

Plant succession and dynamics of soil properties along the Lake Mead Shoreline

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Research Question

♦ Are vegetation and soil properties recovering with the draw down of Lake Mead?

Hypothesis

♦ Succession and soil recovery on the newly exposed Lake Mead shoreline are moving at a slow rate.

INTRODUCTION

♦The receding level at Lake Mead has exposed land that was formerly submerged resulting in changes in desert soil properties including, salinization and siltation, among others. These highly disturbed soils have resulted in plant communities undergoing primary succession as they re-establish along the newly exposed shoreline. This is a unique situation because little is known about primary succession in the Mojave Desert.

♦The exposed shoreline around Lake Mead is being populated by an exotic shrub, tamarisk (*Tamarix ramosissima*).

♦ Many newly exposed areas are left barren.

♦Our objective was to assess soil and plant community compositionalong the Lake Mead shoreline to help understand patterns of plant colonizationin this primary succession environment.

METHODS

♦ This study was conducted by setting up 150 plots around Lake Mead at Stewart’s Point, Overton Beach, and Boulder Beach (figure 1,2) .

♦ Within each site we established 10 transects with 100 m² plots at elevations that represented lake levels at 2008, 2005, 2002, 1998, and never submerged control plots.

♦ At each plot a complete species list was collected for both perennial and annual plants.

♦Soil samples were collected from the top 5 cm of soil.

♦At each plot live and dead tamarisk were individually counted between December 2010 and February 2011.

♦Soil samples were analyzed at UNLV Environmental Soil Analysis Laboratory for soil texture, nitrogen, carbon, CaCO₃, inorganic C, organic C, and total S.

♦Statistical analyses were conducted using ANOVA tests to compare effects of the year and site on soil properties and plant species dynamics.



Fig 1: View of plot distribution at Boulder Beach.

