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ADDENDUM: HYDRODYNAMIC
AND SEDIMENT TRANSPORT
ANALYSES FOR CONOWINGO
POND

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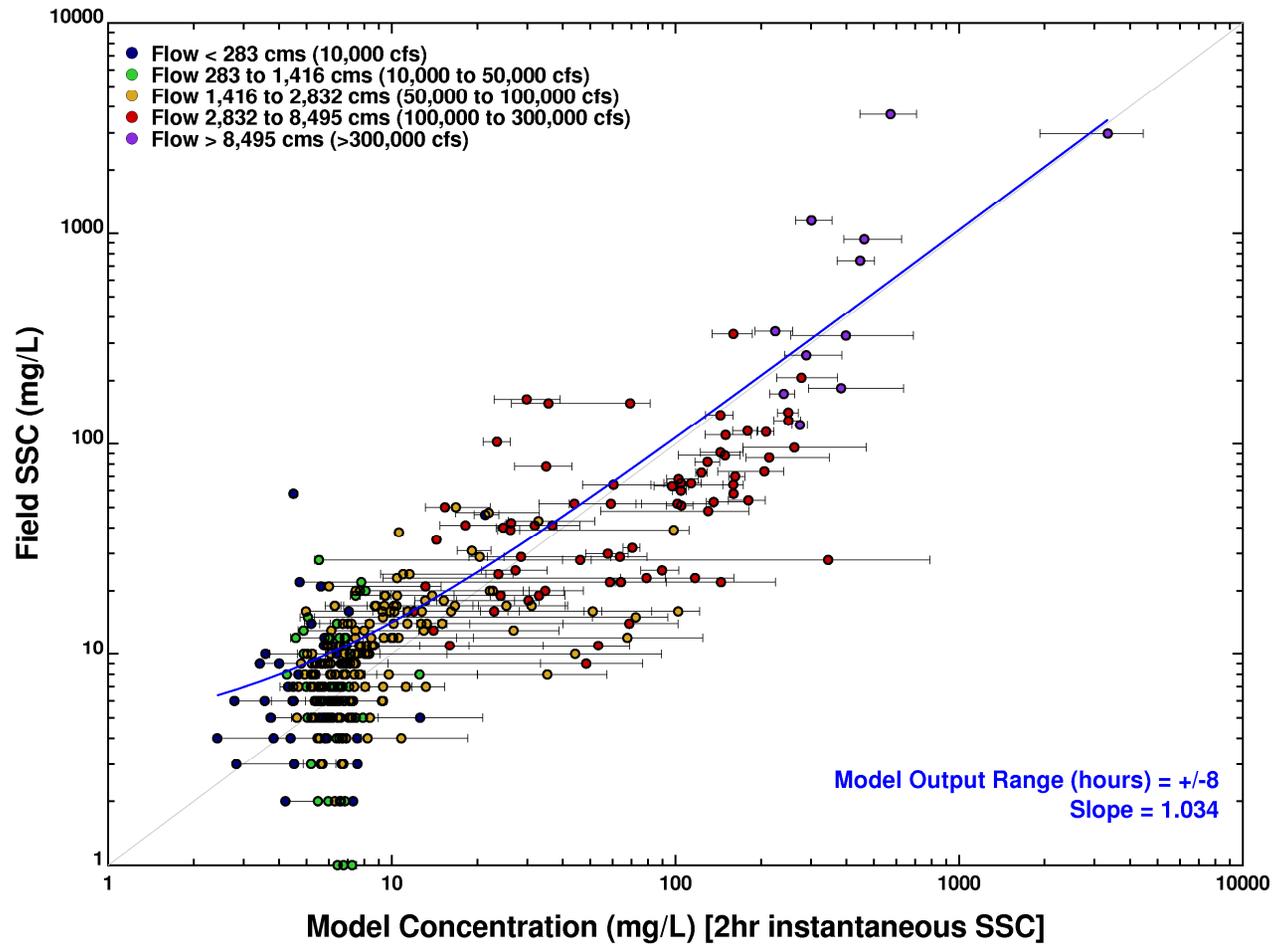
Addendum: Hydrodynamic and Sediment Transport Analyses For Conowingo Pond

As an outgrowth of the Peer Review process, additional statistical analyses were performed to further characterize the performance of the sediment transport component of the Conowingo Pond Mass Balance Model (CPMBM). In the hydrodynamic and sediment transport model report, comparisons of simulated (“predicted”) and measured (“observed”) suspended sediment concentration (SSC) and loads at Conowingo are presented in Figures 58 and 59. In those figures, measurements are presented on the x-axis as the independent variable and simulation results are presented on the y-axis as the dependent variable. This organization of data is termed “PO” (predicted versus observed). However, analyses presented by Piñeiroa et al. (2008) demonstrate that comparisons between models and measurements may be biased when evaluations are performed with data organized in PO format. Piñeiroa et al. (2008) further show that, to eliminate potential bias, evaluations should be performed using data organized in the opposite format, with simulation results presented on the x-axis as the independent variable and measurements presented on the y-axis as the dependent variable. This organization of data is termed “OP” (observed versus predicted).

