

**Capitol Lake and Puget Sound.
An Analysis of the Use and Misuse of the Budd Inlet Model.**

9. APPENDICES.

A. Recommendations presented to WDOE staff during a meeting in November, 2014.

Recommendations for further refinement of the Budd Inlet simulations.

Recommendation	Rationale
1) Simulate the inlet between dates March 15 and October 15.	Some WQ standards violations occur after Sept. 15, the present cut-off date of the simulation. There are none before March 15.
2) Change the present unconventional practice of reporting model outputs (as a single unspecified depth on a single unspecified date showing the maximum level of WQ standards violation for the duration of the simulation) to showing a vertical profile of DO on the date(s) of the violations. If impractical for all violation locations, at least do so for violations at stations reported in the BISS data.	It is presently impossible to compare the model outputs with observed data. The present mode of reporting precludes conventional interpretation by aquatic ecologists.
3) Always report the 90% confidence limits on estimates of the size of WQ stds violations.	Estimates of unknown values of DO's in nature may or may not be far off the mark. Confidence limits put such estimates in perspective.
4) Use as the criterion for identifying WQ stds violations whether or not the upper confidence limit (not the estimate itself) falls below the WQ standard.	If the upper confidence limit falls below the standard, we may be very sure that there really is a violation. <i>Especially</i> if it is an UCL of a mean of several estimates.
5) For validation of whichever model is used, calculate dissolved oxygen vertical profiles for all the BISS stations, on the same dates as the BISS stations were observed and at the same times of day.	These stations, dates, and times are available in the BISS data spreadsheet. This makes a crucial model validation test possible. This calculation is critical to determining whether the model replicates the structure of Budd Inlet water or not.
6) Find a way to extend the Budd Inlet model's "view" into the water beyond Boston Harbor, or use the larger South Sound model for the simulations.	It appears that significant Estuary Scenario effects occur right up to the edge of the Budd Inlet model's domain. For accurate simulations of Estuary Scenarios, it is essential that the water beyond Boston Harbor be brought into the simulation.
7) Articulate the perceived problems to be fixed when modifying the model, and what constitutes "success."	[I am thinking of the poster. Maybe this has already been done, I lost my copy! If so, good work.]
8) It would be helpful if model output maps show the calculated DO's of water in the bottom layer over the whole of Budd Inlet at representative dates.	The bottom layer is almost always the place where DO goes lowest. This would provide valuable overviews of the situation at the bottom.

