phragmites removal should continue without the need to have an accurate water use estimate first.

Hydrology

In addition to the loss of water by ET, the impacts to water flow on the lakebed should be considered. When an inflow to Great Salt Lake reaches the lakebed, if that lakebed area is invaded with Phragmites, the water can be physically blocked from flowing towards the main body of the lake. This can reduce the amount of lakebed wetted or covered by water, which increases dust production, reduces bird habitat extent, and alters biogeochemical processes of Great Salt Lake. Removal of Phragmites from the inflow lakebed areas will decrease these effects and help more water flow to the main body of the lake.

Phragmites Control Strategy

Best Practices

The backbone of FFSL's strategy for Phragmites removal and wetland restoration is best practices developed from research by the Wetland Ecology and Restoration Lab at Utah State University and on the ground experience from Great Salt Lake wetland managers. These best practices were used to create a treatment protocol for Phragmites on the lakebed of Great Salt Lake.

There are two important key understandings to highlight from the best practices. The first is that a late season (August - September) herbicide spray on well-watered, healthy Phragmites is the most effective way to kill a Phragmites patch. In the research studies, better long-term results were observed as compared to a mid-summer spray. The second key understanding is that drought-stressed Phragmites does not effectively uptake herbicide. In other words, spraying dry Phragmites simply does not work.

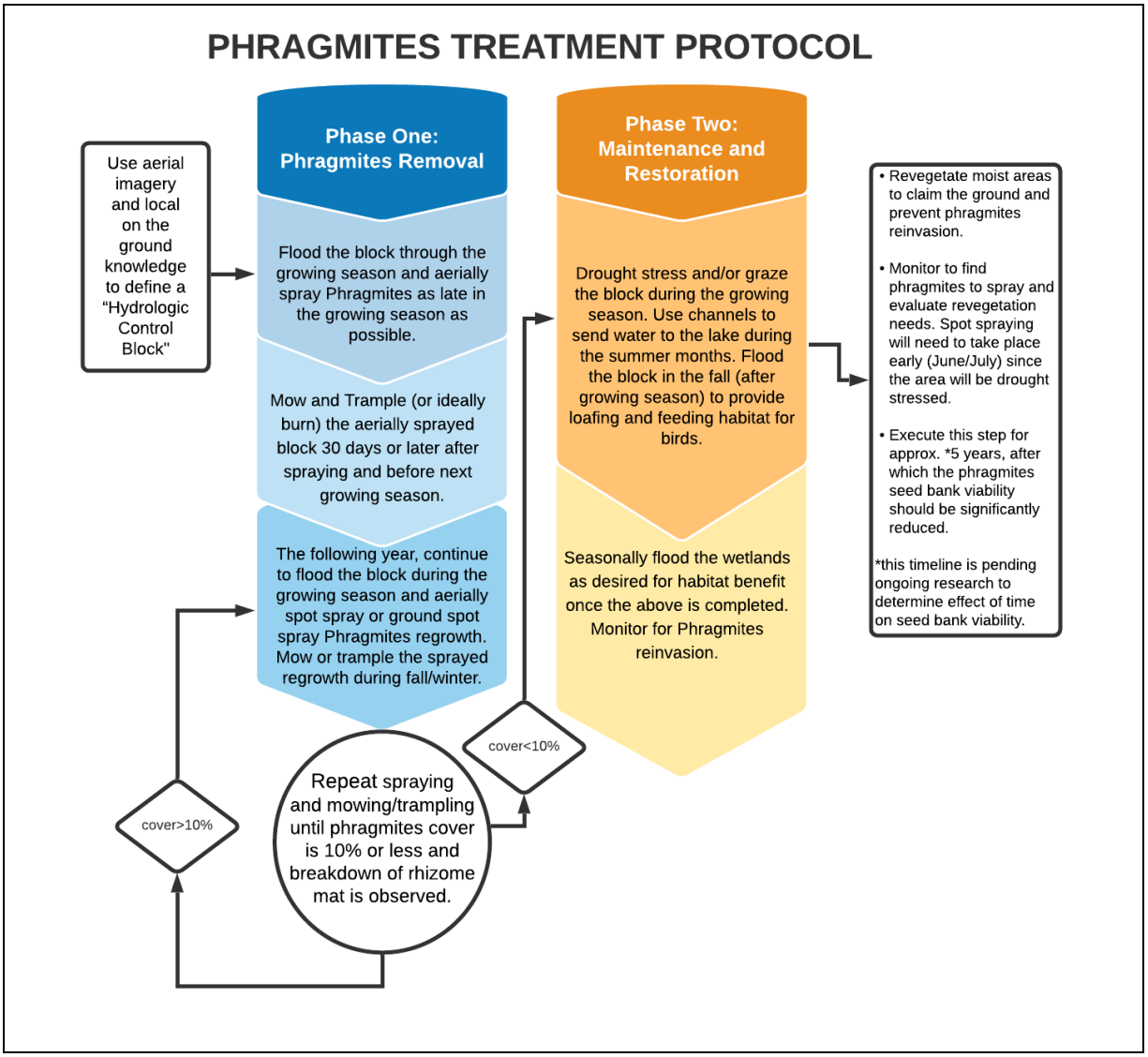
These two key understandings are very important for planning and executing Phragmites control and restoration on the lakebed. For example, mowing or cutting a channel through a large patch of Phragmites with the goal of flowing more water to the lake (and less to feeding the Phragmites) will inhibit the effectiveness of herbicide treatments on that patch. This will make the long-term goal of removing Phragmites from the lakebed more difficult to achieve. Therefore, it is best to allow the water to sheetflow through the patch until the Phragmites has been removed.

