University of Puerto Rico
College of Agricultural Sciences
Agronomy and Soils Department

DETERMINATION OF NUMERIC NUTRIENT TARGET CRITERIA IN LAKES AND RESERVOIRS OF PUERTO RICO

FOURTH PROGRESS REPORT
ENCOMPASSING PERIOD FROM
DECEMBER 25TH, 2004 TO MAY 3OTH, 2005

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OBJECTIVE OF THE PROJECT

1. Develop numeric criteria for nutrients (nitrogen and phosphorus) in lakes of Puerto Rico.
2. Evaluate phytoplankton diversity in lakes of Puerto Rico.

DESCRIPTION OF PROGRESS

CHEMICAL ANALYSES OF WATER SAMPLES

A total of seven sampling events have been completed to date (Table 1).

Table 1: Sampling events completed to this point:

Sampling event	Dates	Progress Reports
1	8/12/03 – 9/2/03	
2	11/7/03 – 12/10/03	11/25/03
3	2/23/04 – 3/18/04	5/29/04
4	6/7/04 – 6/21/04	
5	8/9/04 – 8/25/04	
6	11/16/04 – 12/9/04	12/27/2004
7	2/25/05 – 3/18/05	5/30/2005

Results of the first six events have been presented in previous progress reports (Table 1). Fifty-three (53) samples were collected in the most recent event (March, 2005). All samples were analyzed for nutrients (TP, TKN), DOC and chlorophyll *a.* In addition, 43 samples were submitted for periphyton diversity characterization.

Samples were analyzed for total kjedahl nitrogen (EPA method 351.2), dissolved reactive P and total P (EPA method 355.2). Estimates of the amount of dissolved organic carbon (DOC) were obtained by quantifying the absorbance (280nm) of filtrated samples (<0.45µm cellulose fiber

filter) on a DU-520 Beckman UV/VIS spectrophotometer after calibration with an organic carbon standard (Lab. Chem. Inc.).

LABORATORY RESULTS

A summary of the chemical analyses results for sampling event 7 is shown in Tables 2 -3 respectively (a full QA/QC report is available on request).

Table 2: Chemical analyses results of lake samples from the March (2005) sampling event.

PREQBs Sample I.D.	TKN (mg/L)	TP(mg/L)	DP (mg/L)	DOC (mg/L)	CHL a (ug/l)
Las Curias-89027 entrada	0.363	0.024	0.010	6.21	0.31
Las Curias-89023-sec 4 represa	0.311	0.022	0.015	6.50	0.56
La Plata-01-sec 1-entrada 44400	0.278	0.093	0.012	3.20	2.52
La Plata-01-sec 1-entrada 44400	0.193	0.094	0.013	3.31	4.55
La Plata-02-sec 3 - represa-44950	0.210	0.030	0.010	3.97	2.69
Carraizo-01-sec 2 57500	0.398	0.095	0.029	4.24	6.81
Carraizo-02-58800 centro lago	0.627	0.139	0.058	4.43	3.39
Carite-01 sec 1 desemb rio plata 39900	0.780	0.016	0.010	2.96	1.83
Carite-02 sec 4 represa 39500	0.234	0.011	0.010	2.50	1.20
Patillas entrada rio patillas - 89022	0.156	0.012	0.010	2.61	0.81
Patillas-02 sec 4-rio marin 89025	0.193	0.013	0.010	2.90	0.31
Patillas-03 dique-centro 89023	0.154	0.013	0.010	2.55	0.36
Patillas-04 sec 7-represa	0.131	0.010	0.010	2.60	1.03
Guayo-01 sec 2 89004 near rio	0.367	0.037	0.010	2.45	2.02

Table 2. (cont.)

