From: Office of Modeling, SFWMD

Recommendations Regarding the New Proposed Monitoring and Modeling of Refuge

I. Summary & General Comments, Regardless of the Proposed/Selected Model Type:

The proposed approach needs to build upon two on-going modeling applications (RSM & ELM) and upon extensive District personnel experience in hydrodynamics, water quality modeling, and data analysis of the Refuge, which would help insure successful model development for the Refuge.

Strongly suggest the proposed effort should be a collaborative effort between Department of the Interior and the South Florida Water Management District.

Information describing the proposed water quality and hydrodynamic model for the Refuge is incomplete. More information is needed to understand how the proposed water quality and hydrodynamic modeling approach of the Refuge is different from currently available Refuge models (i.e., RSM and ELM). If current models cannot meet Refuge requirements, then justification is needed.

Define project expectations: For example, do selected/proposed model capabilities match project goals and expectations? A thorough review of all available information needs to be conducted to determine if existing data fully support development, application, and calibration of new model(s).

Data Review: Conduct a thorough review of all available information to determine if available data warrants achieving a pre-determined accuracy criterion for model-prediction (e.g., ±20% of observed values).

Establish Numerical Standards for Model Performance: These standards should be used to evaluate model predictions/performance at the onset of the project (all agencies must agree to this standard regardless of the model selected). At a minimum, numerical acceptance criteria for phosphorus (TP) and chloride (Cl) need to be developed.

Point of clarification: No part of the RSM model is subject to proprietary constraints. The RSM source code will be copyrighted but it will be made freely available under a General Public License (GPL), similar to linux.

II. Monitoring Recommendations:

Re-evaluate the proposed "Synoptic sampling around STA-1E and STA-1W discharges." Re-direct funds from the proposed synoptic plans (approximately $90K) to purchase more hydrolabs instead. The synoptic plan is impractical, manpower intensive, costly, and provides only a "snap-shot" description of conditions during one discharge event. Purchasing and adding hydrolabs would allow for repeated deployment downstream from STA1E and STA1W (weeks at a time), whenever and wherever needed.

Reduce water quality parameters list; use previous monitoring programs to refine stations and parameters list.

Monitoring plan needs to be consistent with the selected model: Model(s) should be selected first and then, based on model resolution and characteristics, parameters to be

measured, sample locations, and sample frequency should be determined. Choices should allow evaluation of the model accuracy criteria specified above.

III. Modeling Recommendations:

General:

Define management questions (and their spatial and temporal scales) that the model should address (i.e., does the model need to accurately capture hourly/daily events, or does the model need to address seasonal/annual cumulative system dynamics?).

Efficiency: Expand knowledge and information gained from the proposed modeling approach by using an already existing tool set up for the refuge (RSM and ELM).

Foster cooperation among state and federal agencies: Re-allocating the proposed fund to hire two personnel (DOI personnel) to focus on enhancing ELM application to the Refuge, and train DOI personnel, on how to run and use ELM to investigate management scenarios.

Should be designed to allow DOI personnel to tap into a wealth of models and modeling experience at the District and the Interagency Modeling Center.

Specific:

Define Model expectations:

- Define scale requirements (i.e., spatial and temporal) for the new modeling approach relative to the management questions. Define grid resolution (spatial) and time-scale required (e.g., daily, weekly, monthly, seasonal, or yearly), and determine if available data supports model expectations.
- Define confidence levels at which we accept model results. Define accuracy requirements for both the hydrodynamic and the water quality model predictions in terms of spatial and temporal resolution.
- Do available data (existing and proposed plans) support the new modeling approach and model(s) expectations (i.e., accuracy) in terms of spatial and temporal scales?

Define model selection criterion for both the hydrodynamic and the water quality models. For example, what are the standards, or criteria, used for selecting and/or rejecting a model?

Define model performance measures that will be used to compare scenarios/alternatives. For example, does a 10% difference or 30% difference between two model prediction scenarios results constitute a meaningful difference? Spatial mapping might be helpful for visual comparison of field data with model predictions, or for comparison of several modeled scenarios, but the spatial comparison must be supplemented by a quantitative comparison to ensure objectivity, and to allow application of acceptance criterion.

There is no money allocated for model training. How will non-Refuge staff be trained as model end-user?

The proposed schedule for this model application is very ambitious, almost impossible to meet with allocated resources. In addition, there is a time lag between field collection programs and the availability of data for model application.

The proposed modeling approach excluded key issues such as seepage and dry downs. Seepage will impact both the hydrodynamics and the water quality at the Refuge. Another critical issue is the model's ability to simulate water quality responses to dry-downs.

The proposal indicated that a water quality model has been selected. The pre-selected simple model to address water quality issues in the Refuge does not simulate soil responses to dry downs, does not simulate other soil/biological processes, which change communities over time and significantly alter nutrient budgets, and has not been used on such a large scale yet. Most, if not all, previous simple model application focused on STAs, which, unlike the Refuge, are sub-divided into treatment cells.

Task 2: Historical sample-type (i.e., grab vs. composite) and sample-frequency (i.e., historical data gaps) are a major problem in calculating nutrient loads to the Refuge, regardless of the model used and/or proposed. Currently, the Water Quality Team (WQT) is, similar to proposed Task 2, conducting and investigating methods to determine uncertainty associated with nutrient loads to the Everglades using historical grab samples combined with daily flow.