

To: Garth Redfield, Chief Environmental Scientist, Environmental Monitoring and Assessment Department, Water Resources
From: Gary Goforth, Chief Consulting Engineer, Water Resources
Date: March 29, 2004
Subject: District Activities Completed, Underway or Scheduled that are Related to the TOC Category A Recommendations

Since the March 2, 2004 TOC meeting, Tracey Piccone and I have reviewed the District's actions that have been completed, are underway or are scheduled, that are related to the four (4) current TOC recommendations in Category A - ***Controlling phosphorus loads to the Refuge***. The District has already addressed, or has scheduled activities to address, most of these recommendations, as reported as previous TOC meetings. The summary below may be a useful reference when trying to bring to closure the TOC deliberations on these recommendations. For ease of cross reference, the summary below follows the framework of the federal agencies' September 17, 2003 detailed recommendations. **Bold numbered statements are the TOC recommendations** and the italicized *statements are DOI detailed recommendations*.

1. Continue to develop and implement strategies to operate the STAs within their design range. That should include review of baseline hydrologic data sets used for STA design and updating to reflect current regional water management.

a. Utilize all available water quality data to further evaluate the magnitudes and causes for the observed excessive loads, and limit implemented strategies to operational changes designed to reduce loads.

Part 1 – further evaluate the magnitudes and causes for the observed excessive loads. District staff have begun an analysis of the relationship between the water quality discharged and the water quality within the Everglades. This effort is a project in the Long-Term Plan [Bc86(5)] and is scheduled for completion by September 2005, although the Refuge analysis could be the priority water body.

Part 2 – operational changes to reduce loads.

- i. All deliveries from Lake Okeechobee to STA-1W were terminated as of February 15, 2003. This was done despite the continuing need to lower the stage in the Lake, and the effort to minimize harmful freshwater releases to the estuaries. Since that time, there has been no movement of Lake water into STA-1W.
- ii. Weekly operations meetings between STA staff and operations staff were initiated to ensure the most efficient and effective coordination of operations.
- iii. The District has increased the coordination with the U.S. Army Corps of Engineers to expedite the completion of STA-1E. This STA was designed to work in concert with STA-1W to treat a portion of the stormwater runoff from the upstream EAA basin, and until it is fully operational, STA-1W will continue to be overloaded with runoff intended to go to STA-1E. The District is considering alternative operations until STA-1E is on line, including diversion to tide, and even possibly (although not preferably) diversion of this extra runoff untreated to the Everglades.

- iv. The District successfully experimented with delivering water **around** the Refuge, as opposed to **through** the Refuge, to meet the water supply demands of a local water control district.
- v. The District expedited the commencement of flow-through operations of STA-3/4, designed to capture and treat approximately 250,000 acre feet per year of Lake water. On January 15, 2004, the 6,500-acre flow-way 1 of STA-3/4 was ready for flow-through operations. In addition, on March 19, 2004, the District received a permit modification to begin flow-through operations of the 4,500-acre flow-way 3. It is anticipated that all future Lake Okeechobee releases, whether they are pursuant to the WSE regulation schedule, BMP replacement water, or for water supply to downstream receiving areas, will be directed to STA-3/4 prior to discharge to the EPA when practicable.

The net effect of these management actions has been a dramatic reduction in the flow volume and phosphorus loads entering STA-1W. The STA has received approximately half of the phosphorus load for the 12-month period ending in February 2004 compared to the 12-month period ending in February 2003.

b. Improve monitoring to provide more accurate measurement of STA-1W phosphorus loads passed without treatment during bypass events, and diversions from the S-5A Basin to STA-2.

- i. The District recently updated the flow measurements at the two structures that convey bypass water into the Refuge (G-300 and G-301). This will improve accuracy of flow and phosphorus load estimates going into the Refuge, and thereby assist in operational decision making.
- ii. S-5A Basin diversion to STA-2. The District has completed design and plans to start construction of the new divide structure (G-341) in May 2004; completion is scheduled for January 2005. This structure will facilitate the diversion of flows from a portion of the S-5A basin to STA-2 by remaining closed in all but the larger storm events. This diversion will reduce flows to STA-1W.

c. Revise the baseline datasets used for STA design to be consistent with currently observed and projected flows and loads. This activity is an existing component of the Long-Term Plan [Bc86(1)] and is presently underway approximately 6 months ahead of schedule. District staff will generate new flow simulations using recently re-calibrated data to be consistent with recent observed flows. As part of this activity, staff will confirm the accuracy of the simulations for S-5A basin diversions to STA-2. The revised data sets are scheduled to be completed in September 2005, however staff plan to accelerate this by 6 months, subject to completion of other dependent Long-Term Plan projects. Staff are prioritizing the revision of the data for the S-5A and C-51W basins that discharge into the Refuge via STA-1W and STA-1E.

d. Reduce deliveries of lake water to STA-1W to levels that are consistent with the STA design basis.