PREQBs Sample I.D.	TKN (mg/L)	TP(mg/L)	DP (mg/L)	DOC (mg/L)	CHL a (ug/l)
Guayo-02 sec 4 89005 center	0.609	0.021	0.010	2.35	1.22
Guayo-02 sec 4 89005 center	0.447	0.023	0.010	2.22	0.84
Guayo Represa est 3 sec 6	0.466	0.019	0.010	1.91	2.04
Caonillas-01-sec 2 89001-Near rio	0.294	0.025	0.010	2.25	2.34
Caonillas-02-89002 sec 5 centro	0.426	0.025	0.010	2.26	2.01
Caonillas-03 - 89003 sec 8 represa	0.314	0.021	0.010	2.27	1.68
Matrullas-01 sec 2-89009 entrada	0.423	0.023	0.010	1.86	2.42
Matrullas-01 sec 2-89009 entrada	0.355	0.026	0.010	1.87	3.51
Matrullas-02 sec 5-89010- represa	0.277	0.016	0.010	1.70	3.11
Cerrillo-01 entrada 89032	0.447	0.042	0.010	2.23	3.89
Cerrillo-01 entrada 89032	0.621	0.043	0.010	2.16	1.54
Cerrillo 02 sec 5 centro 89033	0.522	0.022	0.010	1.92	1.15
Cerrillo- 03 sec 8 represa 89034	0.313	0.013	0.010	1.89	0.62
Cidra-01 sec 3-89029	0.386	0.036	0.010	5.20	0.90
Cidra-01 sec 3-89029	0.445	0.034	0.014	5.06	0.45
Cidra-02 sec 4 center 89030	0.413	0.032	0.010	5.01	0.18
Cidra-03 sec 6 dam 89031	0.373	0.019	0.010	4.58	0.97
Guineo est 1 89007 desemb. Toro negro	0.828	0.058	0.016	3.83	6.05
Guineo est 2 89008represa	0.415	0.023	0.01	2.85	3.47
Guajataca 10720 sec1 entrada	0.373	0.015	0.010	3.27	0.87
Guajataca 10790 sec3 represa	0.291	0.014	0.010	3.29	1.33

Table 2 (cont.)

PREQBs Sample I.D.	TKN (mg/L)	TP(mg/L)	DP (mg/L)	DOC (mg/L)	CHL a (ug/l)
Dos Bocas 25110sec3	0.577	0.100	0.015	2.25	2.33
Dos Bocas 25110sec3	0.554	0.082	0.012	2.90	1.46
Dos Bocas 27090 sec6 represa	0.642	0.024	0.010	2.71	2.02
Melania sec 2 centro-89026	0.165	0.022	0.010	2.78	5.74
Melania sec 2 centro FD	0.134	0.017	0.010	2.73	6.10
Loco represa 89021 sec5	0.305	0.026	0.010	1.74	11.61
Loco represa 89021 sec5 FD	0.230	0.028	0.010	1.79	12.97
Luchetti 01 sec 1 entrada 89017	0.528	0.045	0.010	2.44	38.15
Luchetti 02 sec 4 centro 89018	0.527	0.025	0.016	1.76	19.68
Luchetti 03 sec 7 represa 89019	0.429	0.025	0.010	1.72	32.30
Garzas 20050 - sec 2	0.172	0.020	0.010	1.95	1.17
Garzas 20050 - sec 2	0.246	0.017	0.010	1.62	1.30
Guayabal - centro del lago	0.188	0.035	0.010	2.47	1.55
Guayabal - represa	0.325	0.027	0.010	2.17	0.67
Toa Vaca 01 sec 1 entrada 89014	0.234	0.056	0.015	4.85	1.95
Toa Vaca 01 sec 1 entrada 89014	0.391	0.065	0.014	4.82	2.62
Toa Vaca 02 sec 4 centro 89015	0.230	0.032	0.010	4.82	1.11
Toa Vaca 03 sec 7 frente represa 89016	0.186	0.051	0.020	5.51	1.33

- Samples highlighted in red correspond to samples whose concentrations fall below our detection limit (0.01mg/L or 10 ppb in the case of phosphorus). Although a value was obtained we can not guarantee the accuracy of the result, and therefore the detection limit is reported as the result.
- Samples highlighted in blue correspond to chlorophyll *a* filters whose filter bags were considerably wet when delivered. We can not establish how this could have affected the sample result.

Table 3: Descriptive Statistics for the March 05 sampling event

Parameter	TKN	TP	DP	DOC	Chl *a**
Median (mg/L)	0.36	0.025	0.005	2.60	1.83
Average(mg/L)	0.37	0.035	0.008	3.05	4.02
Std. Dev.	0.16	0.027	0.009	1.27	7.15
Max. (mg/L)	0.83	0.139	0.058	6.50	38.15
Min. (mg/L)	0.13	0.010	Nd	1.62	0.18

*µg/L
- Nd – non detectable

Graphical representations of **average** TP, TKN, DOC and chlorophyll *a* values for all lakes are shown in Figures 1 – 4.

Preliminary estimates of the numeric nutrient criteria were calculated based on the 25th percentile approach established by USEPA. Predicted values are close to reference values proposed in other regions of the US (Table 4). As stated in previous reports the value proposed for phosphorus (17.0µg/L) is substantially lower than the current water quality limit in the island (1,000 µg/L). Based on total P, TKN, and chlorophyll *a* concentrations, Carite, Patillas and Guajataca still appear to be the least impacted lakes, with the rest of the lakes exhibiting various degrees of impact from antropogenic activities.

