III. Constituent Correlations

The data presented in previous sections were used to investigate correlations among the constituents. The following correlation plots are shown in Figures IV-1 to Figure IV-25:

DWSC Water constituents

Figure IV-1	VSS	vs.	TSS
Figure IV-2	chlorophyll *a*	vs.	pheophytin *a*
Figure IV-3	chlorophyll *a*	vs.	TSS
Figure IV-4	chlorophyll *a* + pheophytin *a*	vs.	TSS
Figure IV-5	chlorophyll *a*	vs.	VSS
Figure IV-6	chlorophyll *a* + pheophytin *a*	vs.	VSS
Figure IV-7	TSS	vs.	turbidity
Figure IV-8	VSS	vs.	turbidity
Figure IV-9	chlorophyll *a*	vs.	turbidity
Figure IV-10	chlorophyll *a* + pheophytin *a*	vs.	turbidity
Figure IV-11	$BOD_{uLt.}$	vs.	turbidity
Figure IV-12	$BOD_{uLt.}$	vs.	TSS
Figure IV-13	$BOD_{uLt.}$	vs.	VSS
Figure IV-14	$BOD_{uLt.}$	vs.	chlorophyll *a*
Figure IV-15	$BOD_{uLt.}$	vs.	chlorophyll *a* + pheophytin *a*

DWSC Sediments

Figure IV-16	VSS	vs.	TSS
Figure IV-17	chlorophyll *a*	vs.	pheophytin *a*
Figure IV-18	chlorophyll *a*	vs.	TSS
Figure IV-19	chlorophyll *a* + pheophytin *a*	vs.	TSS
Figure IV-20	chlorophyll *a*	vs.	VSS
Figure IV-21	chlorophyll *a* + pheophytin *a*	vs.	VSS
Figure IV-22	$BOD_{uLt.}$	vs.	TSS
Figure IV-23	$BOD_{uLt.}$	vs.	VSS
Figure IV-24	$BOD_{uLt.}$	vs.	chlorophyll *a*
Figure IV-25	$BOD_{uLt.}$	vs.	chlorophyll *a* + pheophytin *a*

A line was fit to these data using the method of least squares. The goodness of fit was evaluated by squared regression coefficient, R^2. Table IV-1 contains water constituents while Table IV-2 presents plots of sediment constituents. The equation of the line and the R^2 value for each plot is provided in Table IV-1 and IV-2.

Correlations for all the DWSC water samples are generally poor since R^2 values range from 0 to 0.6. The best correlation observed in this group was VSS vs. TSS. This relationship suggests that of the suspended matter in the DWSC approximately 16 percent is organic assuming calcium carbonate precipitate is not present. The correlations of BOD_{ult} with any of the suspended constituents is remarkably poor, suggesting that most of the BOD in the DWSC is of a soluble nature, where soluble is defined as all matter that passes through filter membranes.

Contrary to the DWSC water, relatively good correlations of BOD_{ult} with VSS, chlorophyll *a*, or chlorophyll *a* plus pheophytin *a* were observed for water samples collected in the upstream San Joaquin River station. The correlation of BOD_{ult} with VSS suggests that 1 mg/L of VSS yields 2 mg/L of BOD_{ult} as shown in Figure IV-13. Care should be used with this relationship as it was developed using relatively few data points and the curve was forced through the origin. Figure IV-14 presents the correlation of BOD_{ult} with chlorophyll *a*. This relationship suggests that every 100 µg/L of chlorophyll *a* will yield 24 mg/L of ultimate oxygen demand. Lastly Figure IV-15 shows the plot of BOD_{ult} vs. the sum of chlorophyll *a* and pheophytin *a*. This relationship indicates that every 100 µg/L of chlorophyll *a* plus pheophytin *a* will yield 17 mg/L of ultimate oxygen demand.

The correlations for sediments trapped in the DWSC are relatively good when compared with the correlations shown previously with the water from the DWSC. Values of R^2 ranged from 0.71 to 0.98 for fitted lines shown in Figures IV-16 to IV-25. The fitted curves with the BOD_{ult} data are excellent, with the sum of chlorophyll *a* and pheophytin *a* yielding the best parameter by which BOD_{ult} values can be estimated for trapped sediments. The sediment relationships should not be used for estimating BOD_{ult} values for water samples since the ratio of chlorophyll *a* to pheophytin *a* is about 0.24 compared with 0.89 observed for the water samples. It appears the organic matter associated with pheophytin *a* in the trapped sediments is much more refractory than the matter suspended in the water column.

Table IV-2: Fitted equations and regression coefficients for DWSC water constituent correlations.

Figure	y-axis constituent		x-axis constituent	Fitted Line	R^2
Figure IV-1	VSS	vs.	TSS	VSS (mg/L) = 0.16 × TSS (mg/L)	0.62
Figure IV-2	Chlorophyll *a*	vs.	pheophytin *a*	Chl *a* (μg/L) = 0.89 × Ph *a* (μg/L)	0.25
Figure IV-3	chlorophyll *a*	vs.	TSS	Chl *a* (μg/L) = 0.58 × TSS (mg/L)	0.05
Figure IV-4	chlorophyll *a* + pheophytin *a*	vs.	TSS	Chl *a* (μg/L) + Ph *a* (μg/L)= 1.2 × TSS (mg/L)	0.18
Figure IV-5	chlorophyll *a*	vs.	VSS	Chl *a* (μg/L) = 3.8 × VSS (mg/L)	0.18
Figure IV-6	chlorophyll *a* + pheophytin *a*	vs.	VSS	Chl *a* + Ph *a* (μg/L)= 7.7 × VSS (mg/L)	0.40
Figure IV-7	TSS	vs.	turbidity	TSS (mg/L) = 0.98 × turbidity (NTU) + 1.43	0.50
Figure IV-8	VSS	vs.	turbidity	VSS (mg/L) = 0.13 × turbidity (NTU) + 0.92	0.43
Figure IV-9	chlorophyll *a*	vs.	turbidity	Chl *a* (μg/L) = 0.45 × turbidity (NTU) + 4.6	0.10
Figure IV-10	chlorophyll *a* + pheophytin *a*	vs.	turbidity	Chl *a* + Ph *a* (μg/L) = 1.42 × turbidity (NTU) – 3.2	0.29
Figure IV-11	$BOD_{uLt.}$	vs.	turbidity	$BOD_{uLt.}$ (mg/L) = -.0047 × turbidity (NTU) - 9.24	0.00
Figure IV-12	$BOD_{uLt.}$	vs.	TSS	$BOD_{uLt.}$ (mg/L) = 0.0019 × TSS (mg/L) + 8.1	0.00
Figure IV-13	$BOD_{uLt.}$	vs.	VSS	$BOD_{uLt.}$ (mg/L) = 0.060 × VSS (mg/L) + 7.9	0.00
Figure IV-14	$BOD_{uLt.}$	vs.	chlorophyll *a*	$BOD_{uLt.}$ (mg/L) = 0.00055 × Chl *a* (μg/L) + 8.1	0.00
Figure IV-15	$BOD_{uLt.}$	vs.	chlorophyll *a* + pheophytin *a*	$BOD_{uLt.}$ (mg/L) = -0.016 × [Chl *a*+Ph *a*] (μg/L) + 8.1	0.02

Table IV-3: Constituent correlations for trapped sediments.

Figure	y-axis constituent		x-axis constituent	Fitted Line	R^2
Figure IV-16	VSS	vs.	TSS	VSS (mg) = 0.16 × TSS (mg)	0.98
Figure IV-17	chlorophyll *a*	vs.	pheophytin *a*	Chl *a* (μg) = 0.24 × Ph *a* (μg)	0.83
Figure IV-18	chlorophyll *a*	vs.	TSS	Chl *a* (μg) = 0.068 × TSS (mg)	0.71
Figure IV-19	chlorophyll *a* + pheophytin *a*	vs.	TSS	Chl *a* + Ph *a* (μg)= 0.32 × TSS (mg)	0.84
Figure IV-20	chlorophyll *a*	vs.	VSS	Chl *a* (μg) = 0.72 × VSS (mg)	0.72
Figure IV-21	chlorophyll *a* + pheophytin *a*	vs.	VSS	Chl *a* + Ph *a* (μg)= 3.7 × VSS (mg)	0.87
Figure IV-22	$BOD_{uLt.}$	vs.	TSS	$BOD_{uLt.}$ (mg) = 0.012 × TSS (mg) + 1.3	0.78
Figure IV-23	$BOD_{uLt.}$	vs.	VSS	$BOD_{uLt.}$ (mg) = 0.13 × VSS (mg) + 1.2	0.80
Figure IV-24	$BOD_{uLt.}$	vs.	chlorophyll *a*	$BOD_{uLt.}$ (mg) = 0.20 × Chl *a* (μg) + 1.6	0.72
Figure IV-25	$BOD_{uLt.}$	vs.	chlorophyll *a* + pheophytin *a*	$BOD_{uLt.}$ (mg) = 0.044 × [Chl *a*+Ph *a*] (μg) + 0.89	0.87

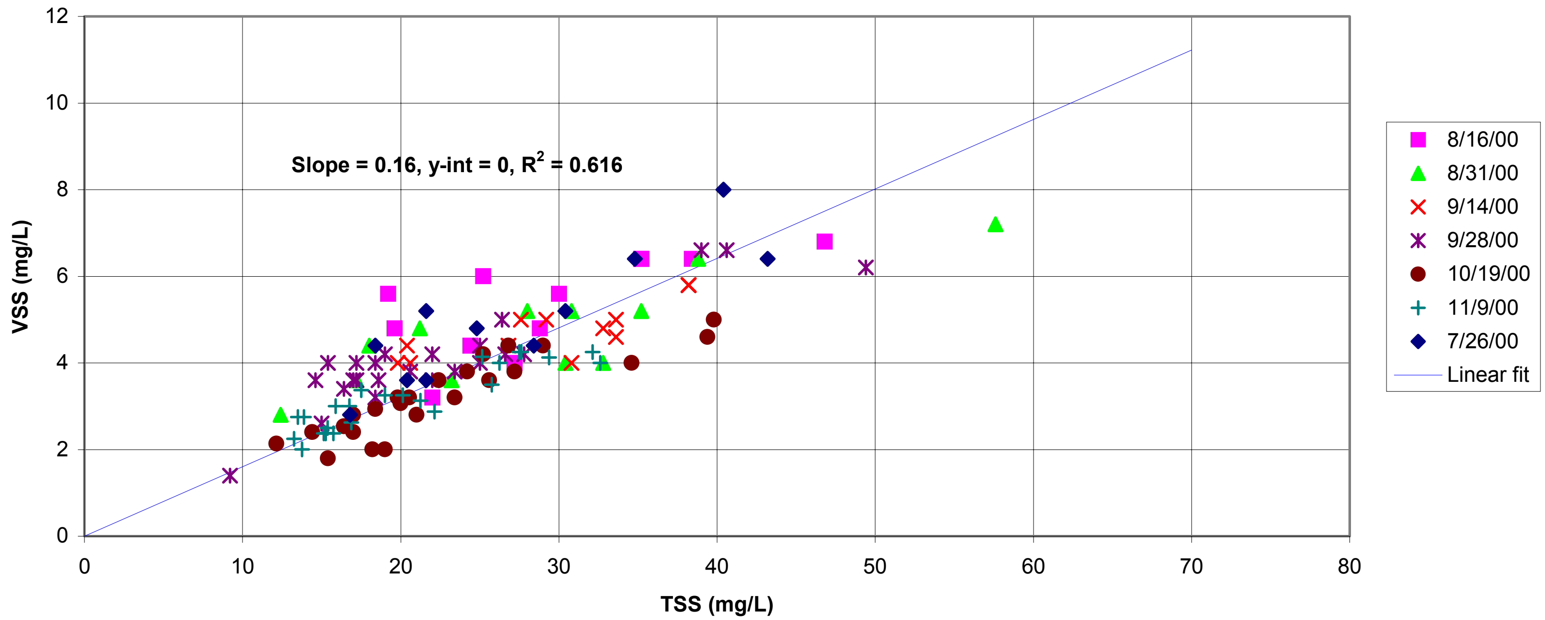

Figure IV-1: VSS vs. TSS for DWSC waters.

