LAKE OKEECHOBEE ENVIRONMENT MODEL

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

Background:

A primary cause for declining ecosystem health in Lake Okeechobee is phosphorus (P) enrichment in the water column and sediment bed. To improve our understanding of P in the lake, and ability to develop effective plans to reduce its impacts, the Lake Okeechobee Protection Act mandates development of a spatial-scale water quality model that reasonably represents P dynamics of the Lake. Because the lake is heterogeneous, in terms of P dynamics, and strongly influenced by wind-driven currents, the water quality model must take into consideration lake hydrodynamics.

Project Overview:

A water quality model is being developed based on the existing Lake Okeechobee Hydrodynamic Model platform. The objective is to develop, calibrate, and validate a Lake Okeechobee Environment Model (LOEM) -- a spatially explicit hydrodynamic / sediment-transport / water quality model of the ecosystem. The LOEM will simulate nutrient and algal dynamics, as well as growth of submerged aquatic plants. Model development is being done by a contractor to the District, using the Environmental Fluid Dynamics Code (EFDC) framework; calibration and validation is being using observed water quality data taken monthly or more frequently at 35 stations within the lake since 1989.

Application of Results:

The validated LOEM will be used in support of the Lake Okeechobee Sediment Management Feasibility Study, the Adaptive Assessment program of CERP, and the Lake Okeechobee TMDL process. This model will not replace the existing Lake Okeechobee Water Quality Model (LOWQM), but rather, will be used in tandem with it. The LOEM will be used to provide critical information about spatial variation in responses of the lake, in terms of physical, chemical, and biological (submerged vegetation) conditions, for relatively short (1-5 year) simulation periods. The LOWQM will provide more coarse-scale information, but can be used for long term (decades or even centuries) simulations of lake response to management alternatives.