Table 4. Preliminary estimates of numeric nutrient criteria for lakes/reservoirs of Puerto Rico. Values for eight of the 14 USEPA ecoregions[1] are included for comparative purposes (refer to www.epa.gov for details on the ecoregions report).

Item	**PR[1]**	Eco II	Eco VI	Eco VII	Eco VIII	Eco IX	Eco XI	Eco XII	Eco XIII
TP ug/l	**17.0**	8.75	37.5	14.75	8.0	20.0	8.0	10.0	17.5
TN mg/l	**0.25[2]**	0.10	1.68	0.66	0.24	0.36	0.46	0.52	1.27
Chl *a* ug/l	**2.66**	1.90	8.59	5.23	2.39	5.18	2.79	2.60	3.35

[1] – ER II (Western Forested Mountains); ER VI (Corn Belt and Northern Great Plains; ER VII (Mostly Glaciated Dairy Region); ER VIII (Nutrient Poor Largely Glaciated Upper Midwest and Northeast); ER IX (Southeastern Temperate Forested Plains and Hills); ER XI (Central and Eastern Forested Uplands); ER XII (Southern Coastal Plain); ER XIII (Southern Florida Coastal Plain).

[2] – Value for Total Kjedahl Nitrogen (TKN)

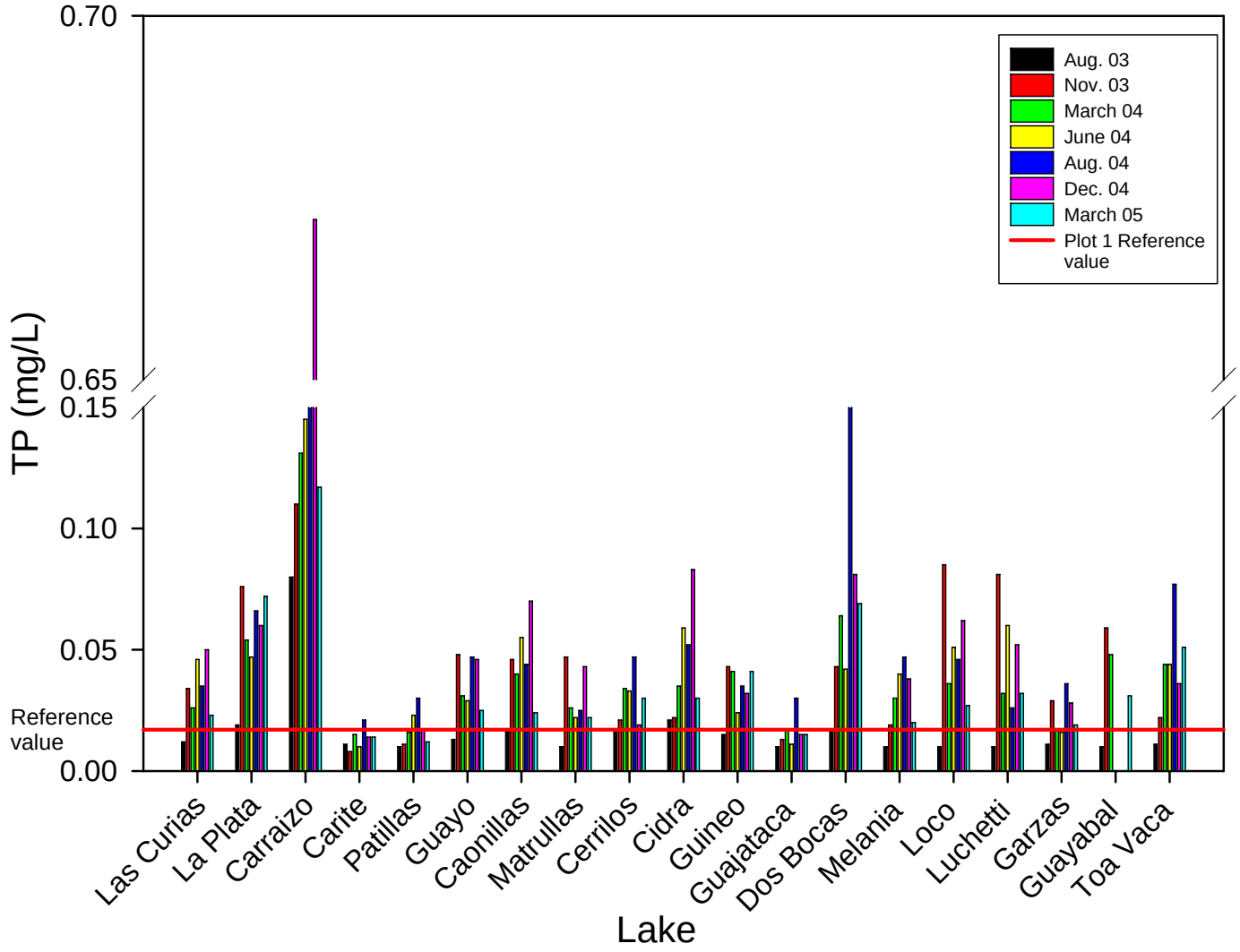


Figure 1. Average total phosphorus concentration in lakes of Puerto Rico (the preliminary reference value is included for illustrative purposes)