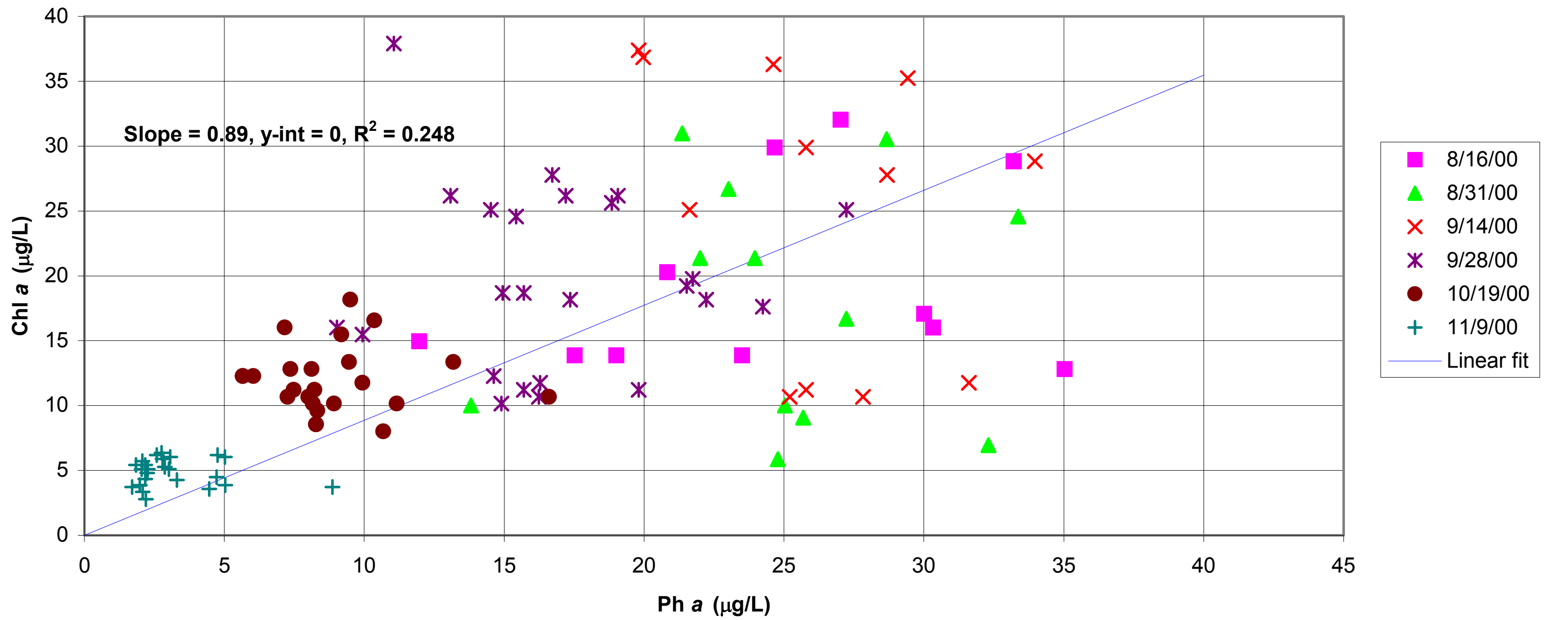

Figure IV-2: Chlorophyll *a* vs. pheophytin *a* for DWSC waters.

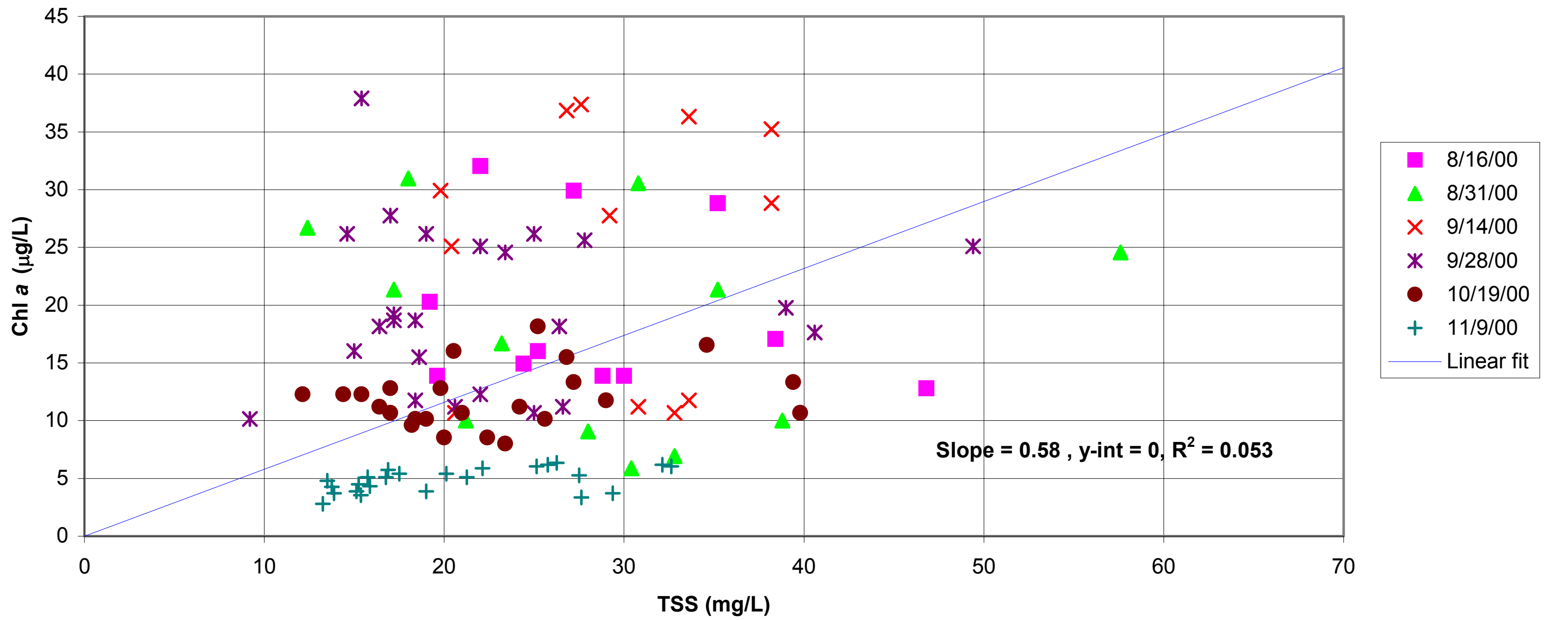

Figure IV-3: Chlorophyll *a* vs. TSS for DWSC waters.

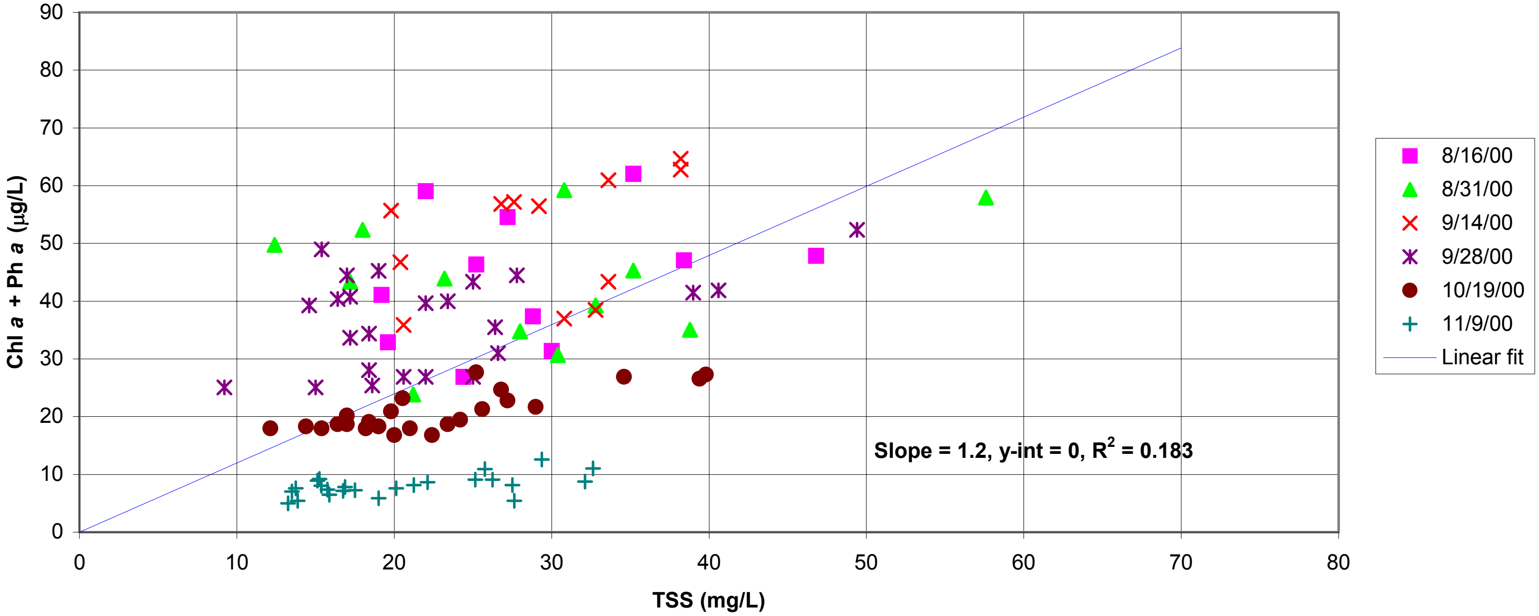

Figure IV-4: Chlorophyll *a* + pheophytin *a* vs. TSS for DWSC waters.

