MS Thesis Defense

Candidate: Amanda Sills

Defense date: November 16, 2015

Title: Long-Term Trends and Identification of Ichthyoplankton Assemblage Structures in a Recovering Tidal Freshwater Embayment

Thesis Director: Dr. Kim de Mutsert
Committee: Dr. R. Chris Jones, Dr. Ed Houde (University of Maryland-Chesapeake Biological Laboratory)

ABSTRACT

Gunston Cove, VA, an embayment of the Potomac River, is a tidal freshwater system utilized by anadromous, estuarine, and freshwater fish species for spawning and larval development. Historically polluted by point source pollution from a wastewater treatment facility, water quality has improved since nutrient loading from the effluent was significantly reduced in the 1980s. This improvement allowed for a transition from a phytoplankton-dominated ecosystem to a submerged aquatic vegetation (SAV)-dominated ecosystem in the last decade. This study aims to determine effects of observed trends in environmental quality on ichthyoplankton assemblage structures and abundances. Using data from bimonthly pelagic ichthyoplankton tows conducted since 1993, multivariate statistical approaches were employed to explore relationships between assemblages and environmental variables associated with nutrient loading. A significant difference was found between assemblage structures sampled within the cove during phytoplankton and SAV dominated time periods. Increases in abundance of fish species that utilize SAV habitats for spawning were found to be significant and correlated with decreases in total nitrogen, total phosphorus and total suspended solids. Outcomes from this analysis help increase the understanding of the effects of point source nutrient reduction on the biology in ecosystems undergoing recovery.

Identification of fish at larval developmental stages in the Potomac River watershed is difficult since identification guides generally do not combine freshwater, anadromous, and estuarine species, which co-occur in tidal freshwater habitats. In addition to the above-described analysis, a dichotomous key was created through updating, consolidating, and adding to available sources.