Hydrodynamic and Water Quality Modeling for the Loxahatchee Refuge – Everglades, Florida

Sponsor: The United States Fish and Wildlife Services (DOI)

Brief Description:

Background:

The Arthur R. Marshall Loxahatchee National Wildlife Refuge is located in south Florida near the northern edge of the Everglades. An aerial map of the refuge is shown at the figure to the right. The Loxahatchee refuge is impacted by altered hydrology, impingement of high-conductivity canal water into the interior marsh, and elevated concentrations of nutrients, particularly phosphorus. A priority for the refuge is to better understand and minimize these impacts. Hydrodynamic and water quality models have the potential to provide needed management and scientific support related to these concerns.

Although previous efforts directed at modeling hydrology and water quality of the refuge (alone or as a part of the greater Everglades) have been of value, none of the past modeling efforts adequately address current refuge needs. This project will build upon the understanding and experience of previous modeling studies to implement a working model that will address refuge needs. In order to minimize cost and ensure timely completion, it is anticipated that this project will not develop new computer modeling computer programs, but will utilize available computer programs (likely with some modification) for hydrodynamic and water quality modeling.

The most important component of this project is modeling the phosphorus levels in the refuge (as shown in the figure to the left). Throughout this project, the modeling team will maintain communication and collaboration with the South Florida Water Management District (SFWMD) Interagency Modeling Center, as well as with other Department of Interior (DOI) teams monitoring and modeling the Everglades. The modeling team will, where possible, build on previous and continuing modeling efforts relevant to the refuge. The modeling team will make available all final documents, reports, data files, and final model input and output files to any interested parties.

This modeling project will also interact with other efforts to assess flows and water quality in the refuge. In particular, interaction and cooperation with efforts by the SFWMD, and the United States Army Corps of Engineers (USACOE) will be actively pursued.

Objectives:
The goal of this modeling is to provide best available technical support for management decisions related to refuge inflow and outflow quantity, timing, and quality. This modeling effort will provide projections of water movement and water quality resulting under alternative scenarios of structure operation, Stormwater Treatment Area (STA) performance, and structural changes within the refuge. The first step toward achieving this goal is conducting a thorough budget analysis (such as shown in the figures to the right and in the next page).

Tasks:
This scope-of-work describes nine contractor tasks divided into two phases. Phase 1 will collect and organize the information needed to support model implementation, and Phase 2 will perform the model implementation and application. Although the deliverable information from Phase 1 will be necessary for completion of Phase 2, some of the tasks in Phase 2 can be initiated prior to completion of all tasks in Phase 1. Task scheduling will be designed by the investigator to minimize overall project completion time within the constraints of total personnel resources available.
Documentation is a vital part of any modeling, and will be incorporated as a requirement for every task and contract deliverable. Metadata documentation requirements will also be established to assure that sources of data and transformations of data are available to future users and reviewers. All project documentation and modeling will be made available to interested parties. This information will, at a minimum, be available through email requests.