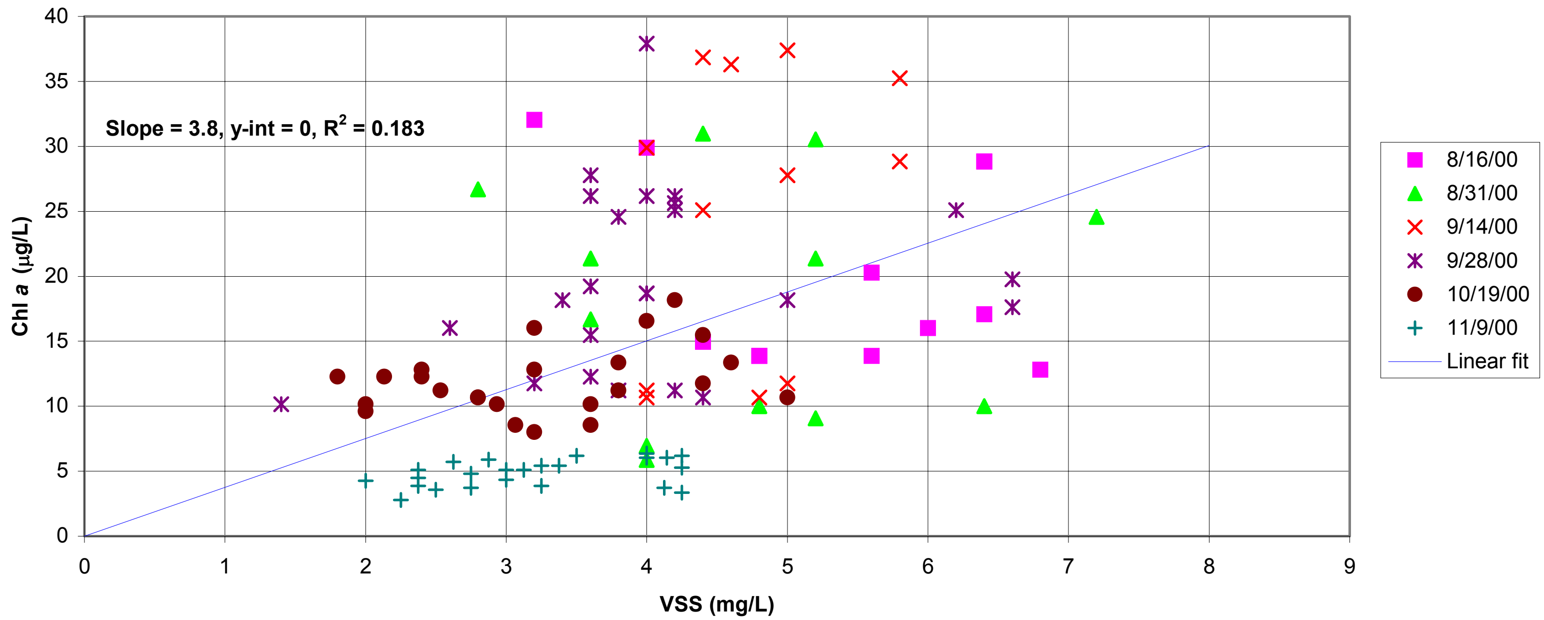

Figure IV-5: Chlorophyll *a* vs. VSS for DWSC waters.

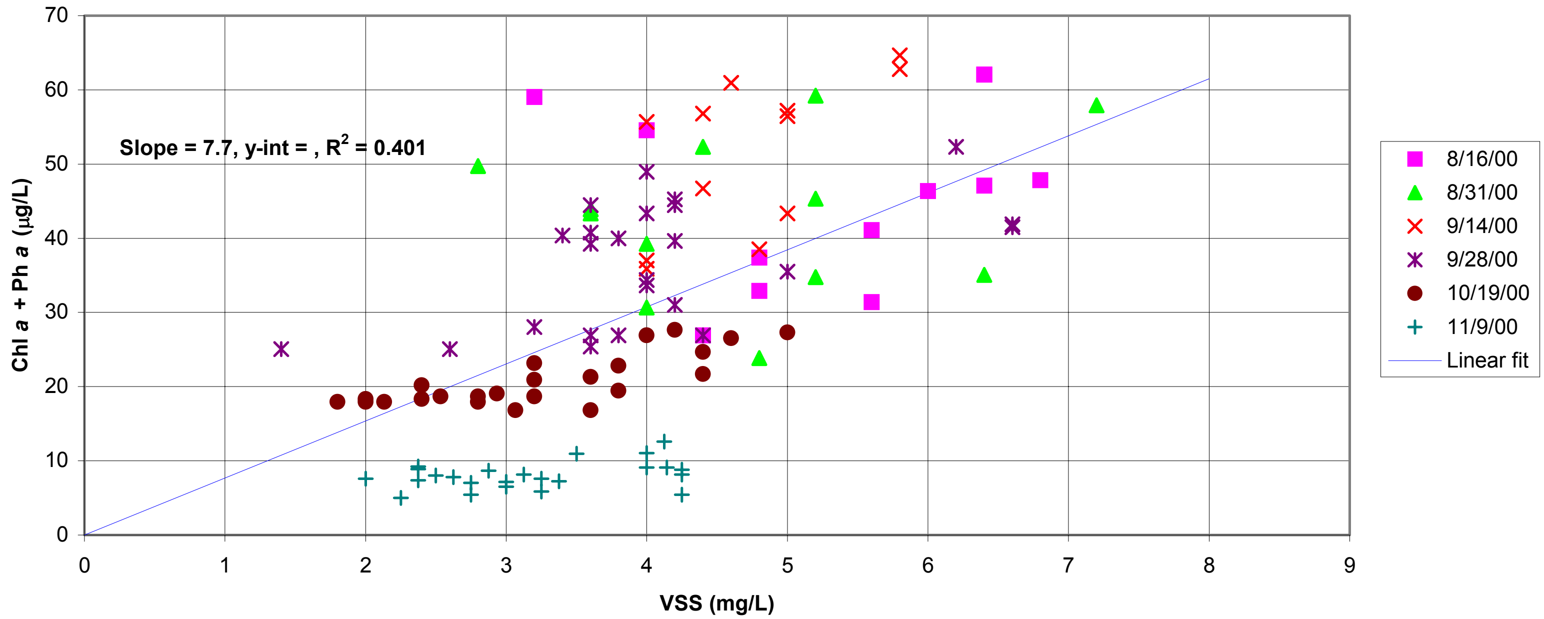

Figure IV-6: Chlorophyll *a* + pheophytin *a* vs. VSS for DWSC waters.

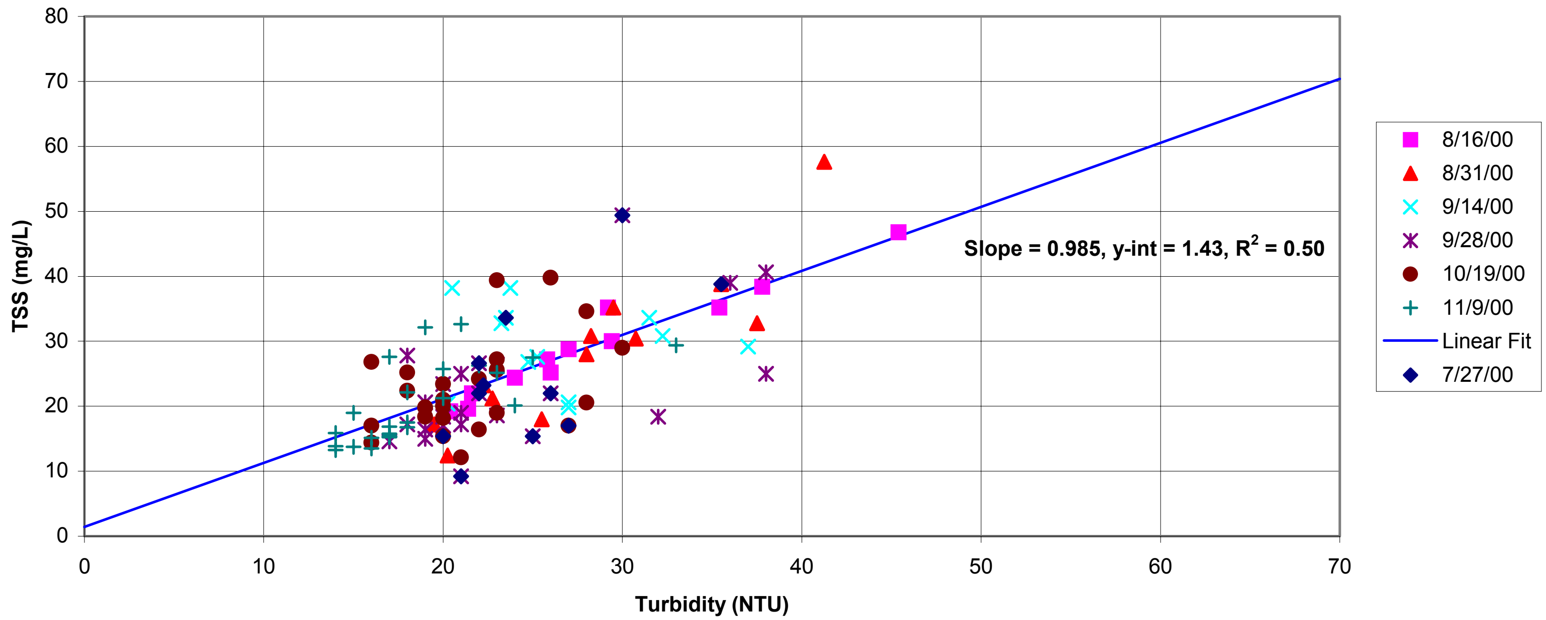

Figure IV-7: TSS vs. turbidity for DWSC waters.

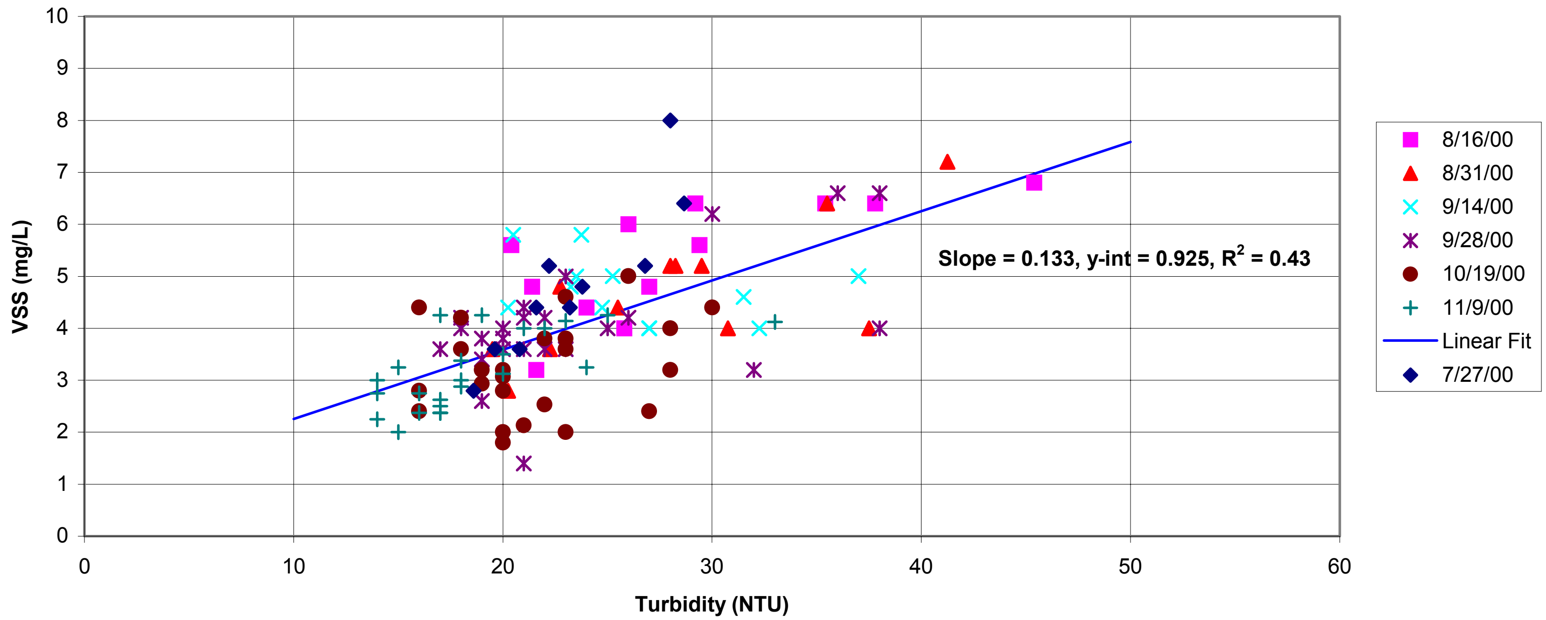

Figure IV-8: VSS vs. turbidity for DWSC waters.

