MS Thesis Defense

Candidate: Brandon Hack

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Title: Effects Of Regime Shift On Phytoplankton Community Composition In Gunston Cove Of The Tidal Potomac River

Thesis Director: Dr. R.C. Jones
Committee: Dr. Christopher Kennedy, Dr. Saiful Islam

ABSTRACT

Research has shown the most common mechanism demonstrated for Submerged Aquatic Vegetation (SAV) decline under nutrient over-enrichment is light reduction through stimulation of algal blooms in shallow coastal areas, such as Gunston Cove, Virginia. SAV decline under nutrient enrichment involves feedback mechanisms, and is manifested as sudden shifts in phytoplankton assemblage structure rather than continuous, gradual changes in parallel with rates of increased nutrient additions. There are few known examples of SAV recovery following nutrient reduction, and return of SAV to Gunston Cove presents an opportunity to investigate the response of a wide array of species to the abatement efforts of chronic eutrophication.

A twenty-year record of phytoplankton species and water quality data in the tidal Potomac River was used to evaluate shifts in phytoplankton community composition in response to a change in environmental inputs. PC-ORD software and ordination techniques including non-Metric Multidimensional Scaling (nMDS) and Multi-Response Permutation Procedures (MRPP) were used to look for community level response and specifically rapid shifts in phytoplankton assemblages following the re-emergence of SAV in Gunston Cove, Va. There were statistically significant alterations in assemblage structure following the re-emergence of SAV in addition to increases in taxonomic diversity. Seasonal progression of the assemblage structure was influenced as well. The use of multivariate analyses in tandem with historical observations, and insights from resource economics furthers our understanding of the link between the phytoplankton assemblage structure, SAV, and the ecological status of Gunston Cove.