- i. Until STA-1E is in full flow-through operation, STA-1W will continue to receive inflows above its design range. We have accelerated coordination meetings with the Corps, DOI and DEP to expedite completion. We are preparing to begin construction of the structure (G-311) that will connect the S-5A pump station with STA-1E; target completion is December 2004, timed to coincide with the earliest flow-through date of STA-1E. If STA-1E can accept this water sooner, we plan to divert EAA runoff (max 500 cfs) to STA-1E through existing structures (S-5AS and S-5AE).
- ii. District staff have developed and distributed a draft paper on the operational design envelopes for each STA. This activity was completed specifically to assist in keeping STA inflows within their design range.
- iii. The District has terminated all discretionary deliveries of Lake water to STA-1W. See 1.a.i. and 1.a.iv. above.

e. Identify, evaluate, and implement additional source-control measures (e.g., enhanced BMPs, additional treatment area) required to reduce EAA runoff and Lake phosphorus loads to levels that are consistent with the STA design basis and the expected BMP performance.

- i. EAA runoff loads. This activity is addressed in the Long-Term Plan and is presently underway [Bc81(1)]. District staff are evaluating 9 years of farm-level flow and phosphorus data. A professional services contract is to be awarded this summer to assist in the evaluation effort; the results are scheduled for Dec 2004.
- ii. Reduce Lake releases. The District has terminated all discretionary deliveries of Lake water to STA-1W. See 1.a.i. and 1.a.iv. above.

f. Identify and evaluate potential operational changes for reducing loads to STA-1W by diverting excess runoff to STA-2, STA-1E, and/or STA-3/4, with the constraint that all STAs be operated within their design loading range.

- i. District staff have developed and distributed a draft paper on the operational design envelopes for each STA. This will assist in keeping STA inflows within their design range.
- ii. District staff are developing a paper describing the process by which the related PDE activities will be synthesized into new projects, including operational/vegetation changes, additional BMPs, integration with CERP and additional treatment area. Staff plan to have a draft paper available in April.
- iii. District staff are reviewing and refining all the STA operational plans; scheduled completion is summer 2004.

g. Accelerate any efforts already scheduled under the Long-Term plan to address the above issues.

- i. Potential acceleration of efforts already scheduled to address the above issues will be discussed in the synthesis paper described in A.1.f.ii. above.
- ii. In addition, the District has recently expedited the Bolles and Cross Canals Improvement Project and is using Long-Term Plan funds (Bc88) to assist with the surveying work. This canal improvement project will improve interbasin transfer

of water among STA-2 and STA-3/4, as well as improve the distribution of water to STA-3/4.

- iii. ACME Basin B currently discharges into the east side of the Refuge. The Village of Wellington has implemented source control programs – 2 ordinances in the last 2 years – to reduce the amount of phosphorus entering the Refuge. In addition, the District recently executed an agreement with the Village of Wellington for a CERP project to treat all the Acme Basin B runoff in STA-1E prior to discharge to the Refuge.

h. Revise the statistical tests recently adopted by TOC for determining compliance with the 80%/85% load reduction requirements for the WCAs and Refuge, respectively, under the Consent Decree. The existing tests, based upon STA outflow concentrations, are invalid when STAs are operated outside of the design loading ranges.

- i. TOC has the lead on this task; District staff will support this effort.
- ii. Recent information suggests that the EAA runoff flows and loads assumed by the Settlement Agreement in coming up with the 80/85% reductions are wrong, particularly the assumption of 20% reduction in runoff due to BMP implementation, and this new information should be included in the TOC analysis.

2. Review the long-term plan to determine whether additional measures are appropriate for optimizing phosphorus reduction. Implement such measures as necessary to achieve the long-term levels.