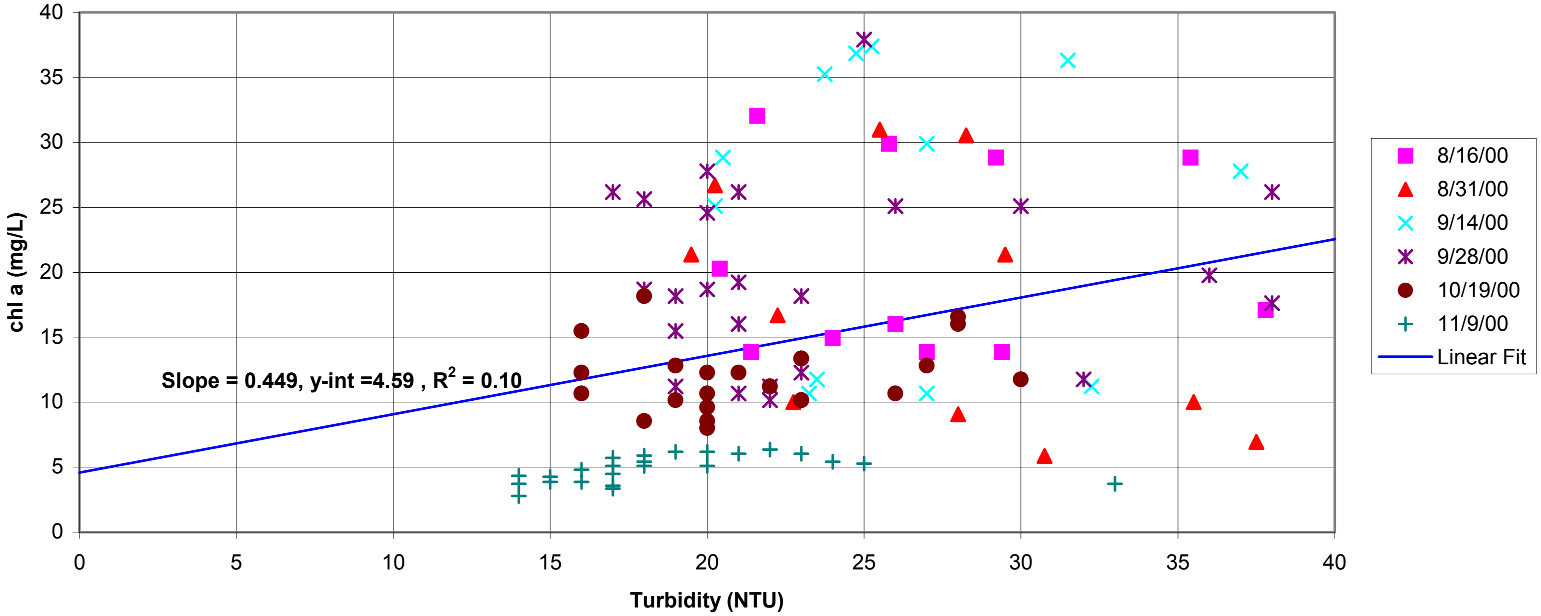

Figure IV-9: Chlorophyll *a* vs. turbidity for DWSC waters.

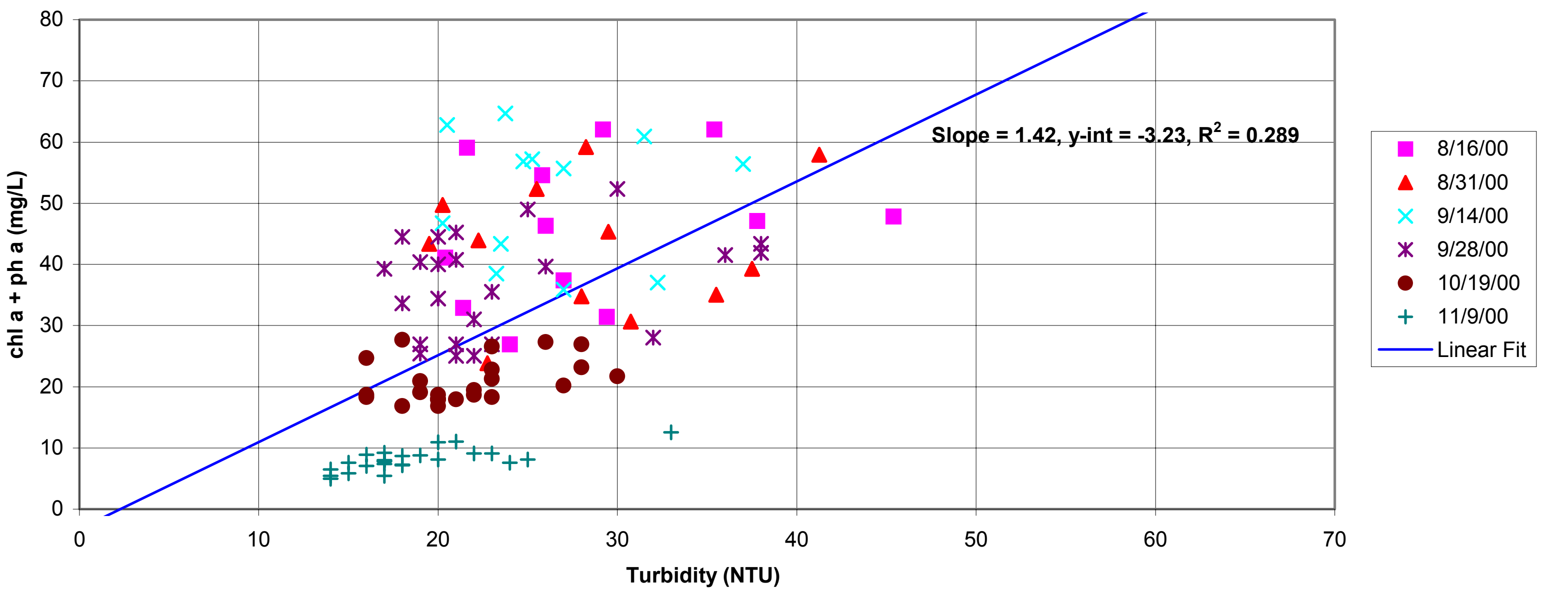

Figure IV-10: Chlorophyll *a* + pheophytin *a* vs. turbidity for DWSC waters.

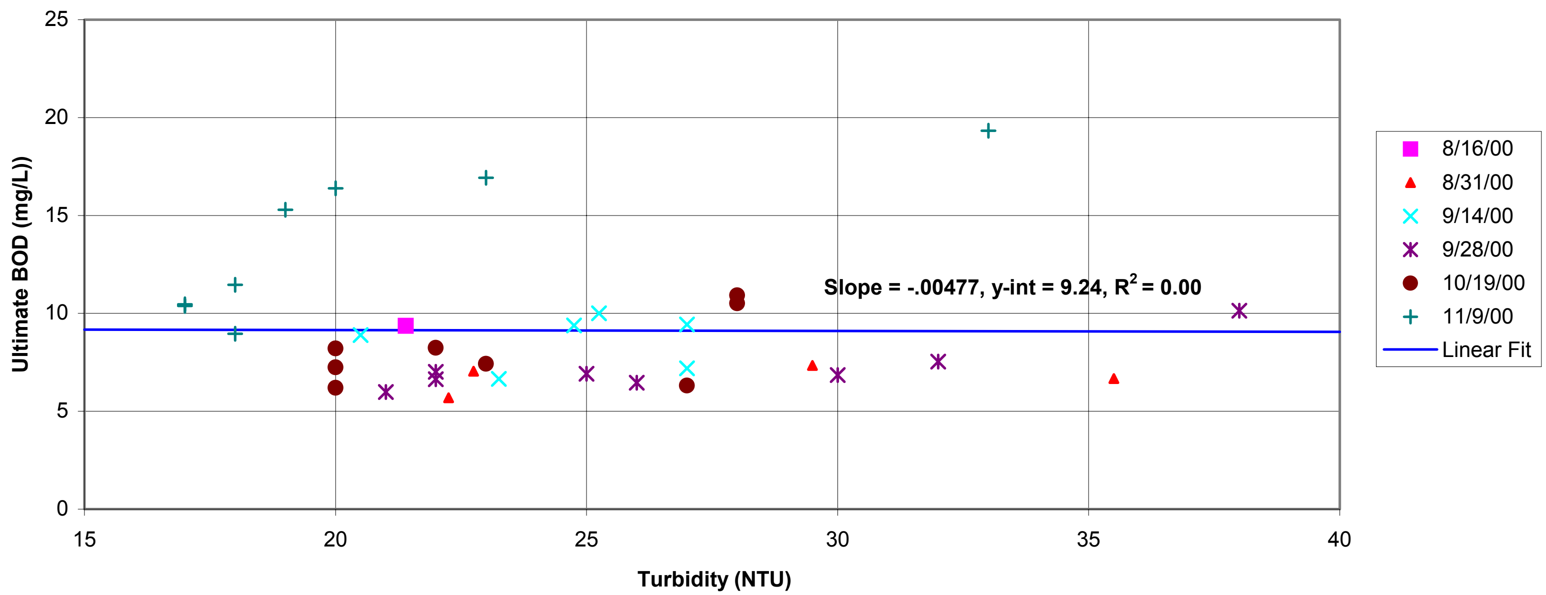

Figure IV-11: Ultimate BOD vs. turbidity for DWSC waters.

