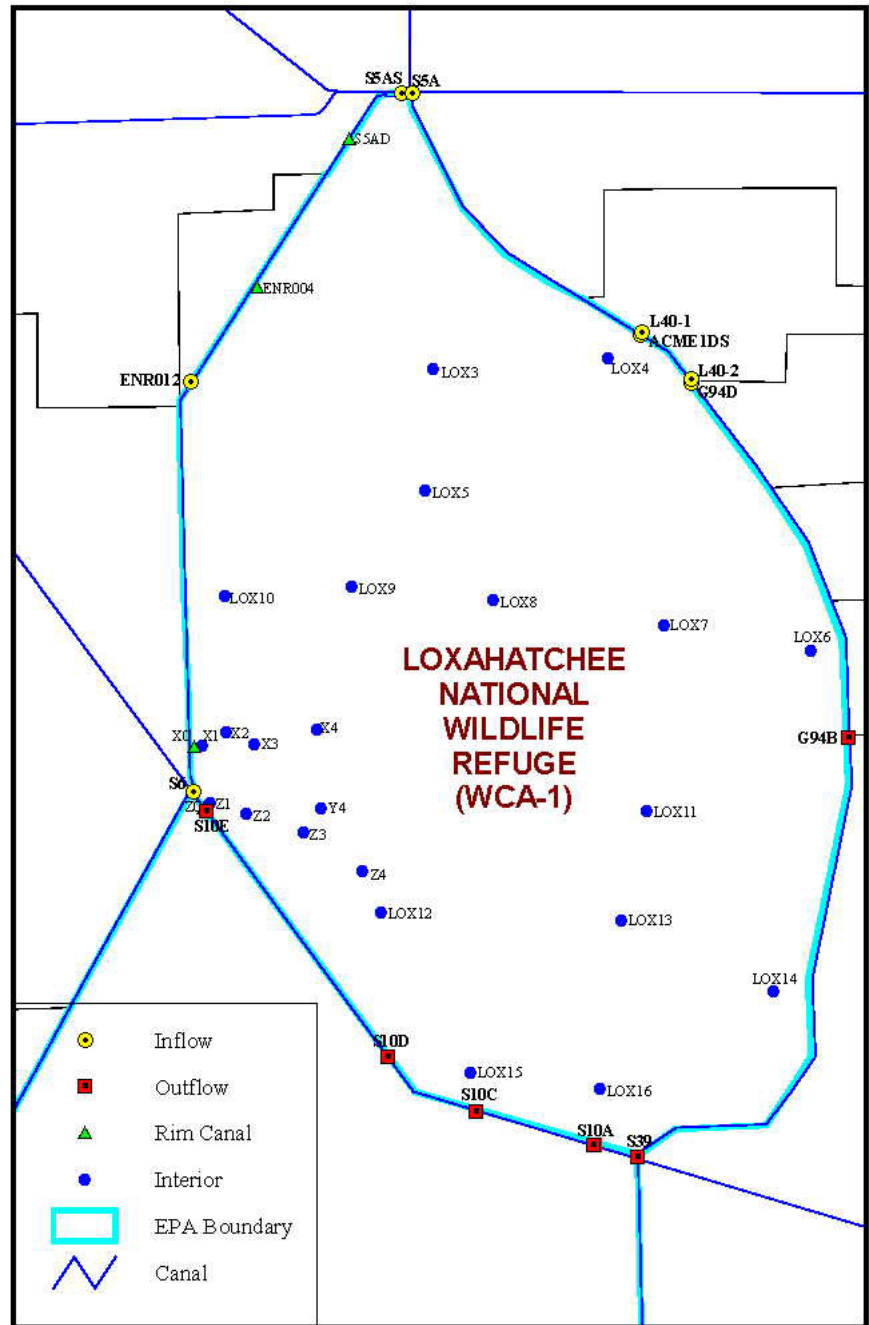


**Discussion of
Recommendations on
'Enhancing monitoring of the
Refuge'**

Nick Aumen, Mike Waldon
US DOI Everglades Program Team

Present routine monitoring

- 14 compliance stations – Lox 3 thru 16
- Inflow and outflow structures – related to permits and settlement agreement
- Research transects – 11 stations, 2 in L-7 Canal
- No monitoring near inflows in impacted zone