To ensure that sediment transport model performance evaluations are unbiased, comparisons were also performed with data organized in OP format. Comparisons of measured and simulated concentrations and loads at Conowingo and the 1:1 line of perfect agreement (with a slope of 1.0) are presented in Figures A1-A2 of this addendum. Model results are shown on the x-axis (independent variable) with averages and ranges (minimum to maximum) that occurred within a ± 8 hour interval centered on the time of sample collection to account for differences attributable to the timing of flow and sediment inputs and transport processes in the Pond. Measured values are shown on the y-axis (dependent variable). Linear regressions were performed to characterize the correspondence between model results and field measurements. When organized in OP format, and using values for all flow ranges, the slope of the regression between measured and simulated concentration was 1.03 and was 0.93 for load. As described in the report, measured loads represent the product of measured concentration and the associated instantaneous flow value at the time of measurement. Likewise, simulated loads represent the product of the simulated instantaneous concentration for the nearest point in time of output (which was reported every two hours) and the corresponding simulated flow. Based on these comparisons (with data in OP format), model load estimates are approximately 7% lower than measured values across all sample collection times and flows. For reference, when data were organized in PO fashion, the regression slope between simulated and measured values was 0.88 for concentration and 0.89 for load. Thus, comparisons presented in Figures A1-A2 (with data in OP format) demonstrate that sediment transport model performance is better than indicated by the comparisons presented in Figure 58 and 59.

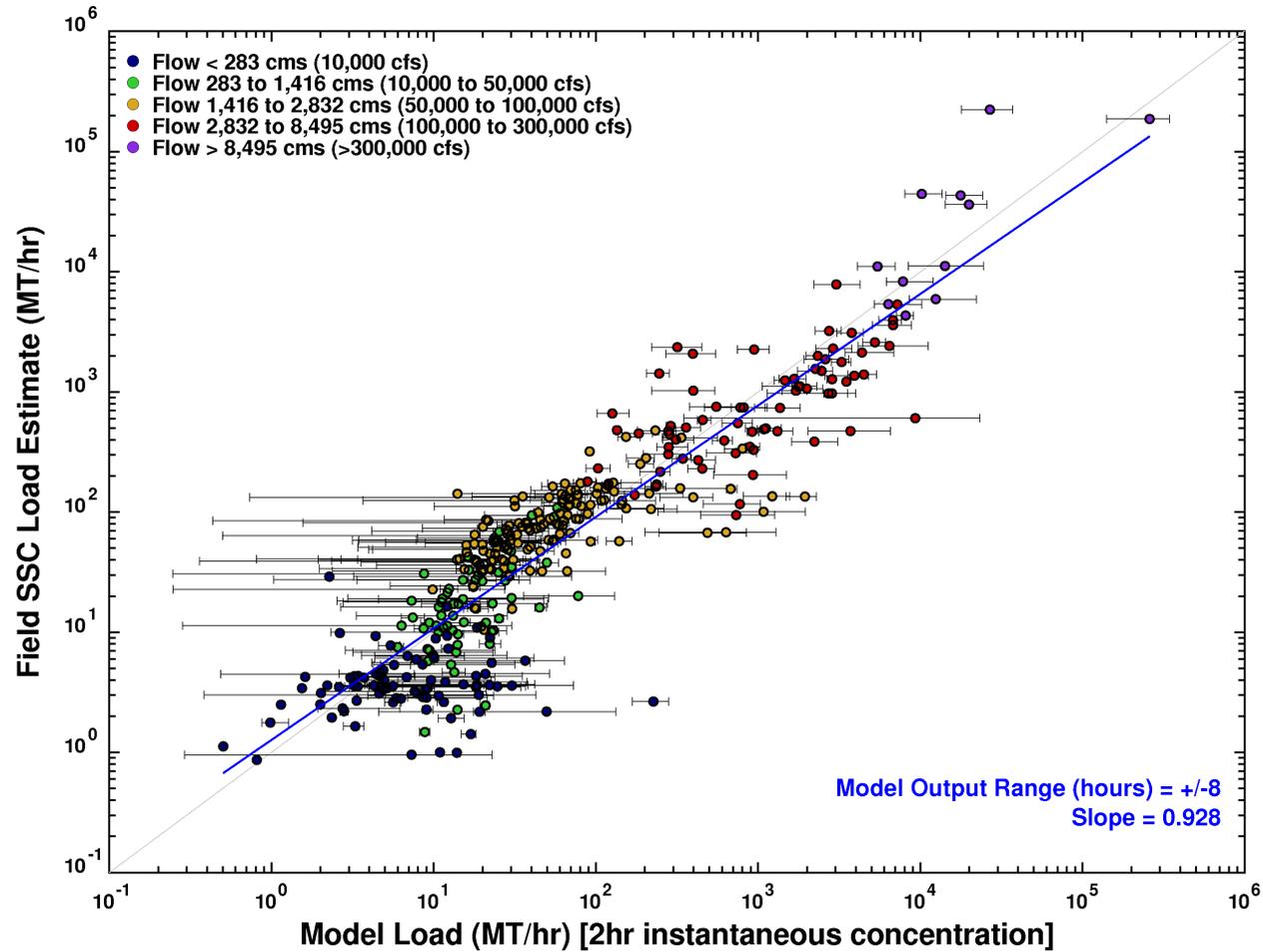
References

Piñeiroa, G., Perelman, S., Guerschman, J., and Paruelo, J. 2008. How to evaluate models: Observed vs. predicted or predicted vs. observed? *Ecological Modeling*, 216(3-4):316-322.



Note: Black bars = range of model results within ± 8 hour interval of sampling times; Blue line = linear regression result (model result vs. field value at times of measurement); Slope = slope of linear regression result; simulated = model instantaneous value reported to nearest 2 hour interval; measured = field value.

Figure A1. Comparison of measured and simulated suspended sediment concentration (SSC) at Conowingo.



Note: Black bars = range of model results within ± 8 hour interval of sampling times; Blue line = linear regression result (model result vs. field value at times of measurement); Slope = slope of linear regression result; simulated = model instantaneous flow and SSC; measured = field instantaneous flow and SSC.

Figure A2. Comparison of measured and simulated suspended sediment concentration (SSC) loads at Conowingo.