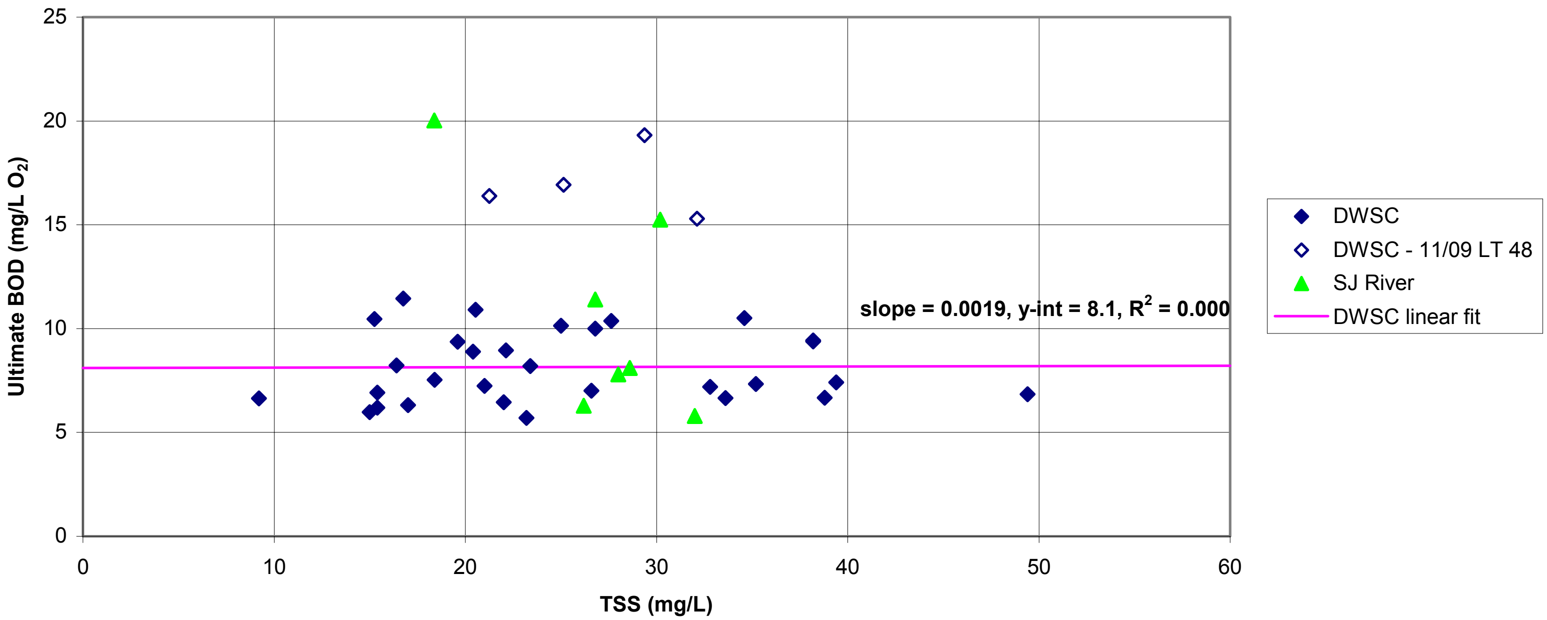

Figure IV-12: Ultimate BOD vs. TSS for DWSC and San Joaquin River waters.

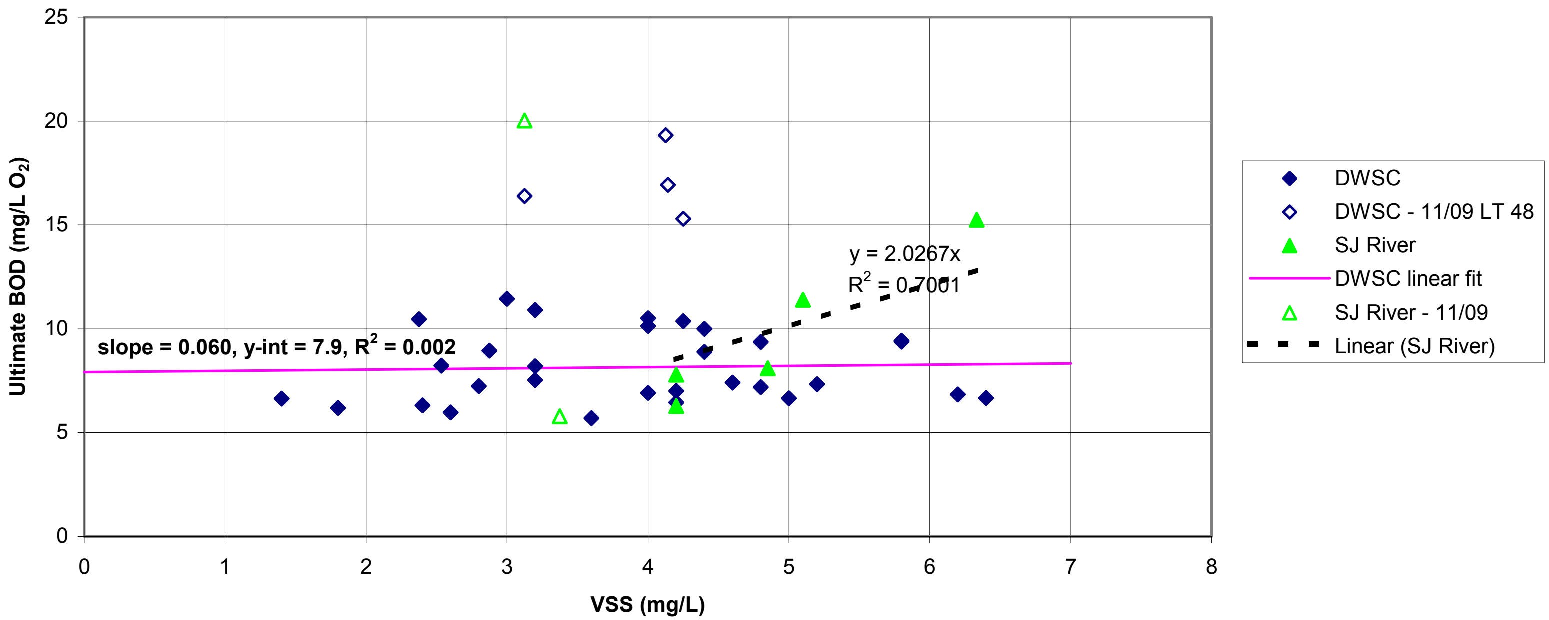

Figure IV-13: Ultimate BOD vs. VSS for DWSC and San Joaquin River waters.

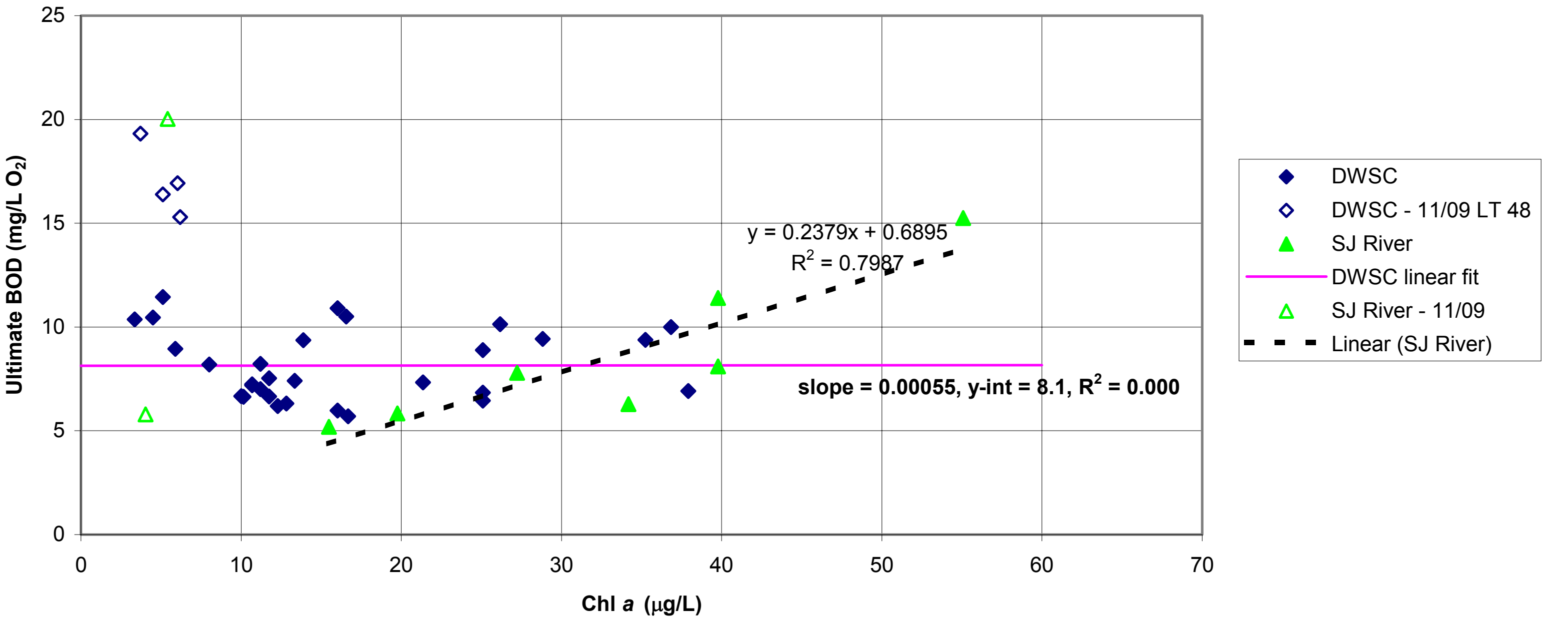

Figure IV-14: Ultimate BOD vs. chlorophyll *a* for DWSC and San Joaquin River waters.

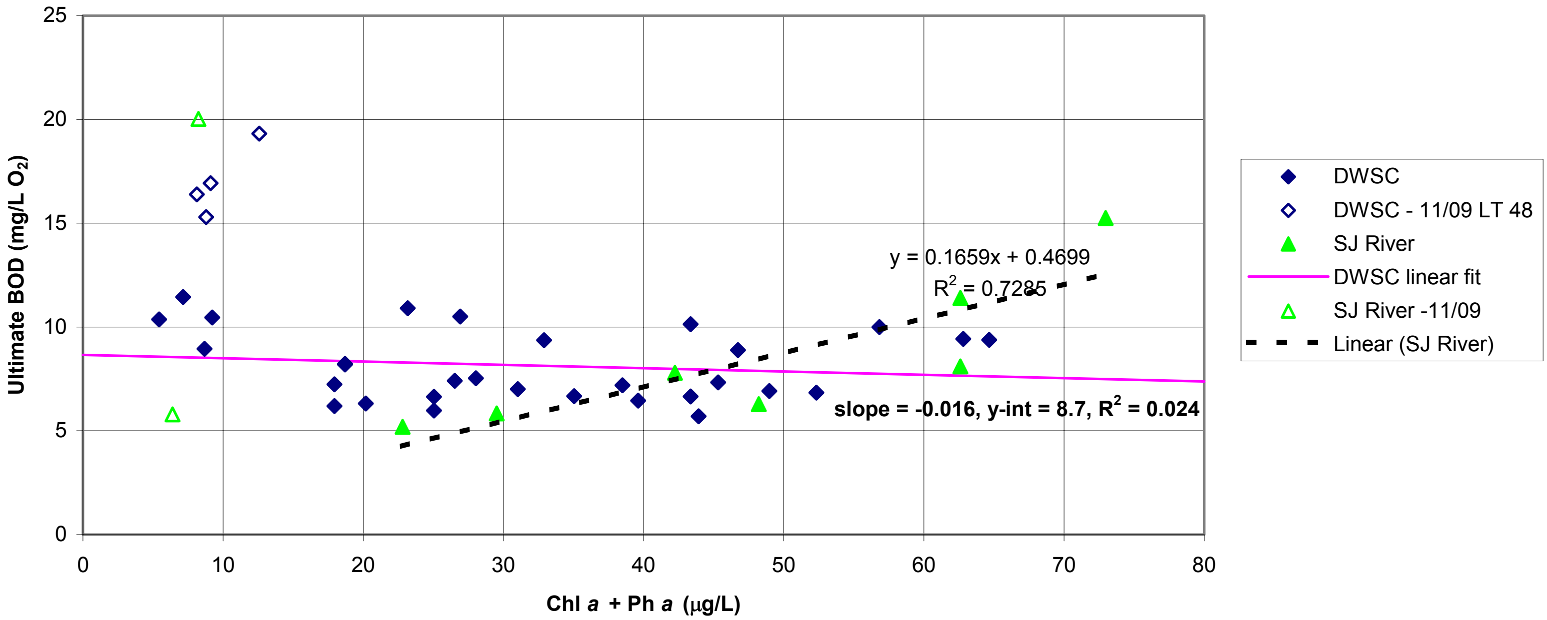

Figure IV-15: Ultimate BOD vs. chlorophyll *a* + pheophytin *a* for DWSC and San Joaquin River waters.

