Ditch Severity and Vegetative Class at the Peggotty Salt Marsh

By Zachary Fouser with Scott Jackson and the Dept. of Environmental Conservation

My Job

This past summer I worked as a Salt Marsh intern under the leadership of Scott Jackson. At these salt marsh sites, we conducted drone flights to photograph the study area. These photographs were taken in RGB, red edge, near infrared, short wave infrared, and even LiDAR. This work force is studying the changes in vegetation and elevation over time to understand the impacts of certain features like ditching, sea walls, and rising sea levels; as well as identify where conservation action might avoid a tipping point. My job as an intern was to conduct photogrammetry procedures into an orthomosaic and Digital Elevation Model (DEM) for the analysis phase. Another job was to help deploy 45 water loggers at two salt marsh sites to intensively measure the water levels and take survey points with an RTK GPS unit to validate the models.

The Twelve Vegetation Subclasses

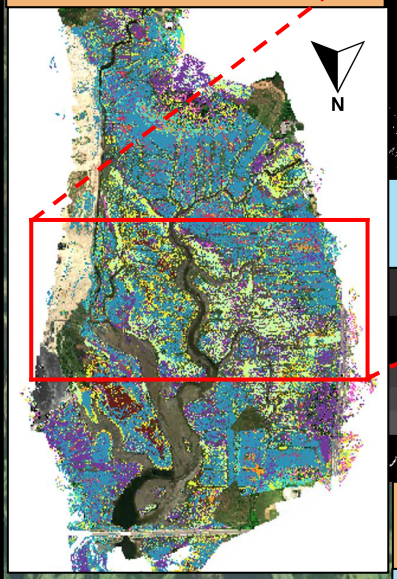
1. Tall form *S. alterniflora* dominant
2. Tall form *S. alterniflora* recessive
3. Short form *S. alterniflora* dominant
4. Short form *S. alterniflora* dominant or mixed
5. *S. patens* and *D. Spicata* dominant with short form *S. alterniflora* dominant
6. *S. patens* and *D. Spicata* dominant
7. *S. patens* and *D. Spicata* mixed with high marsh species and shrubs
8. *Juncus gerardii* dominant
9. *S. patens* and *D. Spicata* mixed with *Iva frutescens, Limonium carolinianum, Baccharis halimifolia*
10. *Salicornia spp.* or *Suaeda spp. Dominant*
11. Brackish marsh species such as *Bolboschoenus spp. dominant*
12. Brackish marsh species *Phragmites australis* dominant

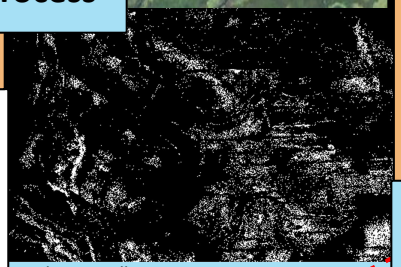
Salt Marsh Importance

Salt marshes are very important for the whole community. They limit the severity of storms, are a wave buffer, purify water, are a home to millions of plants, birds, fish, invertebrates, and terrestrial animals. They are one of the largest carbon sinks as well because of a fast production rate and a very slow decomposition rate due to frequent inundation of salt water leading to anaerobic conditions. In this modern age it is of utmost importance to secure our carbon sinks to reduce our total carbon footprint.

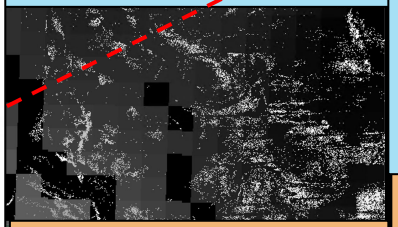
The Process

1. Raster Calculator for each subclass 1-12





2.Clip to smaller section
3.Reclassify by Table
present = 1; absent = -1



4.Use Raster calculator to multiply ditch metric with vegetative presence indicator

5.Create 500,000 random points of the new single raster band and export to excel

6.Correlate absolute value of ditch metric with the presence/absence of vegetation class

Ditching

Back in the Great Depression, the US government started a program to ditch salt marshes. The abundance of mosquitoes were unpleasant and ditching was believed to limit the amount of surface water. This program was not successful and only created issues for the salt marsh. These ditches still flooded over the soil during high tide but dried out the soil during low tide. This could have made the existing grasses die out and be replaced by generalist species.

Results

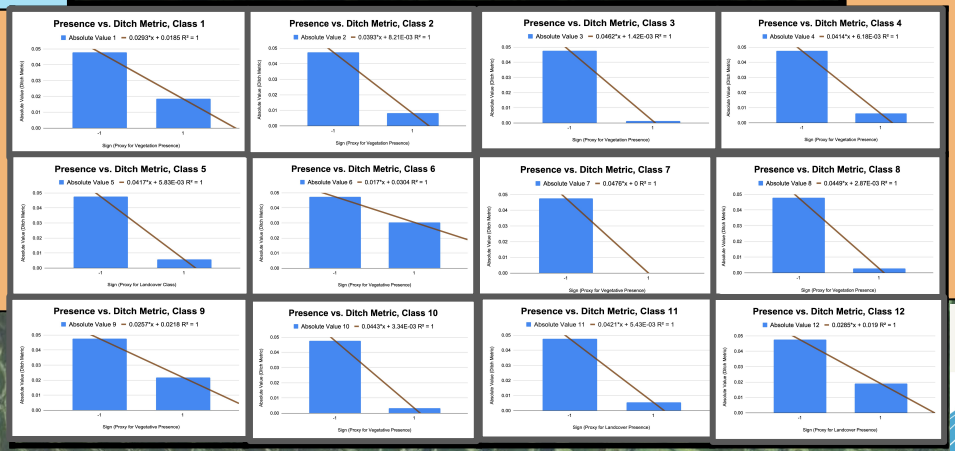
Class 1 and 2 are regularly inundated with water and are found in areas with higher ditch metric values because ditches create more surface area for water; however, further up on the ditch, the soil gets drier as the tide recedes making these areas more uninhabitable for these classes. Class 3 and 4 should be more dominant in this area as well as class 5 and 7 but because of ditching they are not. Class 6 and 9 are found higher up in the marsh and like drier soils. Class 7 was not in the survey area. Class 8, 10 and 11 are seen in areas with fewer ditches. Class 12 might be inaccurate because of errors in the classification model and might be confusing Class 12 with class 1.

Discussion

Ditching might be affecting the total biodiversity of the salt marsh. Classes 4, 5 and 7 all have a high biodiversity but are rarely seen on this model. Classes 8, 10, and 11 should also exist more because they are mainly found on the outskirts with limited ditching where the soil is denser. Class 6 and 9 are so prevalent because they prefer drier soils and still get inundated at high tide.

With more soil being inundated with water during high tide, not only is there more erosion on the edges but also on the surface of the marsh leading to a leveled out elevation. Ditching is also drying up the soil within the salt marsh which could be leaving the area to certain vegetation that is more suitable for drier conditions.

While these data may be able to show a comparison of vegetation subclasses with ditching, there are various inconsistencies within this data. The sample area might be too small; there may not be enough points; the vegetation models are also still in development. Class 12, for example, was seen on the edges of creeks even though Phragmites is brackish and occurs in the middle of the marsh.



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