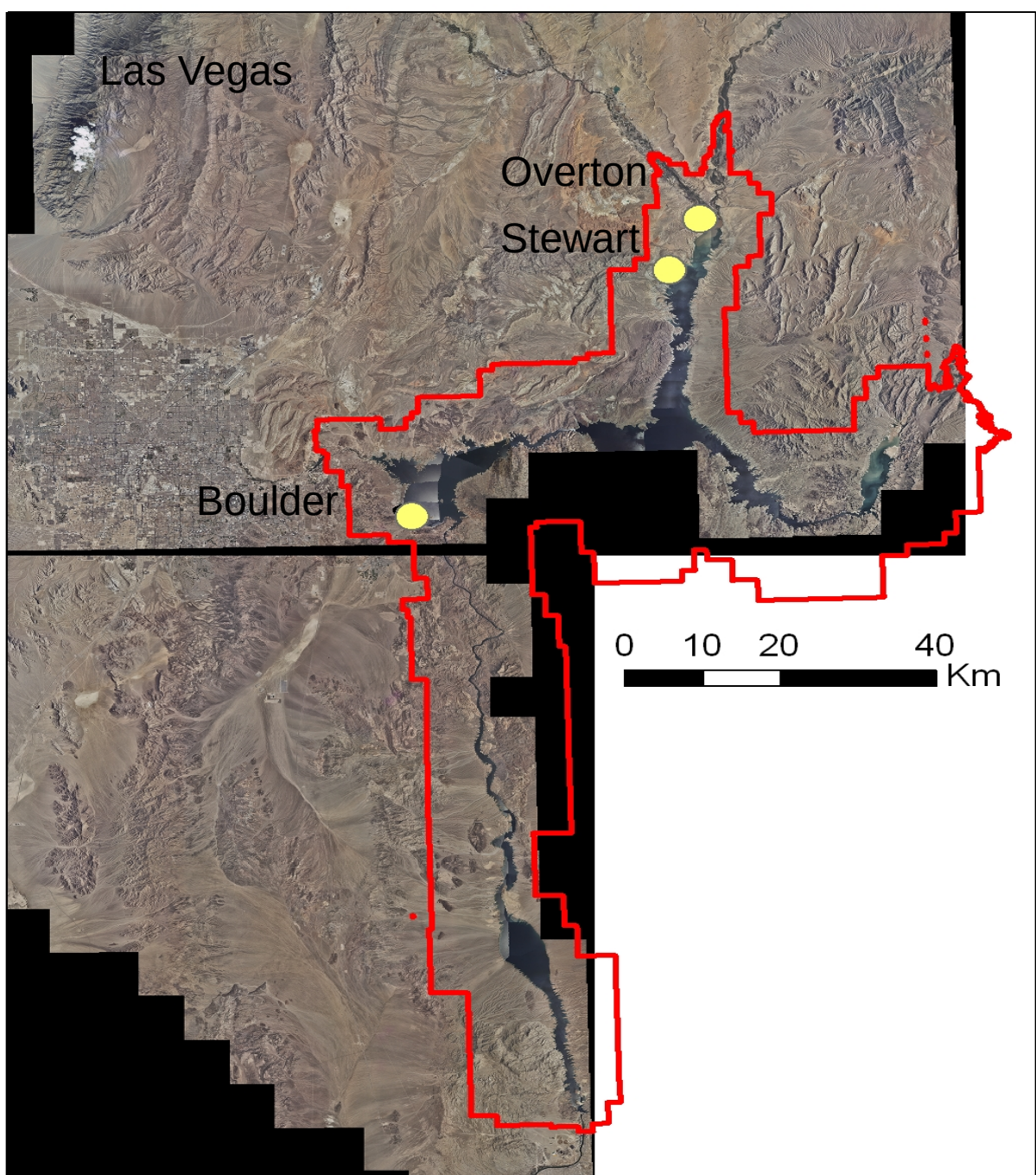


Fig 2: Lake Mead with labeled sites.