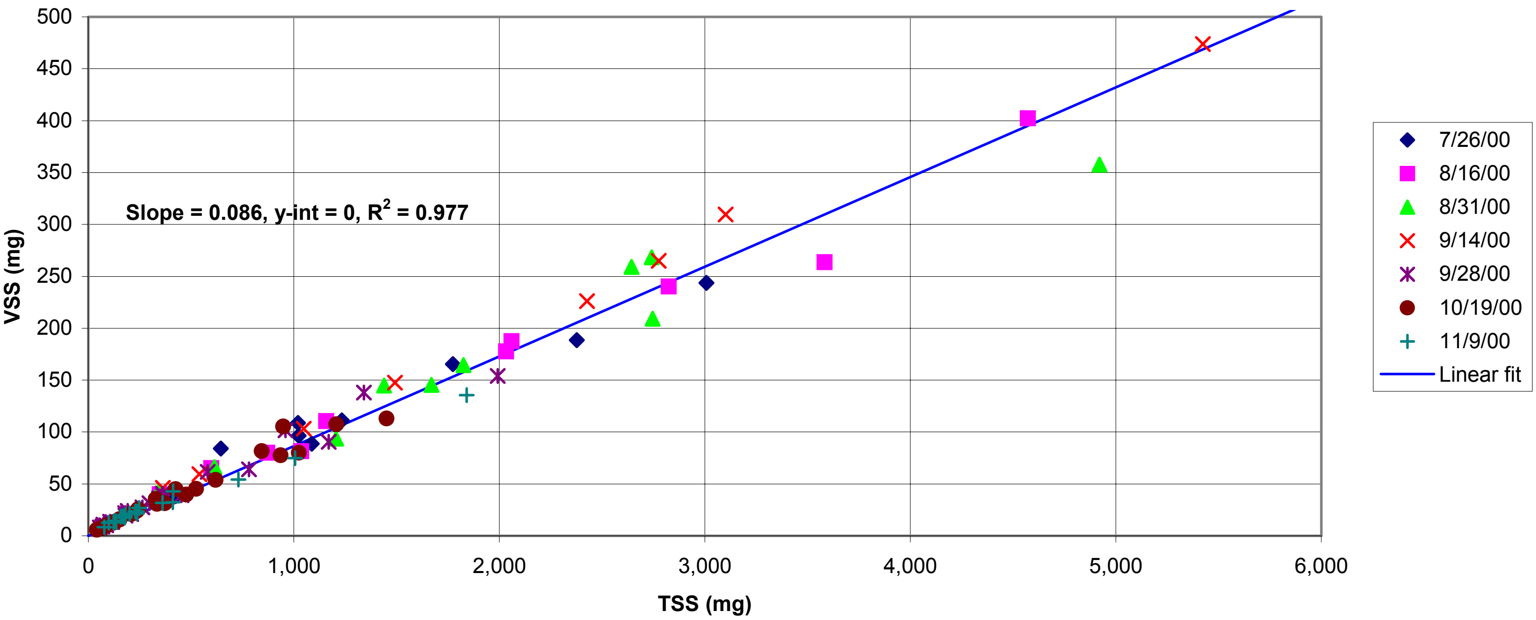

Figure IV-16: VSS vs. TSS for sediments trapped in the DWSC.

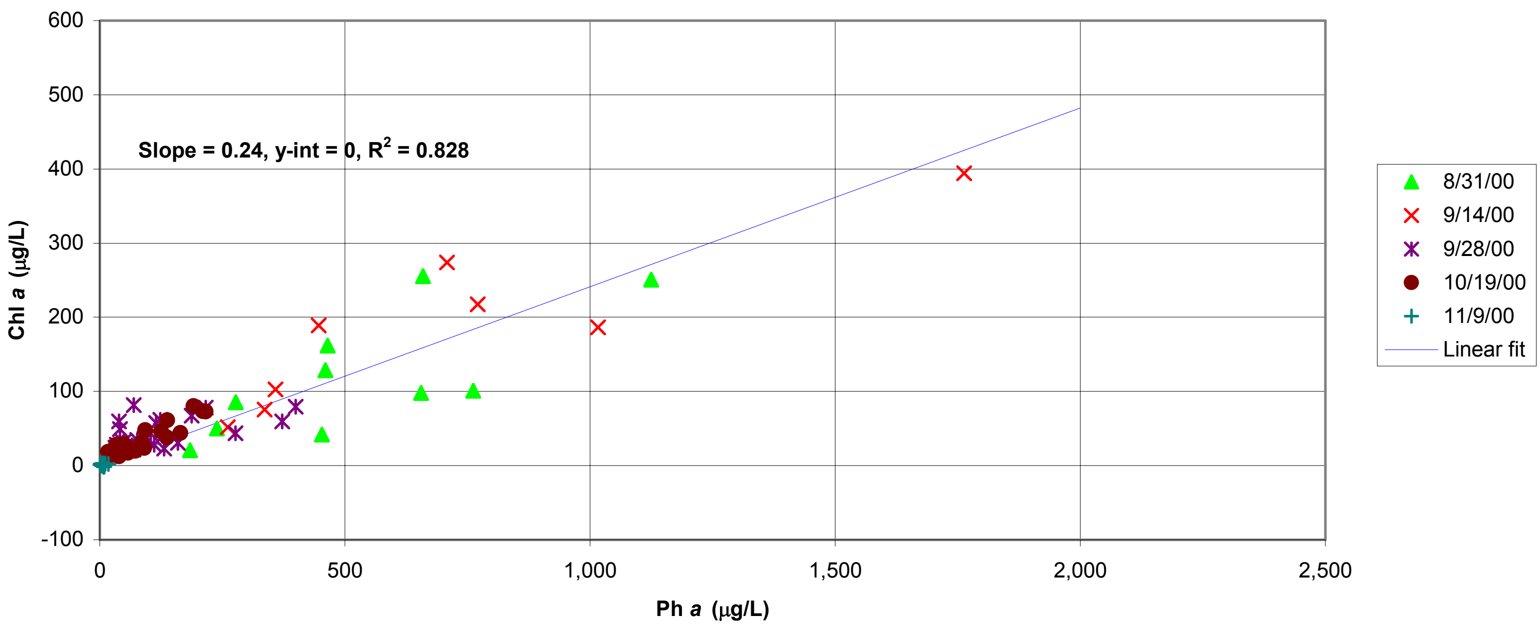

Figure IV-17: Chlorophyll *a* vs. pheopytin *a* or sediments trapped in the DWSC.

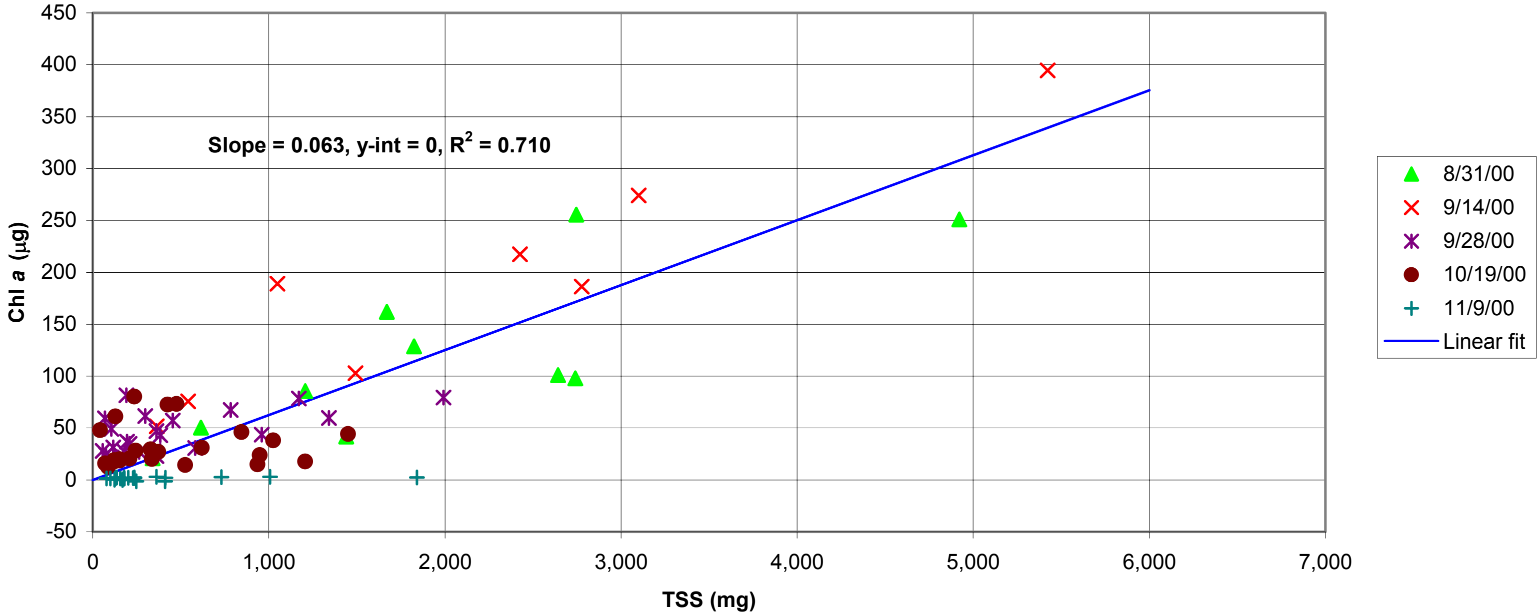

Figure IV-18: Chlorophyll *a* vs. TSS for sediments trapped in the DWSC.

