Vegetation mapping and monitoring at wetland restoration sites in the Delta and Suisun Marsh

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Introduction

The Fish Restoration Program (FRP) is a cooperative effort by the Department of Fish and Wildlife (CDFW) and the Department of Water Resources (DWR) to address specific habitat restoration requirements of the US Fish and Wildlife Service and National Marine Fisheries Service biological opinions for State Water Project (SWP) and Central Valley Project operations. FRP is also intended to address the habitat requirements of the CDFW Longfin Smelt Incidental Take Permit for SWP Delta operations. An objective of FRP is to restore 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh to benefit delta smelt, longfin smelt, winter-run and spring-run Chinook salmon and to enhance food production and availability for native Delta fishes. The Fish Restoration Program is tracking habitat development over time and establishing measurable restoration outcomes through spatial extent and species composition of vegetation at restoration sites.

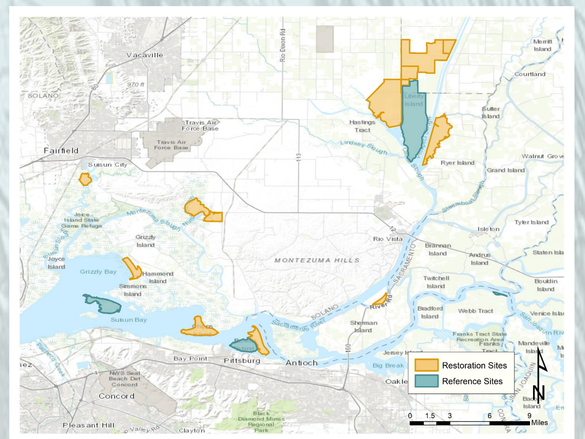


Figure 1. Locations of FRP restoration and reference sites within the Delta and Suisun Marsh.

Methodology

- Aerial imagery, ground truthing field surveys, and GIS will be used to create digital vegetation maps and to monitor vegetation composition and cover at 11 restoration sites and 4 reference sites.
- Vegetation at each restoration and reference site will be field sampled and mapped using heads-up digitizing,
- Sites will be mapped pre-construction, immediately after construction (as-built) and every 3 years post-construction, for a minimum of 10 years.
- Vegetation field data collection and mapping will be done using methodology and standards developed by CDFW's Vegetation Classification and Mapping Program (https://wildlife.ca.gov/Data/VegCAMP/Publications-and-Protocols).

Results

True color 0.5-foot resolution aerial photography was collected for all restoration and reference sites in 2018.

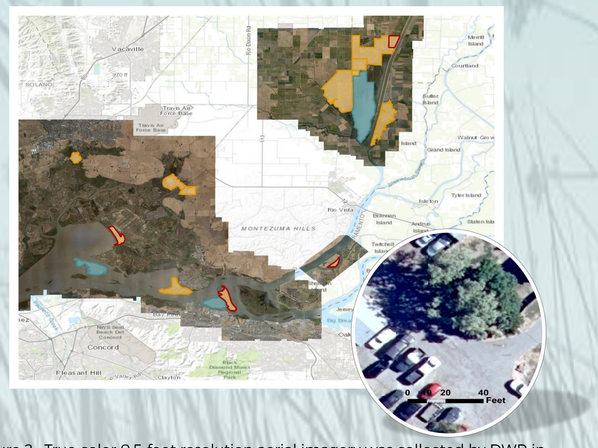


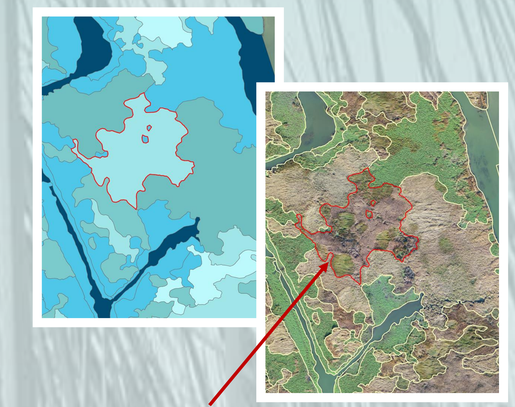
Figure 2. True color 0.5-foot resolution aerial imagery was collected by DWR in 2018 for both restoration and reference sites. 0.5-0.75-inch resolution drone imagery was collected for 4 completed projects in 2018 and 2019 (highlighted in red). The enlarged image of state vehicles at the Grizzly Island Complex Headquarters is an example of the imagery collected in 2018.