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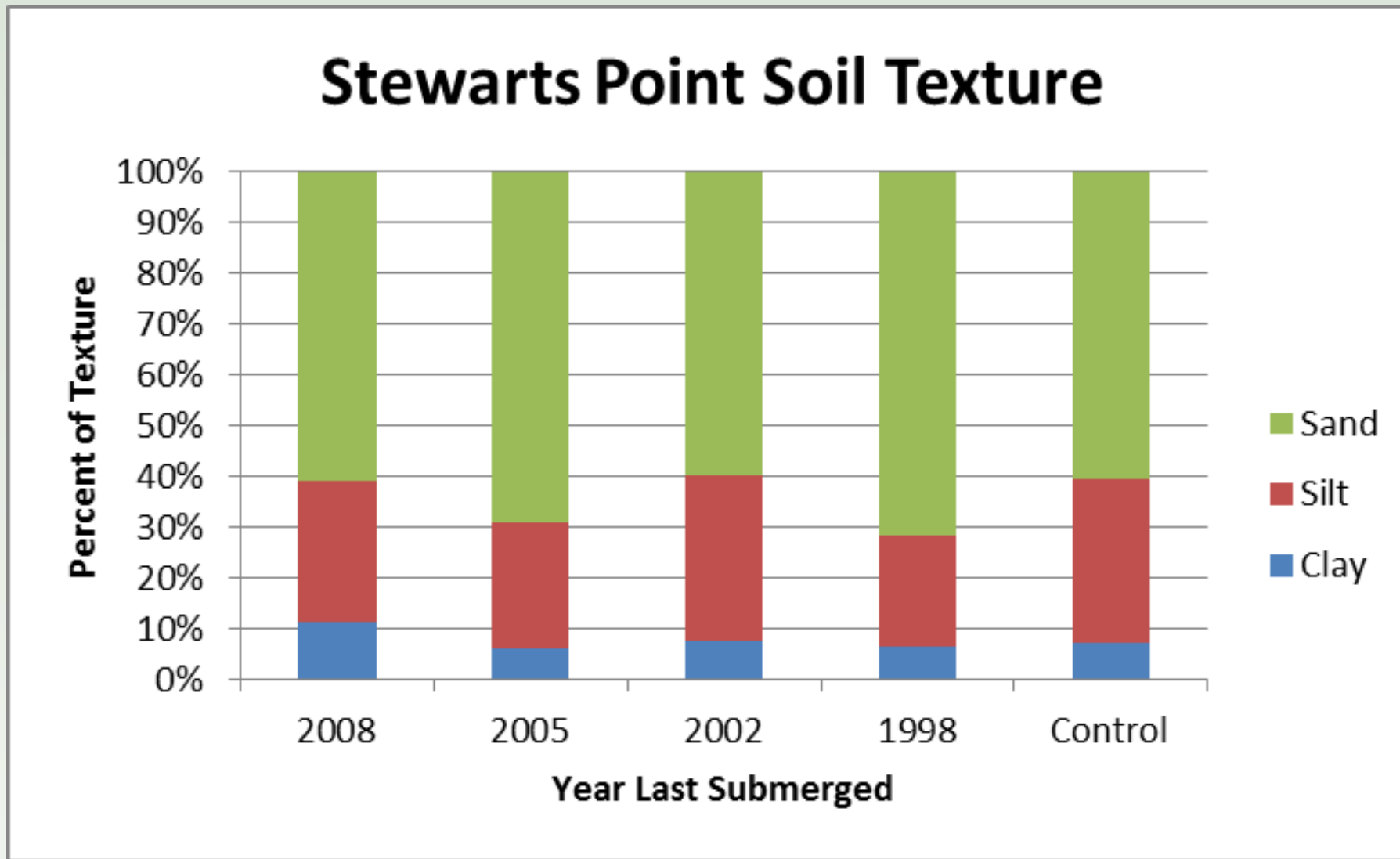
