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Nutrients enhance the negative impact of an invasive floating plant on water quality and a submerged macrophyte

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ABSTRACT

Submerged macrophytes are an important component to the structure and function of freshwater ecosystems. Invasive, free-floating macrophytes can adversely impact native submerged macrophytes, and these impacts can be exacerbated by anthropogenic nutrient loading. Using a mesocosm study, we examined how the invasive macrophyte, giant salvinia (*Salvinia molesta* D.S.Mitchell), affected water quality and biomass of a native submerged macrophyte, coontail (*Ceratophyllum demersum* L.), under salvinia cover treatments and nutrient additions, compared with control cover and nutrient treatments. Under high nutrients, giant salvinia growth rate was ~1.0 g dry wt d^{-1}, which was five times greater than no nutrient addition. We found as giant salvinia grew and increased surface area, dissolved oxygen, pH, specific conductance, and light availability decreased. Additionally, the rate of change for these parameters were determined by nutrient availability. Coontail biomass was negatively affected by giant salvinia under increased nutrients; however, coontail persisted to the conclusion of the study, even while being covered by a complete giant salvinia mat for 3 wk. When nutrients were not added, changes to the environment due to giant salvinia were not statistically different from control treatments. Our results demonstrate how eutrophication of waterbodies enhances salvinia growth, which amplifies the rate of environmental impact. However, the ability of coontail to persist under a vegetative mat for weeks provides a time frame to control giant salvinia, while still retaining submerged macrophytes.

Key words: *Ceratophyllum demersum*, eutrophication, freshwater wetlands, giant salvinia, invasive species, *Salvinia molesta*.

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