LAKE OKEECHOBEE SUBMERGED AQUATIC VEGETATION MODELING PROJECT

Mandate:

Comprehensive Everglades Restoration Plan (CERP),
Lake Okeechobee Watershed Protection Program (LOWPP)

Background:

The District has developed and applied water quality models of Lake Okeechobee since 1981 to determine loading goals of phosphorus, guide research, and help predict impacts of management actions. The current Lake Okeechobee Water Quality Model (LOWQM) predicts phosphorus (P) concentrations in the lake very well for the period of 1983 to 2000, but does not accurately predict the increase in annual average P concentration from 50 ppb in 1973 to over 100 in 1982. One explanation for this discrepancy is that submerged aquatic vegetation (SAV) is not included in the model. SAV, which is known to reduce P concentration in lakes by preventing resuspension of P rich sediments and absorbing P from the water column, grows well in shallow areas of lakes. A simple mass balance model that included SAV correctly predicted the increase of P concentration. This does not prove that SAV is a major player in the rise of P; it does however suggest that it should be investigated.

Project Overview:

A simple mass balance model of Lake Okeechobee, which included SAV, was created using the software STELLA. The model simulates SAV expansion during years of low water (when light conditions are more favorable) and contraction during high lake levels (when light conditions are poor). Resuspension of P stored in sediments is low when SAV levels are high and high when SAV levels are low. A more complex SAV model is being developed to mechanistically represent growth and nutrient interactions. Once completed, this model will be incorporated into the Lake Okeechobee Environment Model (LOEM), a spatial scale 3-Dimensional model of the lake.

Application of Results:

The more complex SAV model will be calibrated and validated to data obtained from Lake Okeechobee. Once incorporated into the LOEM, this model will be used in support of the Adaptive Assessment process of CERP, and the Lake Okeechobee TMDL (Total Maximum Daily Load) process.