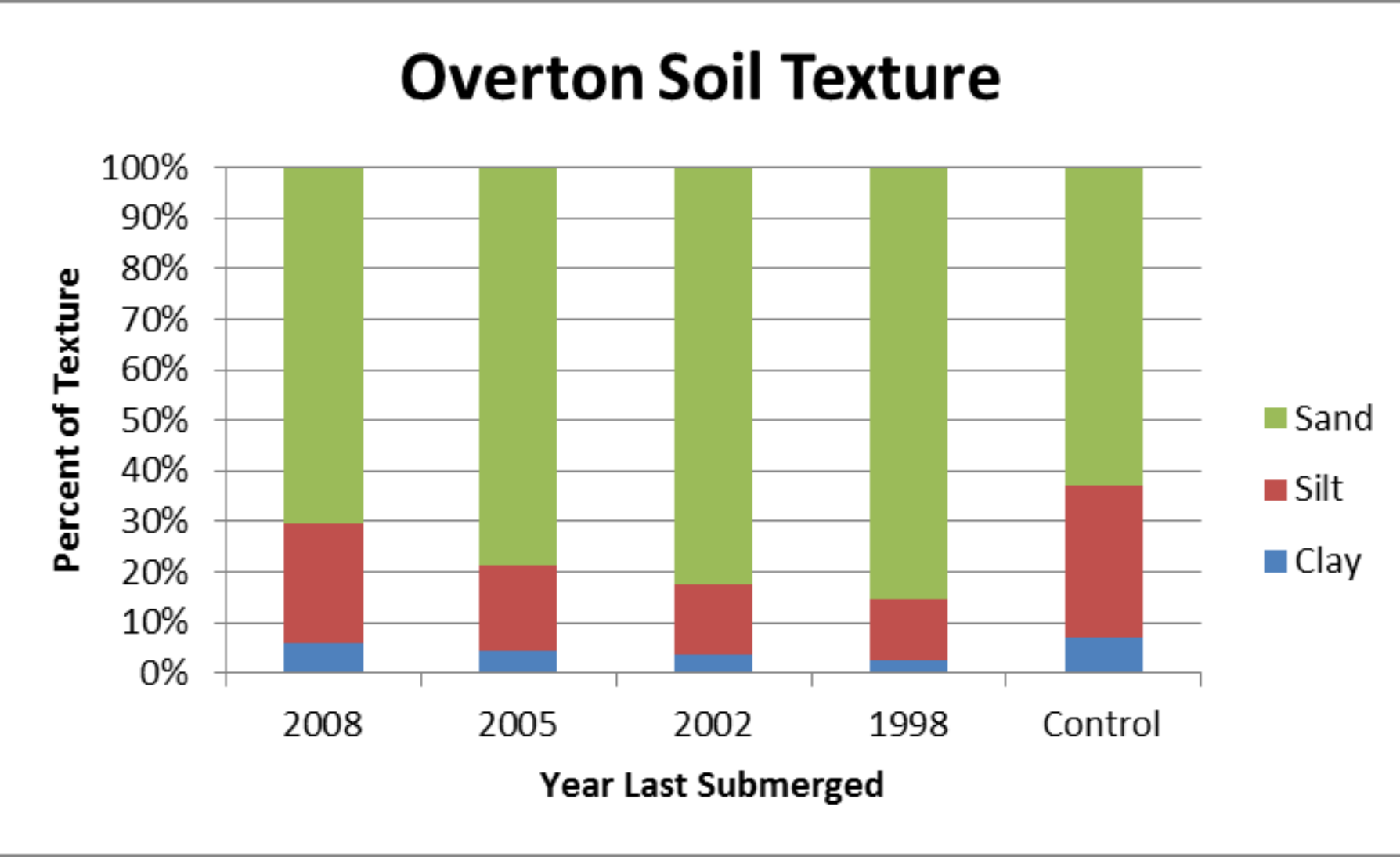
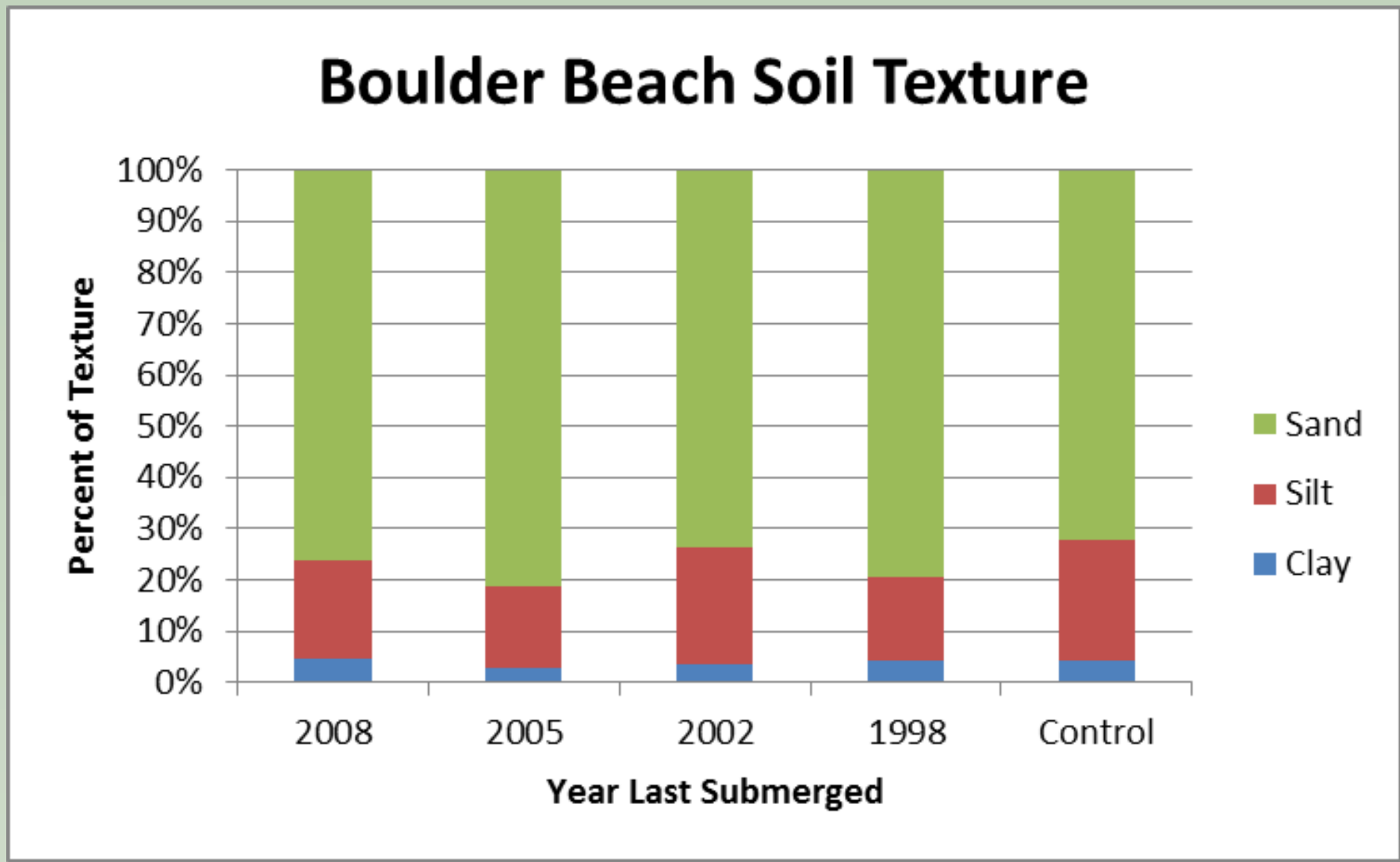