Careful monitoring of conditions at all active treatment areas is needed in order to determine whether an earlier herbicide treatment needs to take place prior to a patch drying out. If a patch is well watered, then a late season treatment is preferable. Additionally, in areas where water control is an option and the water supply for that area is scarce, the water that is available should be prioritized for areas that are being treated.

Treatment Protocol

Below is a schematic of the treatment protocol along with an explanation of how the protocol is applied on the ground around the lake. Next, there is an overview of the project areas, each of which will have its own strategic plan. Following that is an example of the development of a site specific strategic plan.

The treatment protocol is shown below:



In Phase 2 of the protocol, if feasible, water can be sent to the lake using channels (rather than potentially feeding Phragmites) during July and August. July and August are the two months when Phragmites most rapidly expands and when viable seeds are developed. Pushing water to the lake during this time may also alleviate stagnation of water when temperatures are high, bird use is significant, and harmful algae blooms and botulism threaten birds.

The treatment protocol is applied to manageable project areas, called Hydrologic Control Blocks, that are determined in size and location by water source for the given block and the ability to control water flow to that block. This allows for maximal efficacy of control treatments and reduces reinvasion pressure from adjacent Phragmites.

FFSL partners with the upstream landowners of each of the project sites around the lake to develop site specific strategic plans that map out the execution of the treatment protocol over time within the designated project site. This allows for collaborative, strategic management of water with the upstream landowner.

Current Treatments and Project Sites

FFSL Phragmites Control treatments on the bed of Great Salt Lake began in 2015. As of 2024, most areas of the lake are well underway with Phase 1 treatments even though formal strategic plans have not been put in place for each project site. Strategic plans will be created for each project site as time allows to ensure an effective long-term strategy is developed for each project site. In the meantime, Phase 1 treatments can be executed, following the treatment protocol, in order to maintain progress on Phragmites removal. Execution of Phase 1 treatments at a given project site will help inform the planning process at that site.