- a. *Review and revise STA-1E and STA-1W performance forecasts contained in the Plan, based on the conclusions of the hydraulic and phosphorus loading analyses proposed above; the potential incorporation of PSTA; and the additional year of STA operating experience and data gained since the first draft of the Plan was developed. These forecasts should be developed using DMSTA and its updated calibrations.* This work is scheduled to be completed by September 2005 and is dependent on other related Long-Term Plan activities that are presently underway, including Update the Baseline Data Sets, Continued Development and Refinement of DMSTA, and PSTA Investigations.
- b. *Move the analyses required for consideration of BMP optimization and reduced STA inflows into the pre-2006 phase of the Plan, based on the observed overloading and deterioration in STA-1W performance.*
- b. Part 1. The District has taken many positive steps to prevent the overloading that occurred between July 2002 and February 2003 (see 1.A. above). Other activities designed to help STA-1W recover and further reduce phosphorus loads to the Refuge include:
 1. Weekly operations meetings between STA performance staff and operations staff were initiated to ensure the most efficient and effective coordination of operations.

2. Cells 2 and 4 have been taken off line for the balance of the 2004 dry season in order to give this flow-way a period of recovery. In addition, water depths were lowered in order to facilitate increased submerged vegetation growth.
 3. Extensive vegetation management activities have been completed in approximately 1,500 acres of STA-1W, including herbicide application and mechanical removal.
 4. A limerock berm was constructed in Cell 5 between February and August 2003. Preliminary indications are that the outflow concentrations from this treatment cell have improved since the combined vegetation management and limerock berm construction.
 5. District O&M staff have agreed that in the future, all BMP replacement water from Lake Okeechobee will be sent to STA-3/4 and not the other STAs.
 6. District staff, led by the Everglades Regulation Division, are working to revise the algorithm used to estimate BMP replacement water that will be delivered to the STAs in order to improve its accuracy.
- b. Part 2. Potential acceleration of efforts already scheduled to address the above issues will be discussed in the synthesis paper described in A.1.f.ii. above.
- c. *Revise the pre-2006 Plan elements as necessary to align with the current construction schedule for STA-1E.* This will be accomplished as part of the Baseline Data Set updates scheduled to be completed by September 2005 (see A.1.f.1c above).

3. Refine operational strategies to reduce short-term peak loads to and from the STAs.

- a. *Evaluate and implement operational changes that would reduce the magnitude and frequency of phosphorus loading spikes, mounding of water near inflows, and transport of phosphorus into the Refuge interior during periods of high discharge. Such changes should consider revised operation of STA inflow and outflow pumps, regulation of STA water levels to provide temporary storage of peak runoff, and off-line storage (e.g., rock pits or other surface reservoirs).*
- i. Current operations for STA-1W are designed to reduce short-term peak loads to the Refuge by using the smaller (75 cfs – 100 cfs) electric pumps first, prior to the larger diesel-powered pumps. This allows for reduced peak discharges into the Refuge. STA inflow pumps are operated based on the flood-protection mandates of the federal Central and Southern Florida Flood Control Project, and very little flexibility is available. Staff recently lowered the operating depths of some treatment cells for SAV viability, and this will increase the short-term storage capability of these treatment cells. Staff are evaluating lowering the depths in the SAV cells of all of the STAs as part of the refinement of the STA operational plans. The District is expediting the construction of the EAA Storage Reservoir Project on a parallel path with the PIR process.
 - ii. District staff are not aware of any documented impact on the Refuge as a result of these day-to-day operations. Additional information could

potentially be obtained from an analysis using the hydrodynamic model proposed in Part C of the TOC recommendations.

- iii. The Corps of Engineers has committed to construction/excavation activities downstream of the STA-1E outflow pumps inside the Refuge; this will help minimize the impact of peak discharges on the Refuge marsh.

4. Review of regional water management decisions affecting STA operations and performance.

- a. *Develop a real-time protocol to ensure that STA operation and performance are not damaged from regional water management decisions made under the WSE schedule for Lake Okeechobee, the IOP, and other relevant operating constraints.*
 - i. As part of the Long-Term Plan, District staff are currently analyzing the Lake Okeechobee phosphorus trends that affect discharges to the STAs [Bc86(4)].
 - ii. District staff have developed and distributed a draft paper on the operational design envelopes for each STA. This will assist in keeping STA inflows within their design range.
 - ii. District staff are currently analyzing the Lake Okeechobee phosphorus trends that affect discharges to the STAs [Bc86(4)].
 - iii. Staff have also begun to evaluate refinements to the WSE schedule, and are examining the potential of an explicit consideration of phosphorus loads to the Everglades.
 - iv. At the February 3, 2004 TOC meeting, Susan Sylvester of the Corps of Engineers volunteered to lead the effort to review the downstream water management policies [WCA regulation schedules, ENP (IOP) deliveries, etc] and the District will support these efforts.