Fig 3: Soil texture at each site from time since submersion. Soils did not differ within sites, but did differ across sites. Soils at Boulder and Overton sites differed from sites at Stewarts Point.

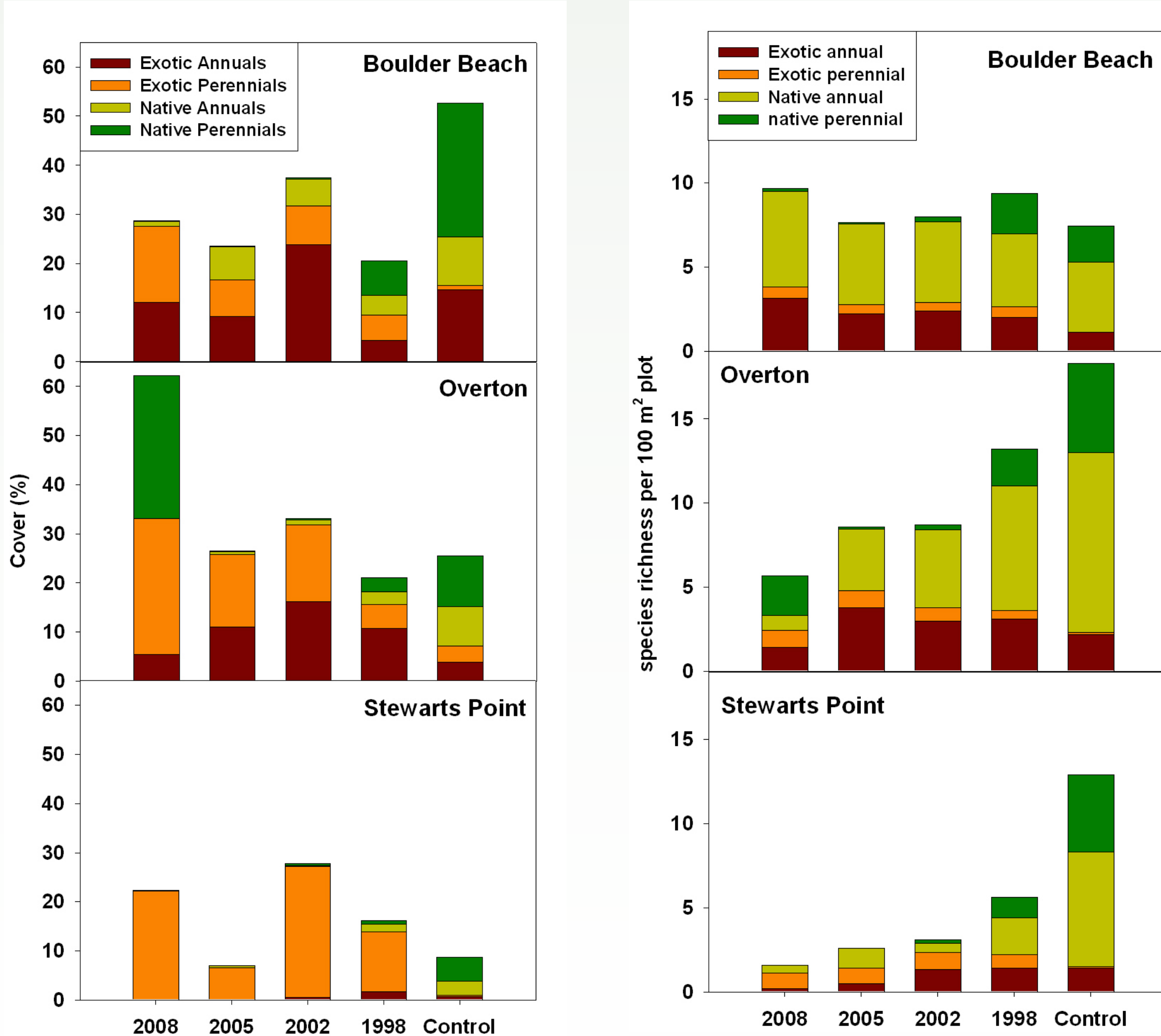


Fig 4: Percent cover and species richness for each site and date of last submersion.