Pre- construction field surveys were conducted in the spring and summers of 2018 and 2019.

Survey Form Field	Value
Waypoint ID	PEN1808130910
Surveyors	AO~, JM
Date	8/13/2018
Location Name	Winter Island
Coordinates	603377E, 4211519N
Photos	FRP: 581-584>N-W
Stand Size	1-2 acres
Field Alliance/Association	Phragmites australis
Comments	Dense Phragmites australis with mix of Schoenoplectus acutus and Schoenoplectus californicus.
Tree Cover	0%
Tree Height	N/A
Tree dbh	N/A
Shrub Cover	0%
Shrub Height	N/A
Herb Cover	70%
Herb Height	2-5m
Non-native Plant Cover	High >66%
Species Cover	Phragmites australis 70%, Schoenoplectus acutus 10%, Schoenoplectus californicus 15%

Figure 3. Field surveys were conducted at both restoration and reference sites in the Spring/Summer of 2018 and 2019. Yellow points represent locations where vegetation surveys were conducted. At each survey point vegetation cover, plant species composition and photographs were collected to aid in vegetation mapping.

Pre-construction vegetation maps were completed for all restoration sites and reference sites. Restoration projects were completed at 4 sites in 2018 and 2019 and post-construction (as-built) vegetation maps were completed for each of these sites.



Map Attribute	Value
Map Unit	Schoenoplectus (acutus, californicus) - Typha (angustifolia, latifolia) Association
Height Class	2-5m
Size Class	NA
Hardwood Cover	0
Conifer Cover	0
Total Tree Cover	0
Shrub Cover	0
Herb Cover Class	>59%
Total Veg Cover	65%
Invasive Plant Cover	No Invasive =<5%
Isolated Tree	No
Restoration	No
Clearing Disturbance	No Disturbance =<5%
Lepidium	No
Ludwigia	Yes
Comments	Sub mmu patches of Typha sp within stand, patches of Ludwigia sp in stand that are too small to map
Method ID	Photo Interpretation
Acres	2.146738

Figure 4. Post-restoration vegetation map of Winter Island. Each colored polygon represents a mapped vegetation type. This vegetation map was created using 0.75-in resolution imagery collected by CDFW with a drone. Each mapped polygon is assigned attribute values, including percentage vegetation cover, vegetation height and percentage of invasive species cover. Polygons were mapped and attribute values assigned using a combination of information obtained during field surveys and photointerpretation of the aerial imagery.

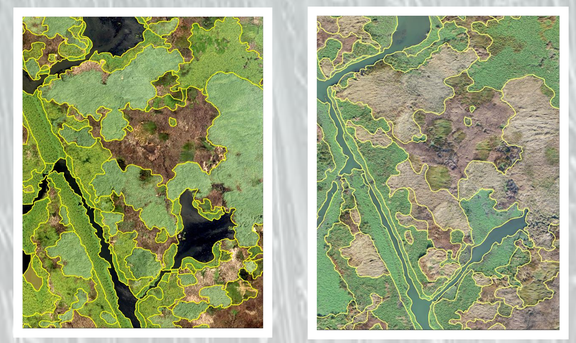


Figure 5. Vegetation maps will be used to monitor changes in vegetation at all sites. The figure on the left is a vegetation map of Winter Island pre-construction (2018) and the figure on the right is Winter Island post-construction (2019).

Acknowledgements

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More Information

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Further information on the Fish Restoration Program: https://wildlife.ca.gov/Regions/3/FRPA