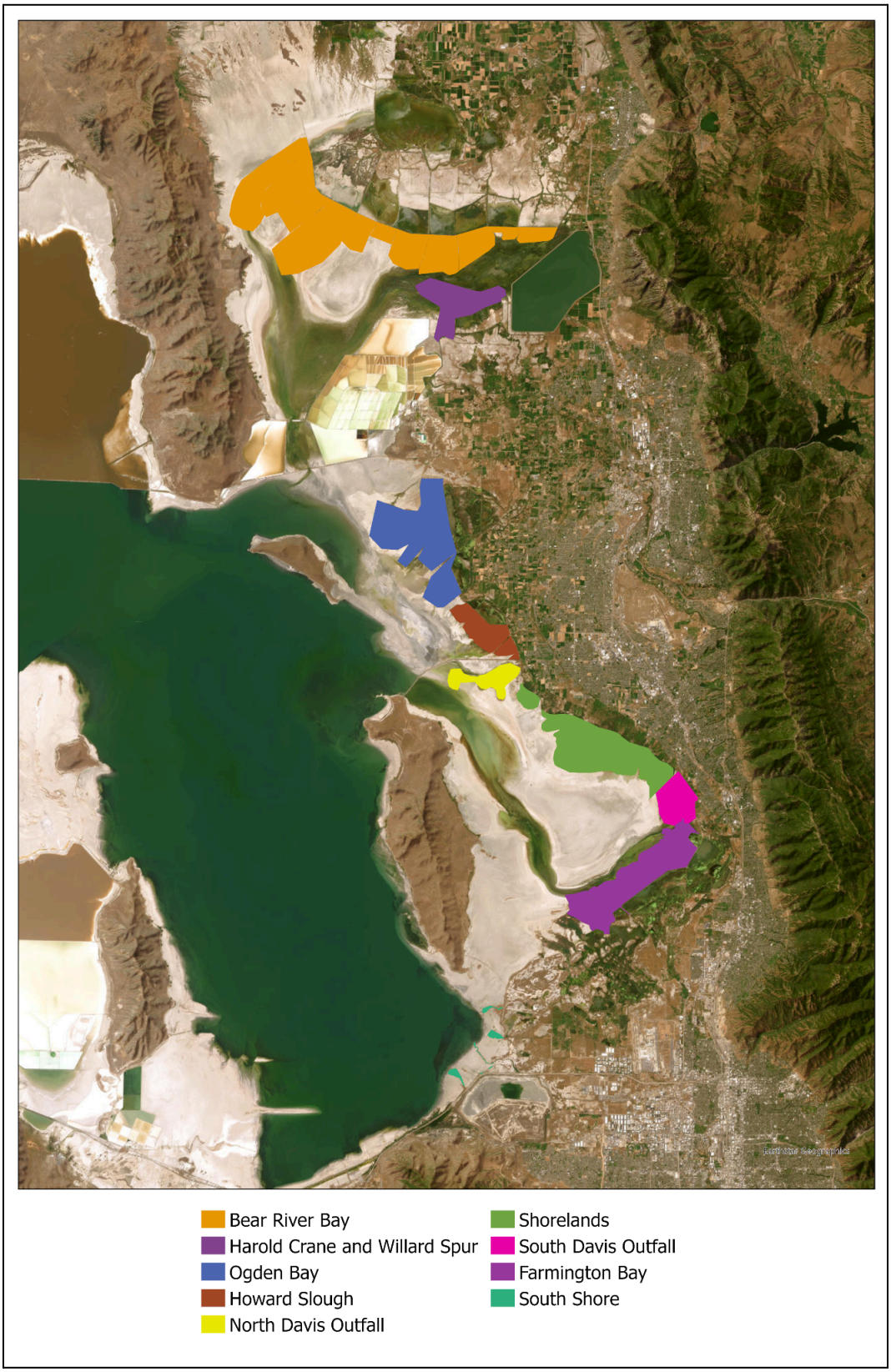
It is important to note that not all areas have the ability to control water. Treatments will still take place in these areas and can be effective, but it will likely take longer to complete Phase 1 and more difficult to maintain Phase 2. A list of the primary project sites where strategic planning has or will take place is shown below.

Table of Primary Project Sites:

Project Site	**Partner(s)**	**Water Control**	**Plan Completed**
Farmington Bay	DWR Farmington Bay WMA	high	2021
Howard Slough	DWR Howard Slough WMA	medium	2022
Bear River Bay	Bear River Refuge	medium	in draft
Shorelands	TNC Shorelands Preserve	low	in draft
Ogden Bay	DWR Ogden Bay WMA	medium	no
Harold Crane and Willard Spur	DWR Harold Crane and Willard Spur WMAs	low	no
South Shore	TNC, Audubon Rockies	none	no
North Davis Outfall	North Davis Sewer District, DWQ, TNC	high	in draft
South Davis Outfall	South Davis Sewer District, DWR Farmington Bay WMA, and TNC Shorelands Preserve	none	no

A map of the project sites is shown below.

Map of Primary Project Sites:

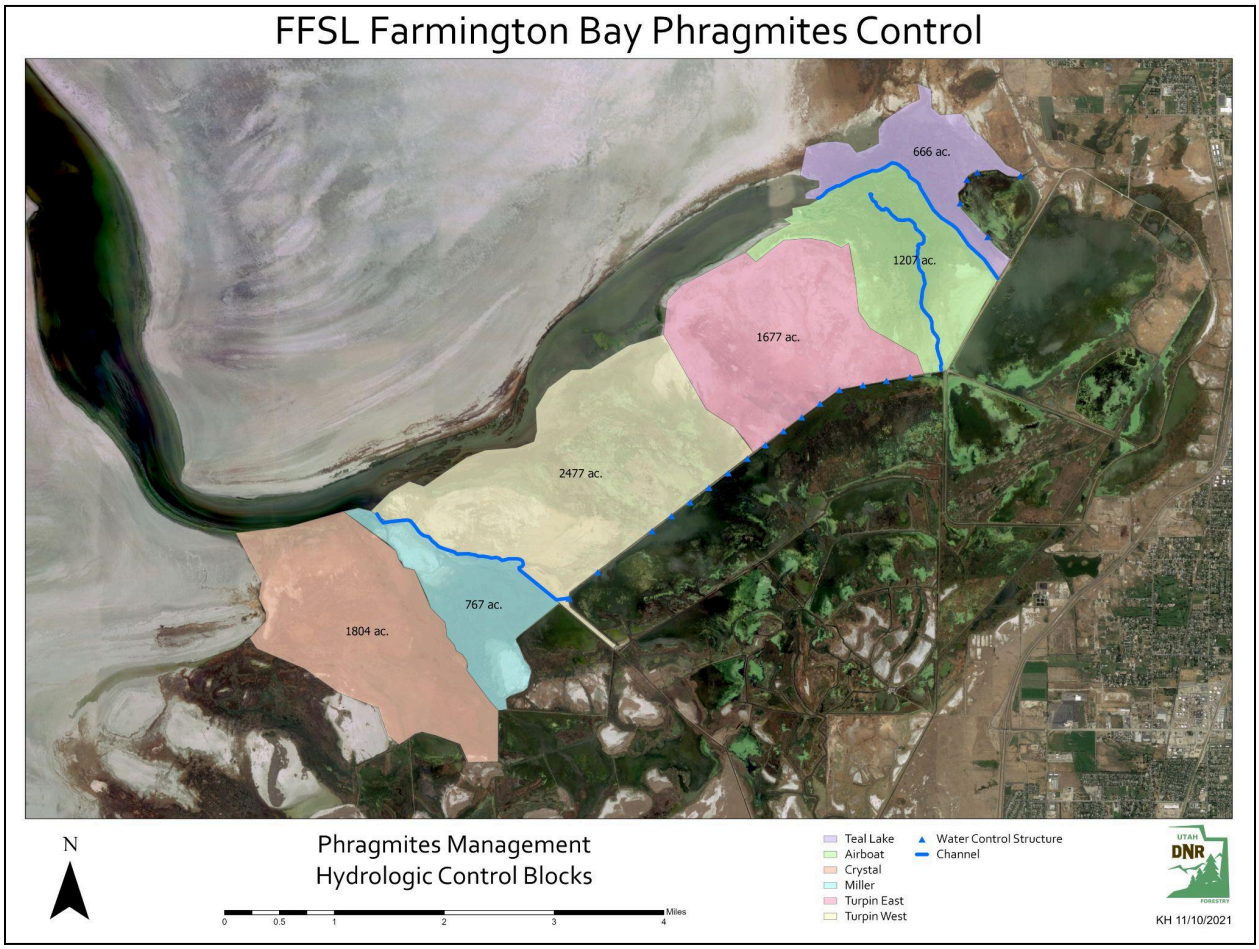


Example Strategic Planning

The planning steps used to create plans for each project site are explained below. Examples of each step are given.