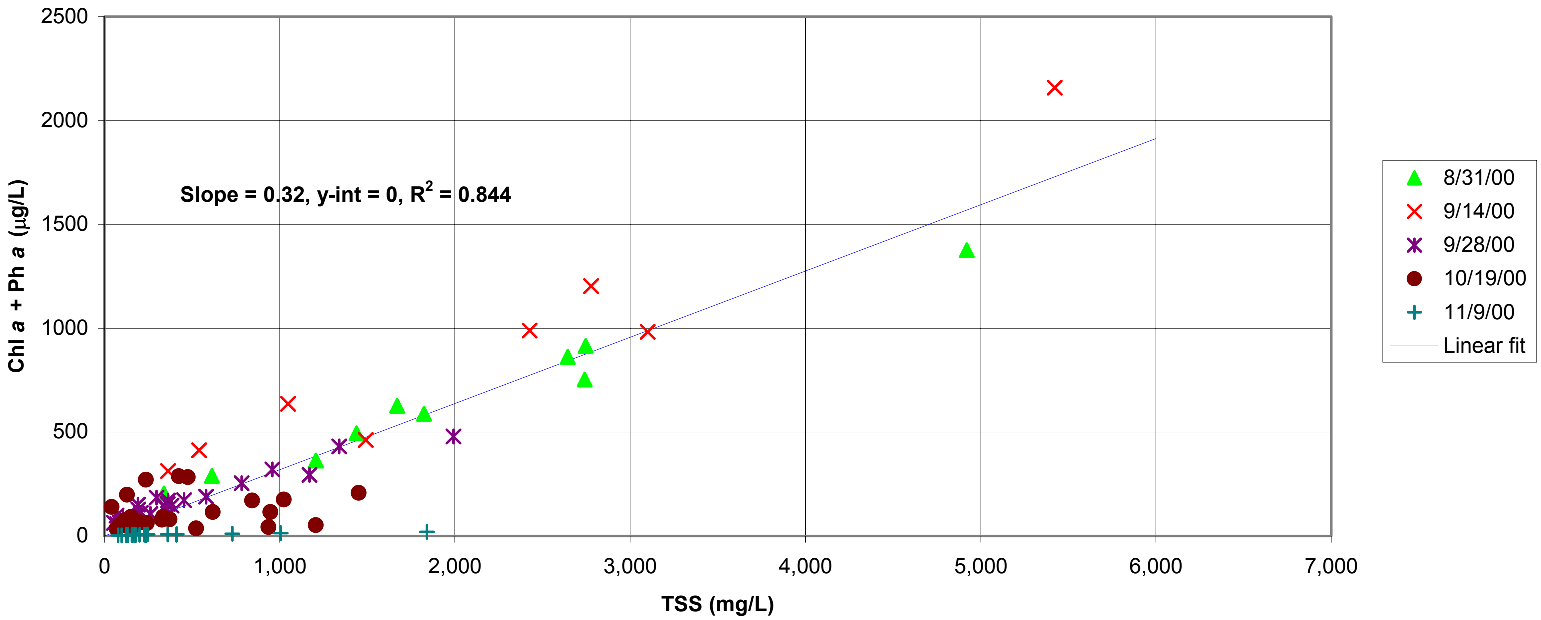

Figure IV-19: Chlorophyll *a* + pheophytin *a* vs. TSS for sediments trapped in the DWSC.

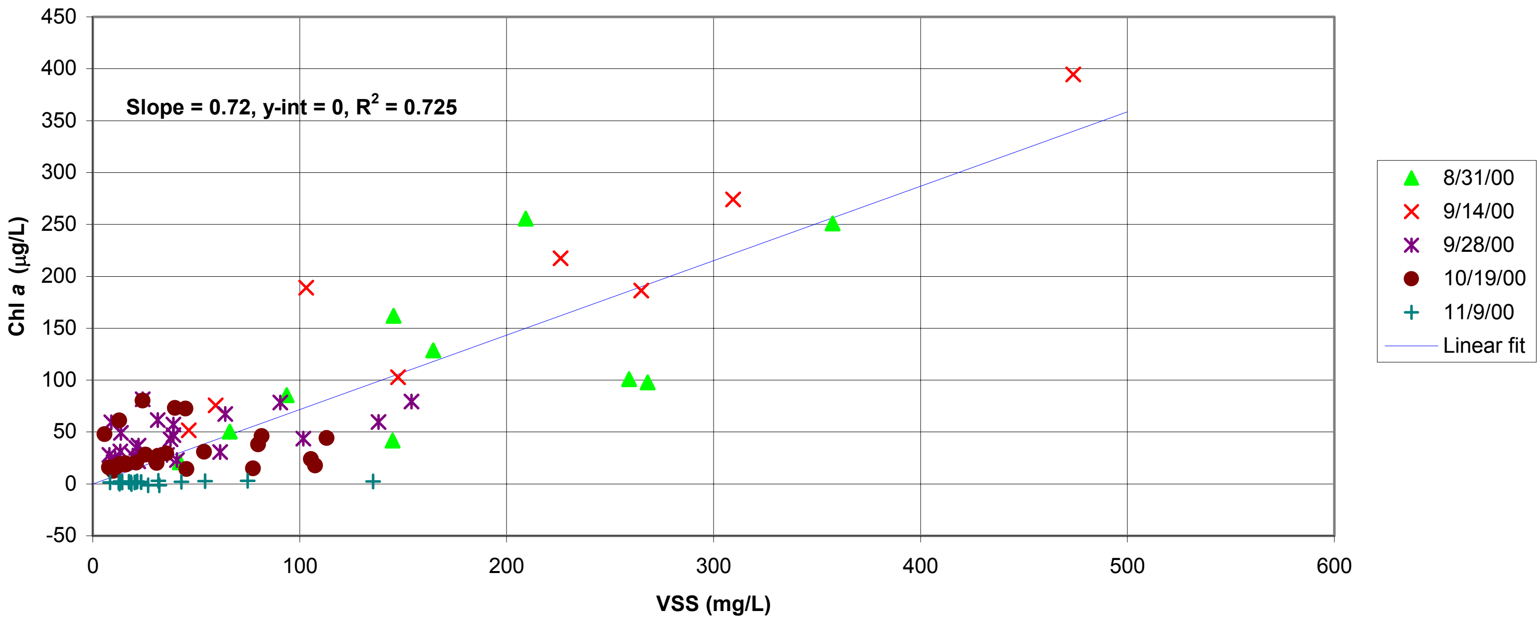

Figure IV-20: Chlorophyll *a* vs. VSS for sediments trapped in the DWSC.

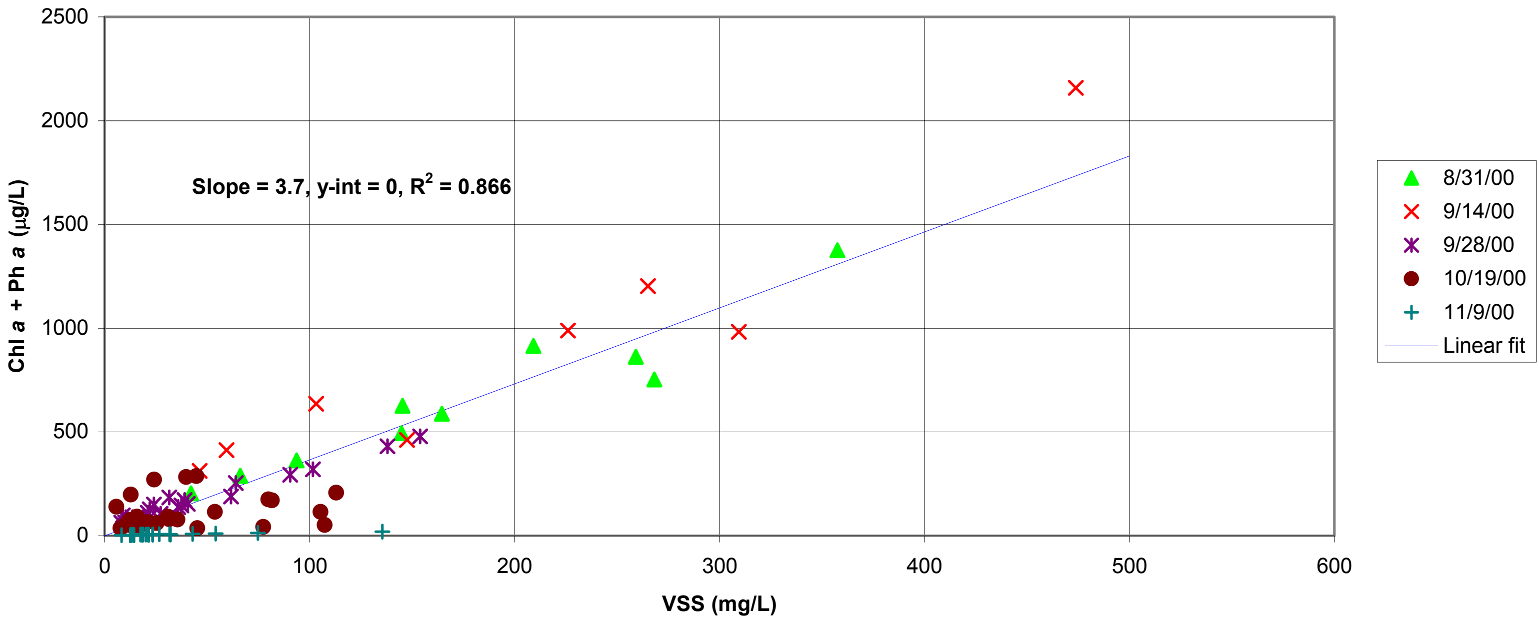

Figure IV-21: Chlorophyll *a* + pheophytin vs. VSS for sediments trapped in the DWSC.

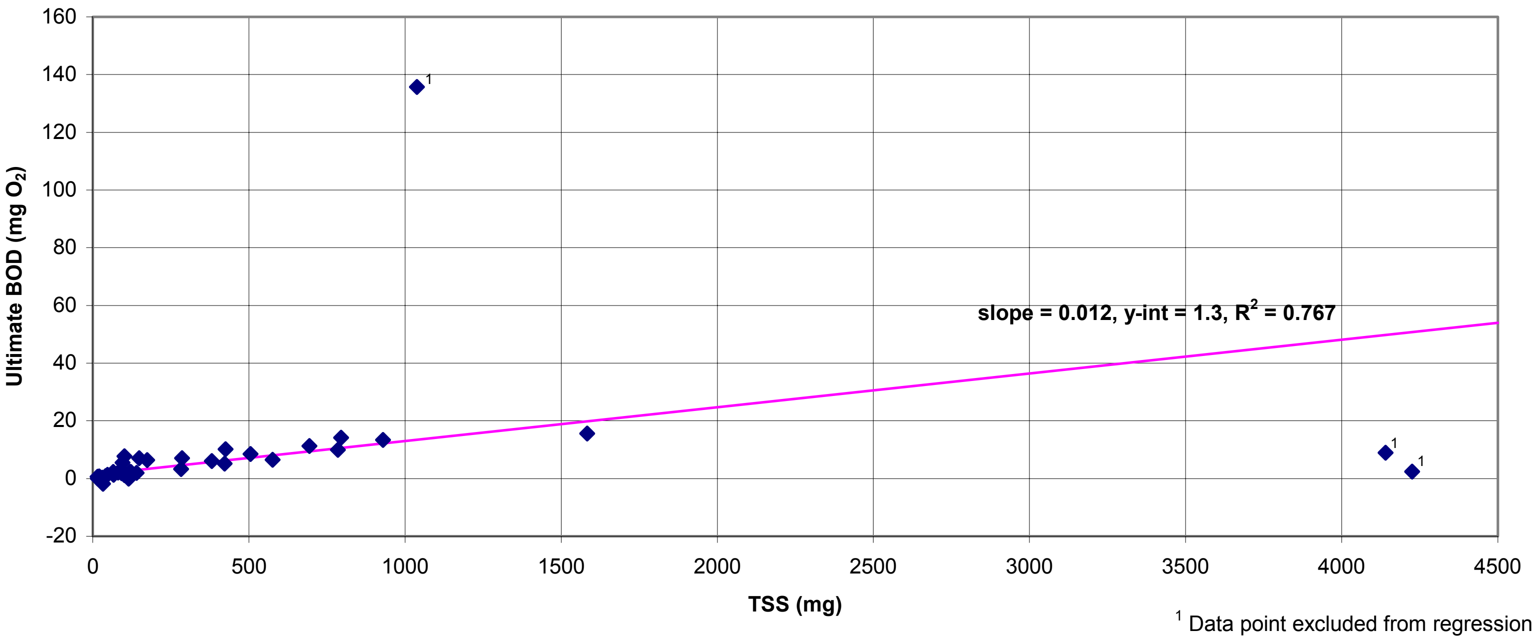

Figure IV-22: Ultimate BOD vs. TSS for sediments trapped in the DWSC.

