

Comments on Draft Science Plan

W. Walker 3/27/2013

The document is generally well-written and comprehensive. The details on the specific projects are still sketchy. It is hoped that there will be further opportunity for review and comment as the individual projects are designed in greater detail. The following comments supplement those made at the March 19th & 20th meetings.

I have always considered the Science Plan as icing on the cake of the long-term STA monitoring plan as a basis for designing projects to achieve treatment goals and am disappointed that the cake has crumbled. The revised monitoring plan for STA flow-ways described in Appendix D specifies reductions in sampling intensity and changes in sampling methods relative to the program that existed prior to 2013. These changes were not discussed in the state/federal workshops until the last half hour of the last workshop. The historical design has been stripped to meet specific “mandates” in the discharge permits, consent decree, BMP rule, etc. The Science Plan itself is a “mandate” that seems to have been ignored in scaling back the program. The discharge permit specifically states:

“Key areas that should be considered for further scientific studies include the effect of the following factors on STA performance: (1) phosphorus loading rates; (2) inflow phosphorus concentration; (3) hydraulic loading rates; (4) inflow water volumes, time, pulsing, peak flows, and water depth; (5) phosphorus speciation at inflows and outflows.....”

The revised monitoring plan will decrease the accuracy and precision of the flow-way inflow & outflow loads, inflow & outflow concentrations, P speciation, and “performance” as measured by load reductions, concentration reductions, or settling rates. It will be more difficult to detect long-term trends or measure changes in performance resulting from changes in operation or vegetation management. The value of the extensive historical database as a basis for comparison is compromised by the change in sampling methods and frequency.

While there is room for optimizing the historical program, radical reductions of this scale are not justified without demonstrating that they will provide adequate data to meet the Science Plan mandates and support ongoing operations and management to optimize STA performance. While there is apparently an option for researchers to request additions to the plan at some point in the future, below are concerns that I believe should be considered now to ensure that the Science Plan gets off on the right foot and to reduce the risk that significant data gaps will be discovered 5 years down the road (too late) during analysis and interpretation of the study results.

Beyond saving cost, the logic behind the “10 Rules for Monitoring STAs” is not clear. The following changes are of concern:

- Elimination of auto-samplers in the individual flow paths, except in cases where cell inflows and/or outflows are tied to the permit (e.g., STA-5/6 In & Out, STA-34 Out). As reflected in the District’s Regulatory programs and discharge permits, flow-weighted composite sampling is the most accurate and reliable way to measure loads in storm-driven systems. The “episodes” that drive the inflows and internal dynamics are far less likely to be captured with grab sampling at biweekly or monthly frequency. Grab sample concentrations are typically lower than composites. Phosphorus budgets constructed on the individual flow-ways based upon grab samples will be inconsistent with the P budgets constructed for the STA’s and related to permits, as well as with the historical long-term mass balance datasets for the flow-ways.
- Monitoring of the interior levees (generally representing the outflows from emergent cells and inflows to SAV cells) has been scaled back significantly from weekly composites to monthly grabs. This is clearly inadequate to measure the performance of the emergent cells and the inflows to the SAV cells, and to capture episodic loading events, especially given the focus of the Science Plan on the tail ends of the STAs.
- Flow-Way starts are grab-sampled biweekly and only for TP and Ca. The Flow-Way interiors are grab-sampled monthly for TP, TDP, SRP, and Ca. Any assumptions that the pump station and flow-way start concentrations are equal should be justified based upon the historical data. This is frequently not the case. It is not clear why Calcium is consistently sampled in the flow-ways, whereas P species are not. I did not see a description of how the calcium data will be used.
- Eliminating composite sampling in the outflows from STA-1W flow-ways is a particular concern because they will be the inflows to the expanded treatment area.
- Seepage recycle is an important component of the STA-1W and STA-1E water and P budgets.

Here are examples of how the cutback in monitoring could have significant adverse impacts on the other Science Plan projects:

- Vegetation Management. The ability to detect episodes and measure changes in performance resulting from changes vegetation management and climatologic events is

compromised.

- Canal Study. Requires accurate measurements of P load into and out of canal segments. Auto-samplers needed for both inflows and outflows of the canal segments to capture dynamic sedimentation/ re-suspension events.
- Water Budget Study. The primary reason for improving the STA water budgets is to improve STA phosphorus budgets. The decreases in sampling frequency and elimination of composite samplers clearly work in the wrong direction. This study could be scaled back to an initial matrix evaluation of the water budgets and the funds used to restore the monitoring plan.
- Modeling. The value of the existing long-term dataset to support model calibration and testing is compromised. Calibrations to FWM concentrations computed from grab samples in the individual flow paths would not be transferable to permit outflow concentrations measured with composite samplers. Inaccurate loading and inflow concentration estimates, particularly for SAV cells with inflows are grab sampled monthly.
- Transect Studies. The focus on the transect studies will be to measure changes in P speciation along the gradient between the inflows and outflows. It is essential to characterize the dynamics of the inflows to interpret transect results. Only TP and calcium are measured in the inflows to the individual flow-ways.

Other Comments:

- Capping Study. The reason for including this new project is unclear, since previous economic analyses have indicated that capping is generally not economically feasible on large scale. As discussed at the meeting, the study could focus specifically on measures that could be implemented in the STA-1W expansion. Including capping, amendments, grading, tilling, etc..
- Transects. Recommend that transects not focus exclusively on the SAV cells, but extend along entire flow-ways from inflows to outflows to provide a basis for comparison. Important to capture high-flow events. Include vegetation and periphyton tissue P content to assess luxury uptake.
- Cattail Inundation Study. Focuses on average-high water levels. Consider experimenting with modest draw-down between flooding events. That is more

consistent with the actual depth variations in the field. Hypothesis that draw-down could increase resilience to deep water (re-rooting etc.). Cells 5 & 7 of STA-1E should be included in the field studies as examples of cells with deep water.

- **Grab/Composite Study.** Suggest that the study start with a broad comparison of grabs and composites across all of the STA sites. Compare annual flow-weighted-mean concentrations computed with composites vs. grabs only. This will provide information on consequences of eliminating the flow-way auto-samplers. Examine correlations between the grab/composite ratios and potential causal factors, such as flow variability, concentration range, basin, etc. Results of the intensive studies at G310 may not be applicable to other pump stations and structures. At S6, for example, grab concentrations typically exceed composite values, unlike G310 and most of the other sites.
- **Canal Study.** As discussed above, this study is significantly compromised by the elimination of the flow-way auto-samplers. The STA-1E discharge canal should be studied because there have been significant discrepancies between the cell outflows and pump outflows with respect to volume and P load.
- **Modeling.** The modeling team should review the updated monitoring plan to ensure that it is adequate to support future model development. The models contemplated in the individual research projects are not likely to be compatible with the general mass-balance models used for design (DMSTA and successors.). Data needs to support continued model development should be considered in designing data-collection efforts under each research project.