Evaluating the Impact of Land Use Change on Submerged Aquatic Vegetation Stressors in Mobile Bay

Alabama coastal systems have been subjected to increasing pressure from a variety of activities including urban and rural development, shoreline modifications, industrial activities, and dredging of shipping and navigation channels. The impacts on coastal ecosystems are often observed through the use of indicator species. One such indicator species for aquatic ecosystem health is submerged aquatic vegetation (SAV). Watershed and hydrodynamic modeling has been performed to evaluate the impact of land use change in Mobile and Baldwin counties on SAV stressors and controlling factors (temperature, salinity, and sediment) in Mobile Bay. Watershed modeling using the Loading Simulation Package in C++ (LSPC) was performed for all watersheds contiguous to Mobile Bay for land use scenarios in 1948, 1992, 2001, and 2030. Landsat-derived National Land Cover Data (NLCD) were used in the 1992 and 2001 simulations after having been reclassified to a common classification scheme. The Prescott Spatial Growth Model was used to project the 2030 land use scenario based on current trends. The LSPC model simulations provided output on changes in flow, temperature, and sediment for 22 discharge points into the Bay. Theses results were inputted in the Environmental Fluid Dynamics Computer Code (EFDC) hydrodynamic model to generate data on changes in temperature, salinity, and sediment on a grid with four vertical profiles throughout Mobile Bay. The changes in the aquatic ecosystem were used to perform an ecological analysis to evaluate the impact on SAV habitat suitability. This is the key product benefiting the Mobile Bay coastal environmental managers that integrates the influences of temperature, salinity, and sediment due to land use driven flow changes with the restoration potential of SAVs.

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