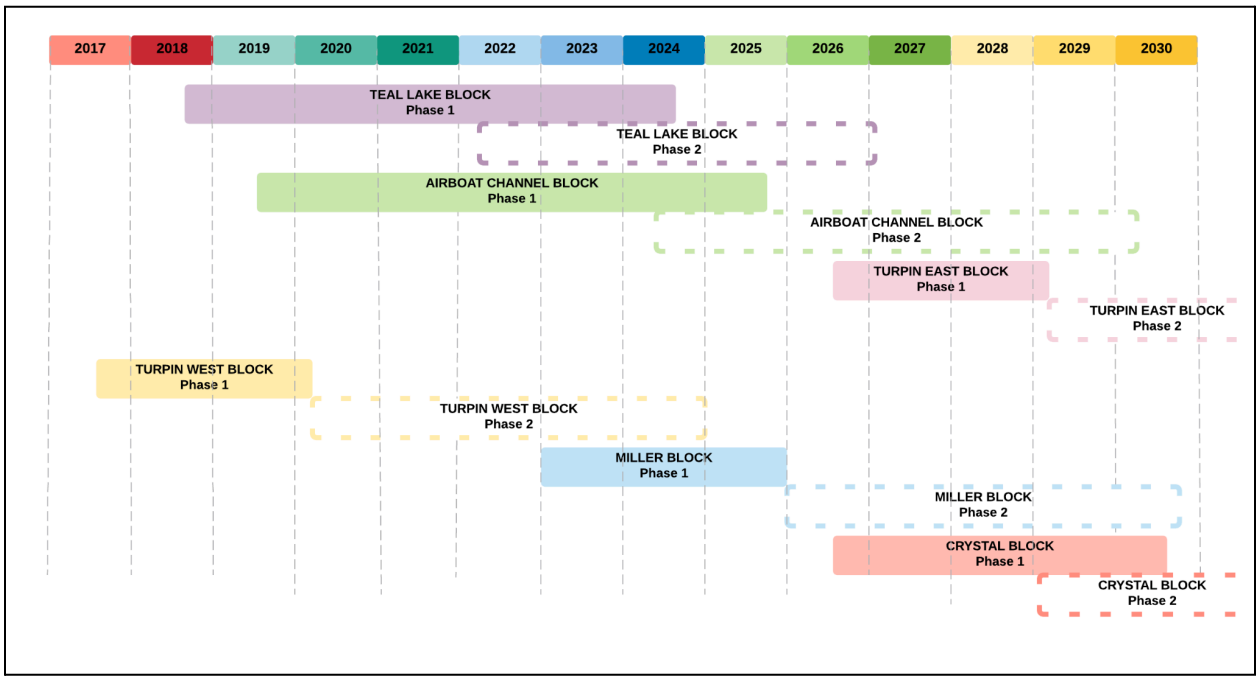
Step 1 - Divide the project site into Hydrologic Control Blocks using knowledge of water control ability at the sites, observed hydrology, and historical aerial imagery.

Example Map of Hydrologic Control Blocks:



Step 2 - Create a long term calendar for following the treatment protocol at each block based on water control ability, estimated available funding, and site conditions.

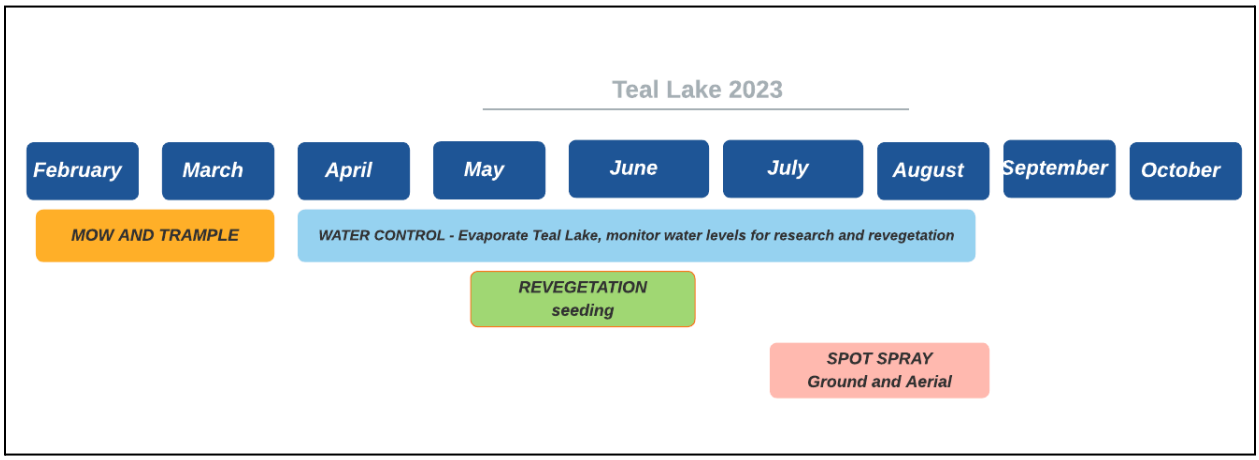
Example Long Term Project Site Treatment Calendar:



Step 3 - Create seasonal treatment calendars for each block.

These calendars will be created annually for the upcoming season. The calendars will be adjusted based on treatment execution, treatment efficacy, and site conditions.

Example Seasonal Treatment Calendar for Individual Block:



Program Needs

In order to successfully execute the treatments in these strategic plans, FFSL needs the following:

- Continued funding
- Storage infrastructure for equipment, herbicide, and seed for long-term maintenance activities

In addition, the following will be very helpful for more efficiently and cost effectively executing treatments:

- Support for prescribed fire
- Phragmites mapping through the use of remote sensing
- Additional staff