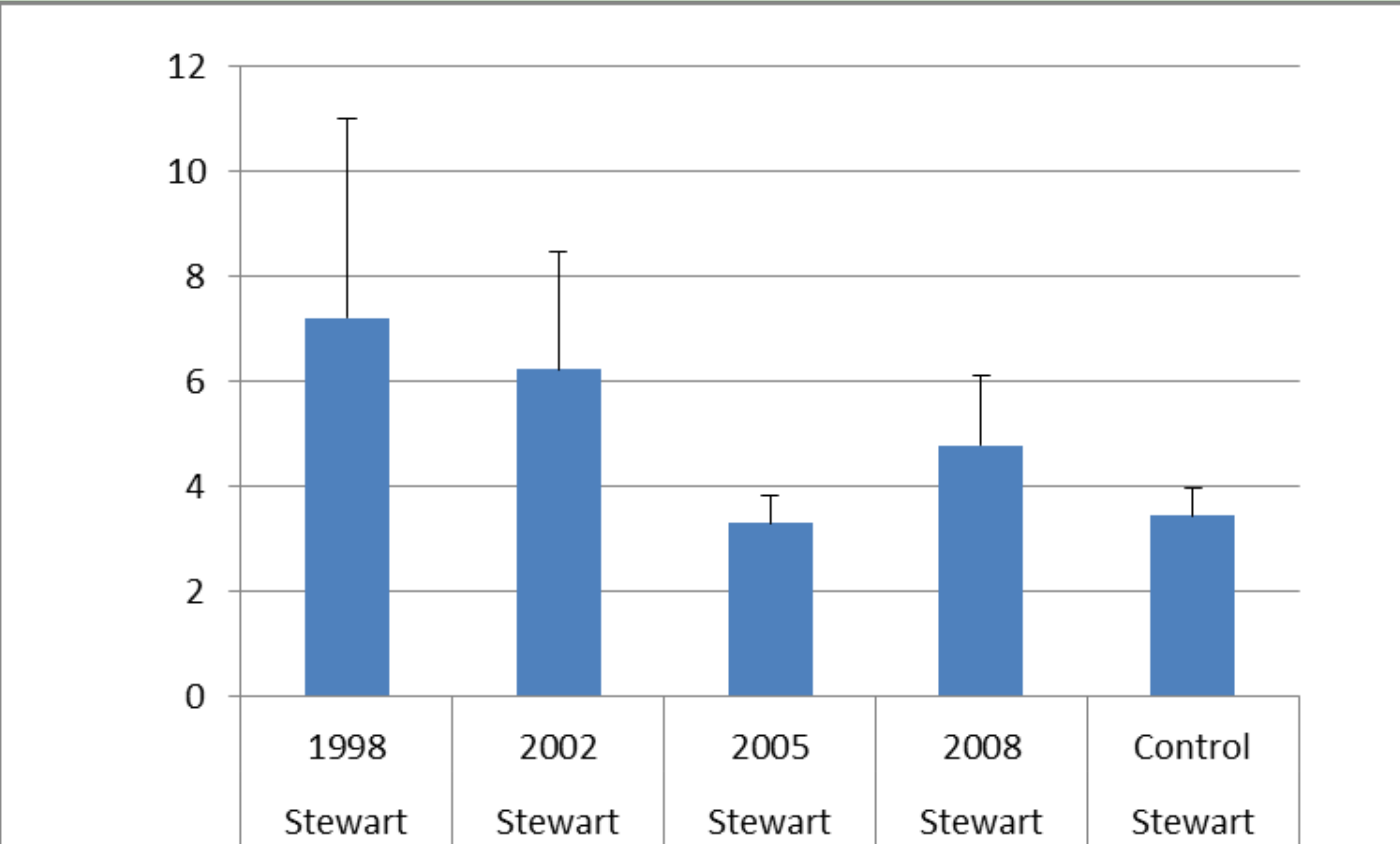
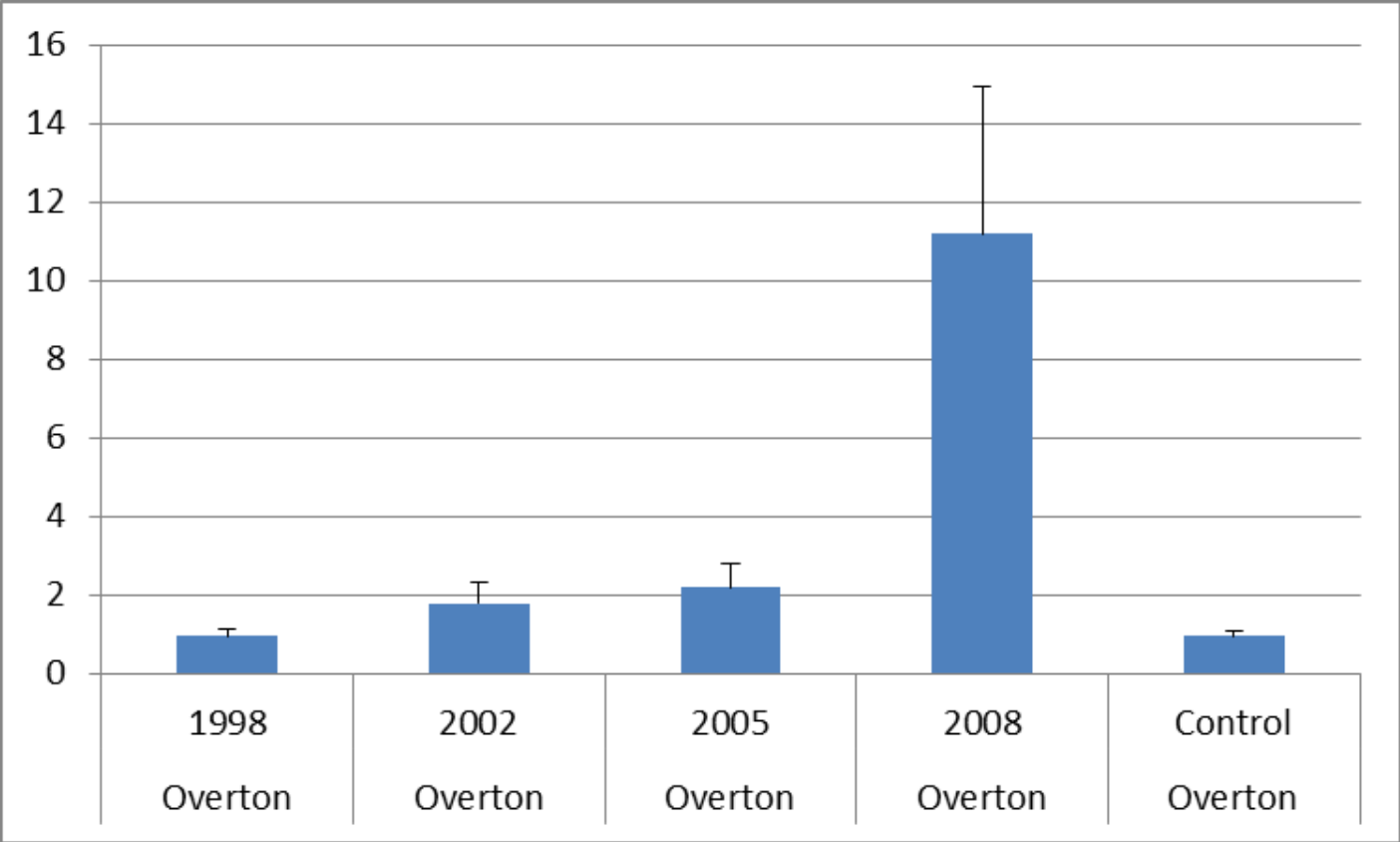