B. The “DeMeyer data” used in this Analysis.

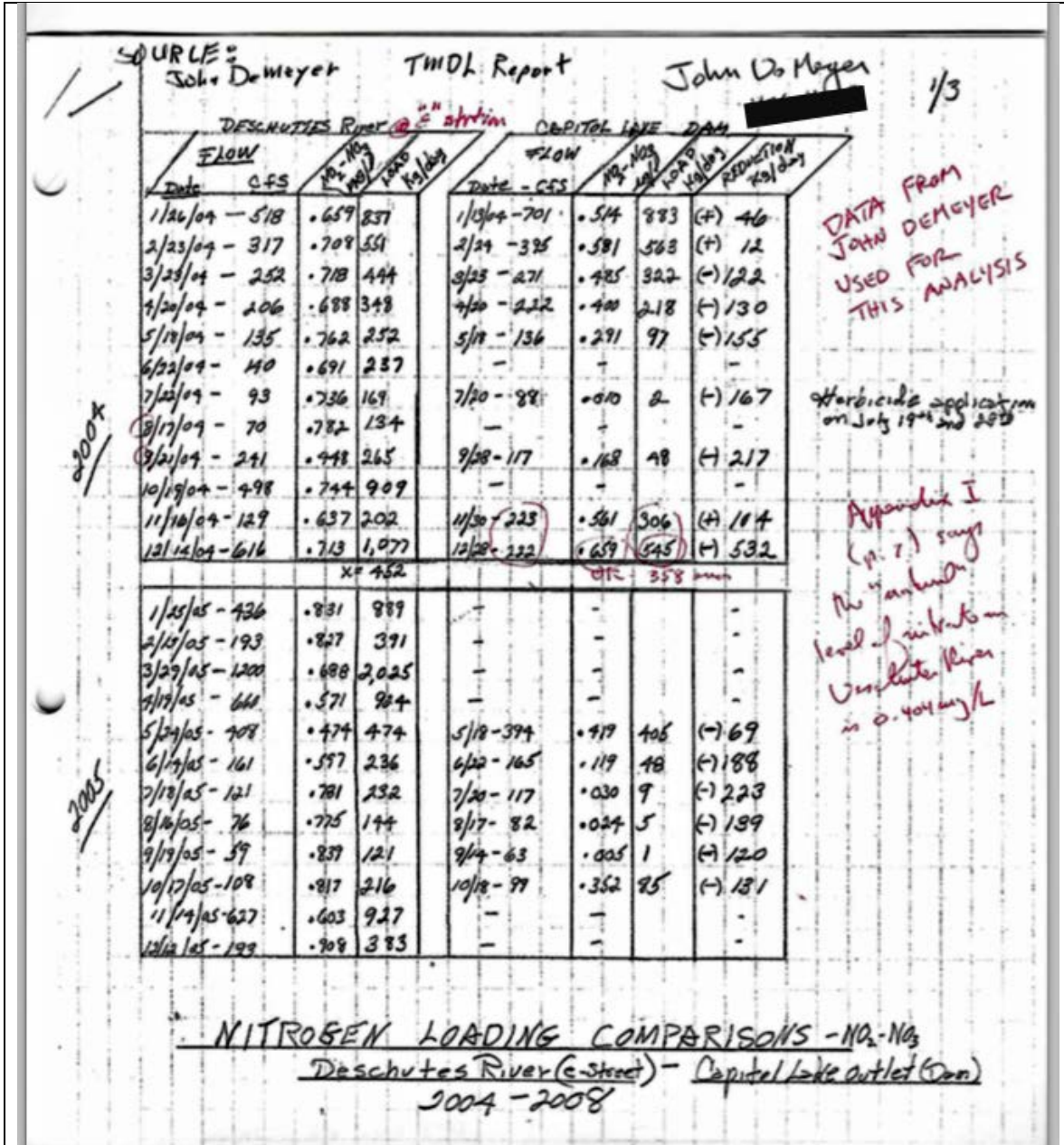


Figure A-1. Page 1 of the “DeMeyer data” used in this analysis. This is a data set provided to the author by Mr. John DeMeyer in 2013. He obtained it from a Department of Ecology website, which was posted upon his request. The data set consists of his penciled copies of the following; Section 1 Deschutes River data from E-Street bridge (Tumwater) with dates, river flows (cfs), nitrate+nitrite concentrations (mg/L), and load (kg/day). Section 2, Capitol Lake data at the dam; dates, flows (cfs) through the dam, nitrate + nitrite concentrations (mg/L), load (kg/day), and “Reduction (kg/day)” [The “Reduction” entry consists of his own calculations. Red annotations are my own.] The WDOE website showed data from 2004 through 2008. Data for 2004 (used in my Figure 3-2) showed the entire year’s nitrogen entry and exit data; data for all other years showed only the summer patterns. (These summer patterns are all similar to that shown in Figure 3-2.)

After two weeks, the data unaccountably disappeared from the WDOE website. Neither he nor I can find it

again. His notes include an entry on another page, "See p. 36 South Puget Sound Dissolved Oxygen Study." I find nothing pertaining to these data on that page or elsewhere in the SPSDOS reports.

These are the only data I've seen that report the actual flows of the Deschutes River and water exiting the Lake. All others show concentrations of nitrogen nutrients in the River water and the Lake water at the dam.

(Black bar obscures JDM's telephone number.)