Introduction

In recent decades rooted submerged aquatic vegetation (SAV) has declined in Florida’s spring-fed rivers. At many sites, former SAV beds have been replaced by thick benthic algal mats. Benthic algae dominance at these sites can create challenges for restoration plantings because organic matter accumulation reduces sediment redox potential. In these reduced conditions, phytotoxic compounds form and can be taken up into plant tissue (Fig 1). Reestablishing SAV on these sediments may require specialized techniques to prevent phytotoxicity and plant senescence.

Experimental Design

We established 1 m² plots of two vegetation types (Ramets and Sod) in three sediment types in Gum Slough, Sumter County, FL (Fig 3):

Algae: Sediments covered in benthic algae
Bare: Sediments free of benthic algae
Dredged: Sediments where benthic algae and organic matter was removed via hand dredging

Platinum electrodes measured sediment redox potential in two-week intervals for each experimental replicate. After four months we measured plant growth: biomass, leaf elongation, and shoot density.

Purpose of Study

We investigated two potential management options as approaches for restoring Vallisneria americana, a prominent Florida SAV species, on sediments high in organic matter (Fig 2):

1) Sod Cultivation: Vallisneria is grown on a fiber mat until forming a thick sod. The resulting dense root system may oxygenate underlying sediments.
2) Dredging: Overlying algae and organic matter are removed from sediments. Sediment redox potential may increase due to decreased decomposition.

Results

Sediment redox potential in Dredged plots was significantly higher than in the Algae plots, indicating that dredging effectively raised sediment redox potential (Fig 4).

Shoot density was significantly correlated with redox potential in the Ramet plots, but not in the Sod plots (Fig 5). Pairwise comparisons for statistically significant differences in mean growth showed that Dredged and Bare plots grouped together in the Ramet treatments, while Dredged and Algae plots grouped together in the Sod treatments (Fig 6).

Restoration Implications

1) Dredging may be an effective tool for planting ramets on sites formerly dominated by filamentous algae if managers can minimize future algal growth.
2) When dredging is not a possibility, managers may increase likelihood of planting success by installing Vallisneria sod.