ENV Report 51 – *Aquatic plant Growth Model Refinement for the Upper Mississippi River – Illinois Waterway System Navigation Study* by Elly P. H. Best, Gregory A. Kiker, Beth Anne Rycyzyn, Kevin P. Kenow, Jim Fischer, Shyam K. Nair, Daniel B. Wilcox.

ABSTRACT

Simulation models have been developed for two submersed plant species that reproduce vegetatively through tubers. These two species, American wildcelery (*Vallisneria americana*), a meadow former, and sago pondweed (*Potamogeton pectinatus*), a canopy former, represent the characteristic life forms of submersed aquatic vegetation in the Upper Mississippi River System (UMRS). The models simulate growth in an established plant bed and are based on carbon flow through the vegetation rooted in meter-squared (m^2) water columns. The models take into account the effects of changes in (1) water depth, (2) shading by seston, (3) self-shading, and (4) temperature on plant biomass formation.

For application to the UMRS, the models were expanded with equations enabling calculation of the effects of current velocity and shading by epiphytes on biomass production. Calibration data for these equations were derived from new field data collected in 2002. The effects of current velocity on plant biomass of American wildcelery were quantified in a study on the Red Cedar River, WI. Potential shading by epiphytes of wildcelery and sago pondweed was quantified using field data collected in UMRS Pools 8 and 13. The self-shading coefficient of sago pondweed beds in the UMRS was measured in Pool 8, was higher than the model default value determined in more clear water, and allowed a higher light capture. A new field data set on shoot biomass of both species and environmental factors, all collected at the same selected sites in UMRS Pools 8 and 13 in 2001 and 2002, was used for model validation.