DOI proposed monitoring

- 2 year study
- Focus on impacted zone of marsh
- Consistent with current compliance monitoring
- Support better understanding of:
 - Conditions causing canal water to enter marsh
 - Relation of pumped water P load to exceedances
 - Impacts of water management decisions
- Year 1 ~ 40 sites, dropping to fewer sites in year 2
- Total cost approximately \$700,000



Discussion of Recommendations on 'Modeling of the Refuge'

Mike Waldon, Senior Hydrologist
Arthur R. Marshall Loxahatchee National
Wildlife Refuge



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Previous Studies:

A number of studies have developed hydrology and/or water quality models of the refuge alone or as part of the Greater Everglades

- Receiving Water Quantity Model – SFWMD 1979, Steve Lin, modeled only hydrology
- LOXHYDRO – F1 Coop Fish & Wildlife Research Unit, UF, Gainesville, John Richardson, et al., 1990
- HSE – SFWMD, 2002, Dave Welter
- EPH – TetraTech 2002, compartmental Hydro & P model
- SFWMM – 2x2 mile grid hydrology model
- ELM – SFWMD, models hydrology, water quality, and ecological parameters
- COE modeling of STA-1E discharge impacts, T. Ferguson, 2002
- DMSTA – B. Walker

DOI needs for modeling and model objectives

- Resource protection orientation
- The goal of this modeling is to provide best available technical support for management decisions related to refuge inflow and outflow quantity and quality.
- The model(s) will further provide a quantitative and defensible platform for analysis of causes of elevated phosphorus events at refuge interior monitoring stations.

Relationship to TOC Recommendations

(C) Modeling of the Refuge

- 1. Develop a water quality / hydraulic model for the Refuge with a phosphorus cycling component.**
- 2. Evaluate issues associated with phosphorus loads and transports within the L-40 and L-7 canals.*
- 3. Develop and track a simple phosphorus mass-balance for the Refuge.**

Description of DOI proposed modeling: Tasks

Phase I: **PREPARATION OF DATA**

1 Data acquisition and processing

1.1 Select candidate constituents for modeling

1.2 Select period-of-record

1.3 Types of data: Geographic data - elevation, base map; Hydro data - stages and structure flows; Meteorological data - rainfall, temperature, ET; Water quality data - inflow, within, and outflow

1.4 Procure and QA all data

1.5 Format data as required

2 Develop boundary condition (WQ and flow) time series

3 Develop daily water/material budgets for all refuge structures (Recommendation C.3)

Description of DOI proposed modeling: Tasks

Phase II: MODEL IMPLEMENTATION (Recommendation C.1)

- 4 Selection of model(s)
- 5 Model implementation
- 6 Model calibration and verification
- 7 Scenario analysis
- 8 Documentation
- 9 Archive of program and all other files
- 10 Model maintenance for use

Time & Resource Requirements

- Estimated total cost to DOI – \$300,000
- New effort required (in addition to current staff) – 4 person years
- Estimated time required – 2 to 2½ years to complete
 - Phase I completion in 1 year
 - If human resources are available, Phase II can start before completion of phase I
 - Phase 2 completion 1½ years after start
 - It is *possible* that working model(s) will be in testing within 1 year of start

Other modeling needs that may not be met by DOI proposal

1. This is planned as a “far-field” model. “Near-field” and “intermediate-field” (plume model or momentum-dominated flow) hydraulic effects will not be appropriately modeled.
2. Sediment erosion and transport are not envisioned as a part of this modeling
3. Impacts of erosion of sediments in the L-40 and L-7 Canals are therefore not expected to be adequately addressed by the proposed modeling alone

DISCUSSION