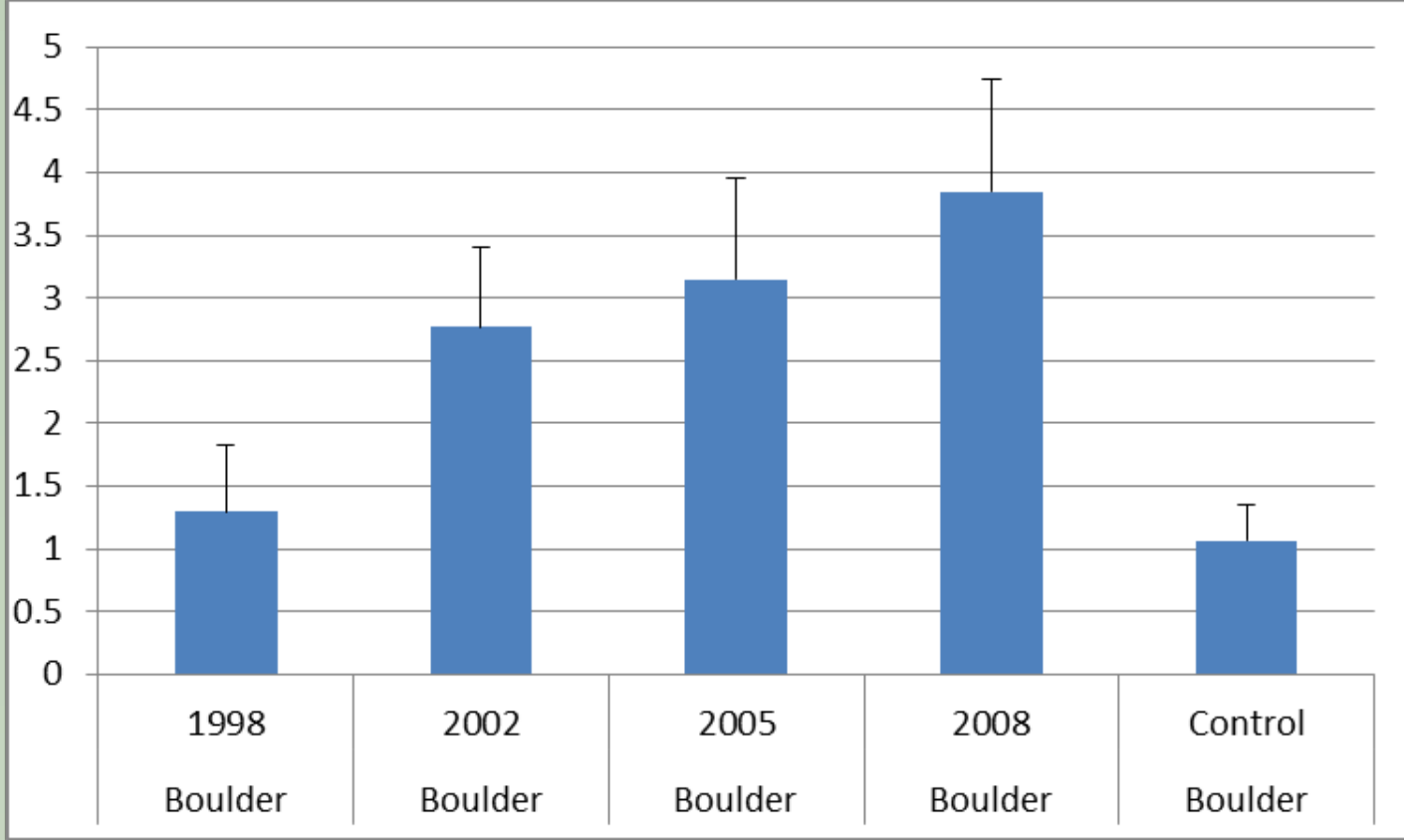


