

MS Thesis Defense

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Title: Recovery Of Structure And Function Of The Vegetation Community After A Disturbance As Affected By Initial Planting Richness In Created Wetlands

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ABSTRACT

Creating and restoring wetlands is commonplace because many wetlands have been threatened or destroyed by urban expansion. Structural and functional aspects of created wetland ecosystems, however, remain poorly understood. One of the challenges facing created wetlands is ensuring that the ecosystem is able to recover after a disturbance, such as a mass herbivory eat-out or a large storm event. In this study, we use a controlled environment to examine how original planting diversity affects the ability of a created plant community to recover structurally (vegetation morphology and soil characteristics) and functionally (acquiring above ground biomass, potential denitrification and microbial respiration) after a disturbance. We used four macrophyte species, planted along a gradient of functional richness (FG 1 – FG 4) to assess community resilience based on morphometric measurements and biomass estimates. The vegetative results were compared to the two growing seasons prior to the disturbance. Soil biogeochemical characteristics were examined both during the growing season and the non-growing season. After the disturbance (i.e., aboveground harvesting and extensive soil coring),

total mesocosm percent vegetative cover increased as planting richness increased, indicating that higher richness positively impacts the recovery of the over all plant community. The facultative annual and the reed both produced fewer and shorter stems than prior to the disturbance. The sedge had a shorter maximum canopy height. The facultative annual and the sedge were unsuccessful in monoculture with 50% failure of monocultures for both species. All four species produced less biomass one year after the disturbance as compared to the two years prior. The obligate annual was dominant where it was planted, contributing positively to total mesocosm cover and aboveground biomass, and providing support for the growth of other species. No seasonal differences were observed with any of the soil characteristics measured, although unplanted mesocosms (FG 0) were consistently different than those of higher planting richness, with lower bulk density, soil moisture, and C:N. Potential denitrification increased with increasing planting richness. Microbial respiration was initially much higher in unplanted mesocosms, however over the 324-day soil incubation, all functional groups converged at a moderate respiration rate. Our results indicate the importance of having a species-specific planting regime when creating/restoring wetlands to ensure the development of functional resilience.