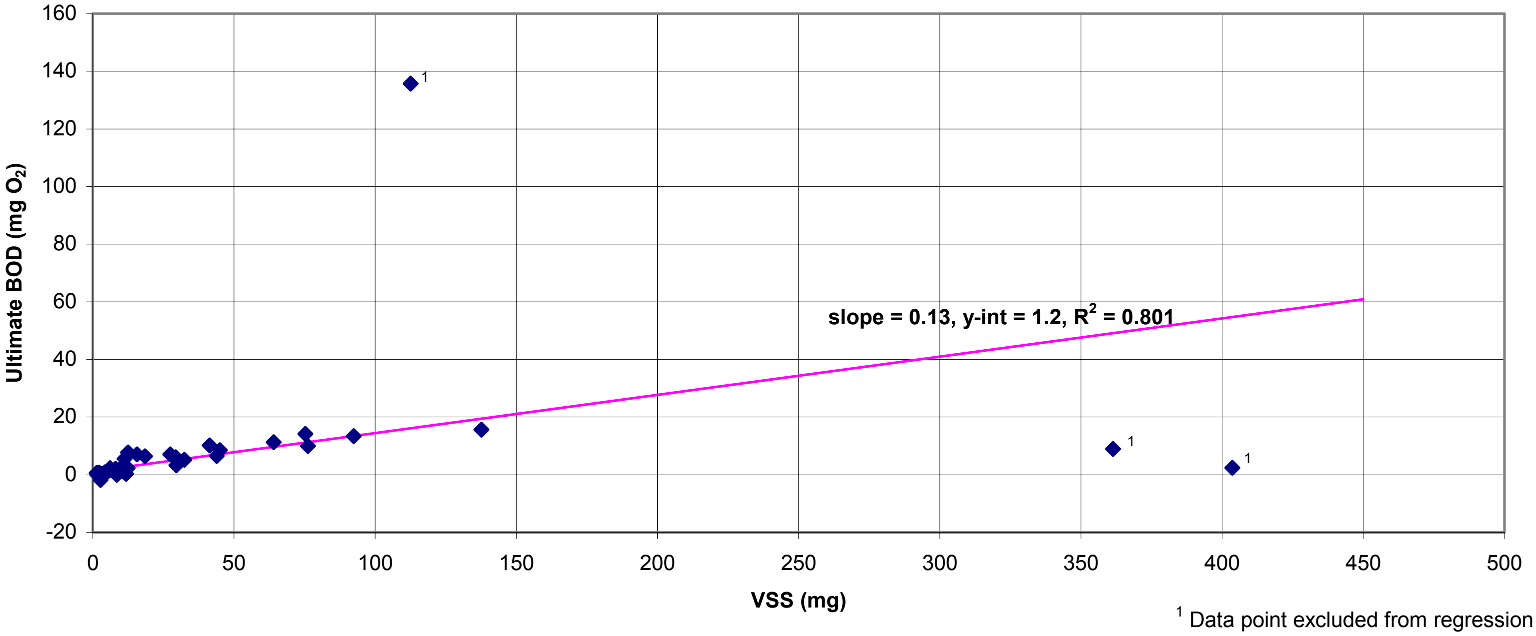

Figure IV-23: Ultimate BOD vs. VSS for sediments trapped in the DWSC.

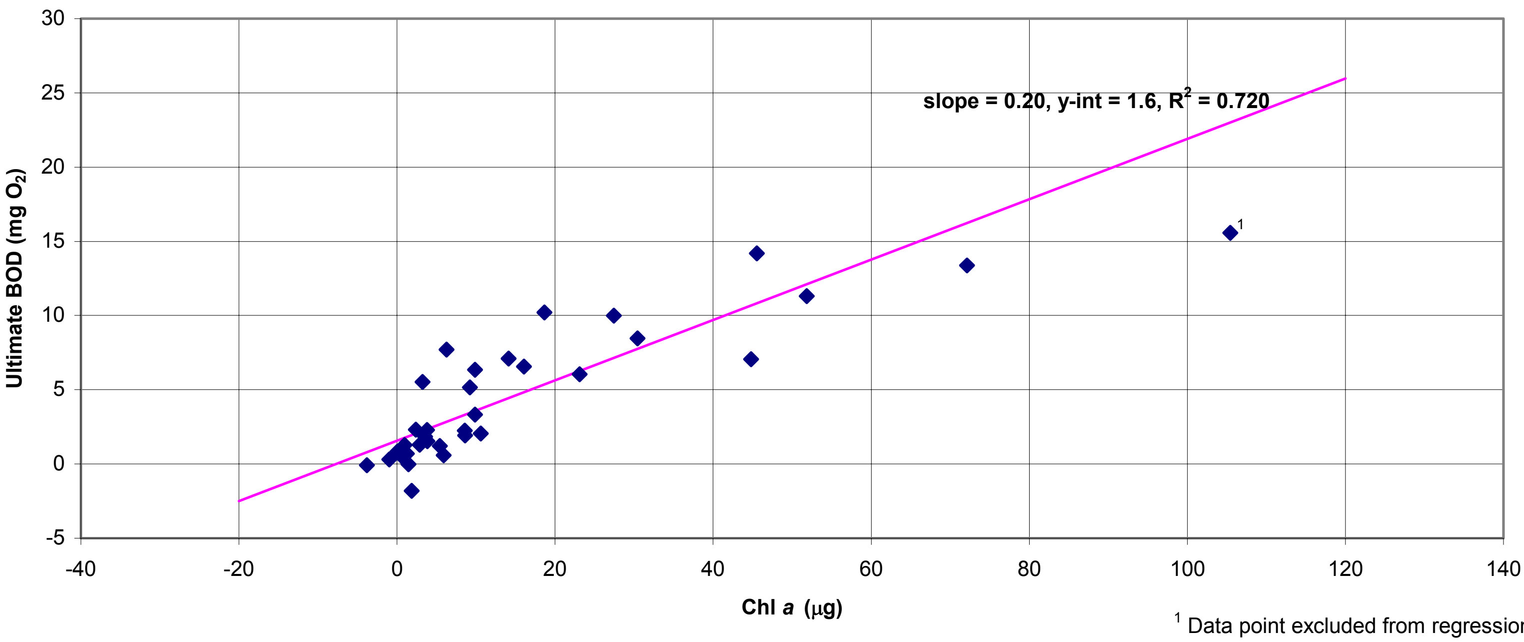

Figure IV-24: Ultimate BOD vs. chlorophyll *a* for sediments trapped in the DWSC.

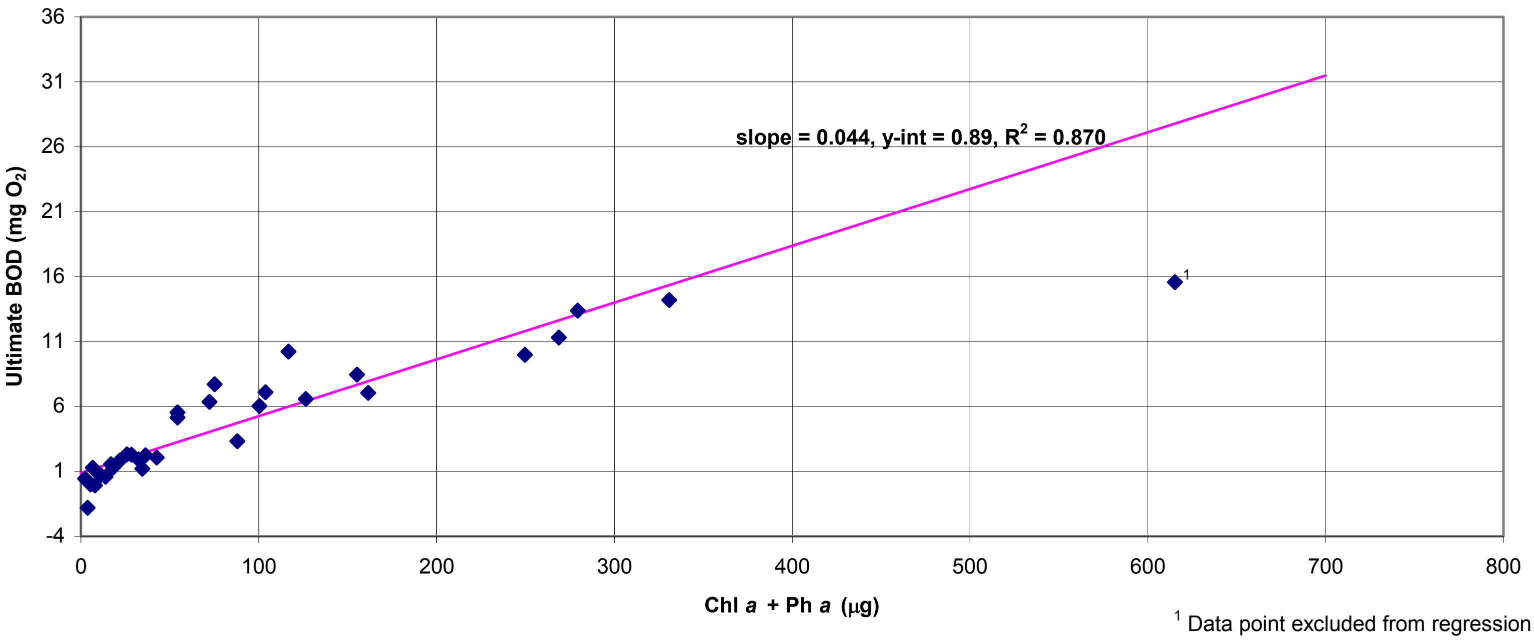

Figure IV-25: Ultimate BOD vs. chlorophyll *a* + pheophytin *a* for sediments trapped in the DWSC