Fig 5: Electrical conductivity (EC), a metric representative of soil salinity, showed a trend of decreasing over time at Overton and Boulder.

Results

♦ Our research indicated that electric conductivity (EC) is declining from time since submerged at Overton Beach and Boulder Beach. EC did not show any distinct patterns at Stewarts point. The declining EC only showed a slight relationship to tamarisk populations,

♦ Soil texture did not seem to follow any distinct pattern since time submerged.

♦ Soil nitrogen, carbon, CaCO₃, inorganic C, organic C, and total S all did show some significant P values, but we could not find any distinguishable patterns with these soil properties.

♦ Species richness was related to elevation at Overton and Stewarts Point, but elevation had no effect on Boulder Beach. At Stewarts Point all of the elevations significantly differed from the control and at Overton all of the elevations differed significantly from the control except 1998, and Overton 2008 was significantly different then the control.

Discussion

♦ Soil data varied throughout each site which made it difficult to make any connections to how soil is reacting over time.

♦Species richness was shown to be related to elevation at Overton and Stewarts Point, but species richness does not show that these plots still had different species composition for annual and perennial species.

Conclusion

♦ Most of our soils data did not show a relationship with time since submerged except EC. For future study it may be worth a more in depth look at the amount and types of salts in the soil. This may give us a better look into distinguishing between the different types of salts in undisturbed areas and disturbed areas.

♦Further study needs to be done on the variances in the different soil characteristics and how these characteristics are impacting revegetation.

♦Experimental out plantings are being done that can give us a better idea if the current soil conditions can support the dominant species located in our control plots.

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