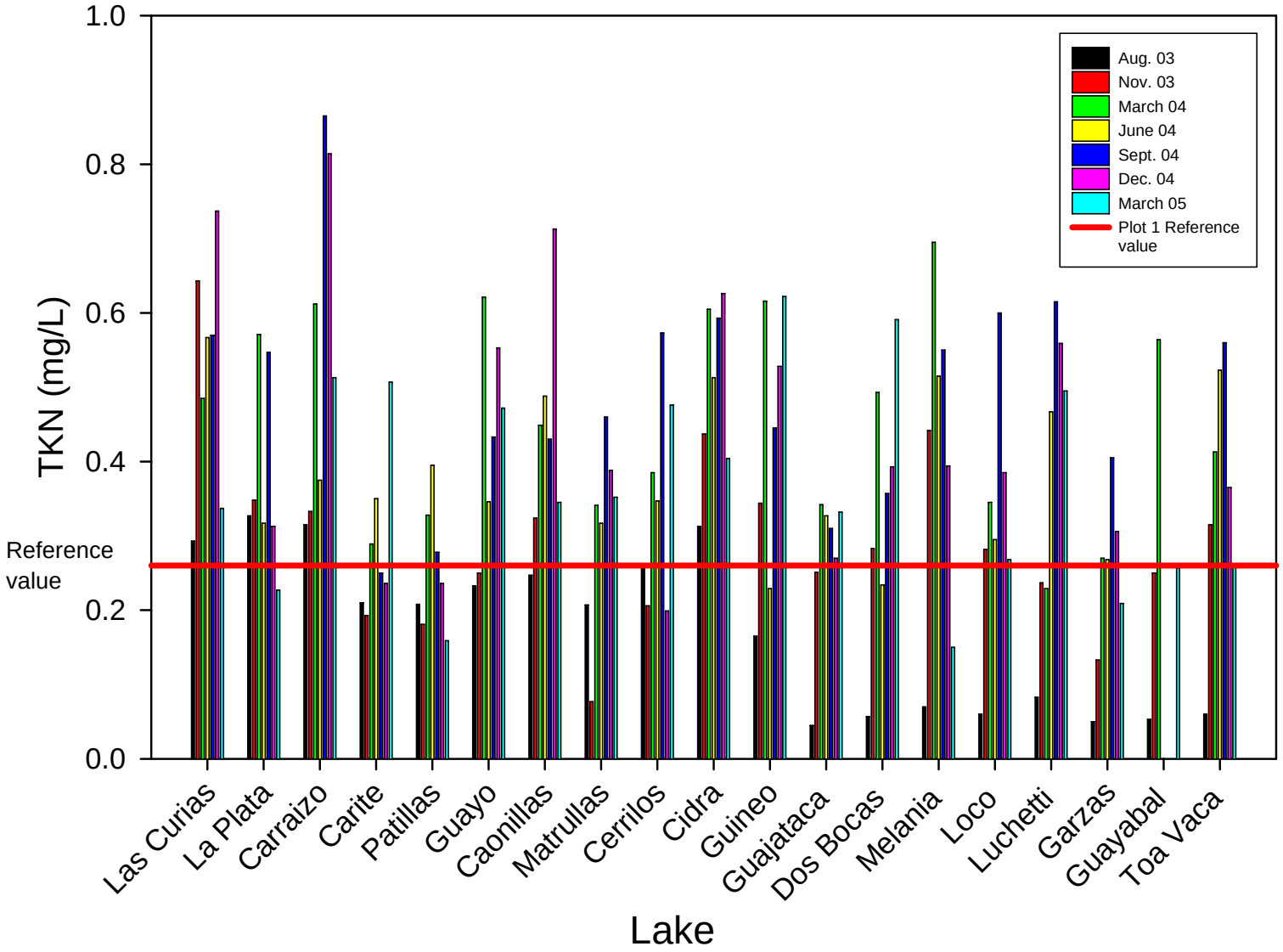


Figure 2. Average TKN concentration in lakes of Puerto Rico (the preliminary reference value is included for illustrative purposes).

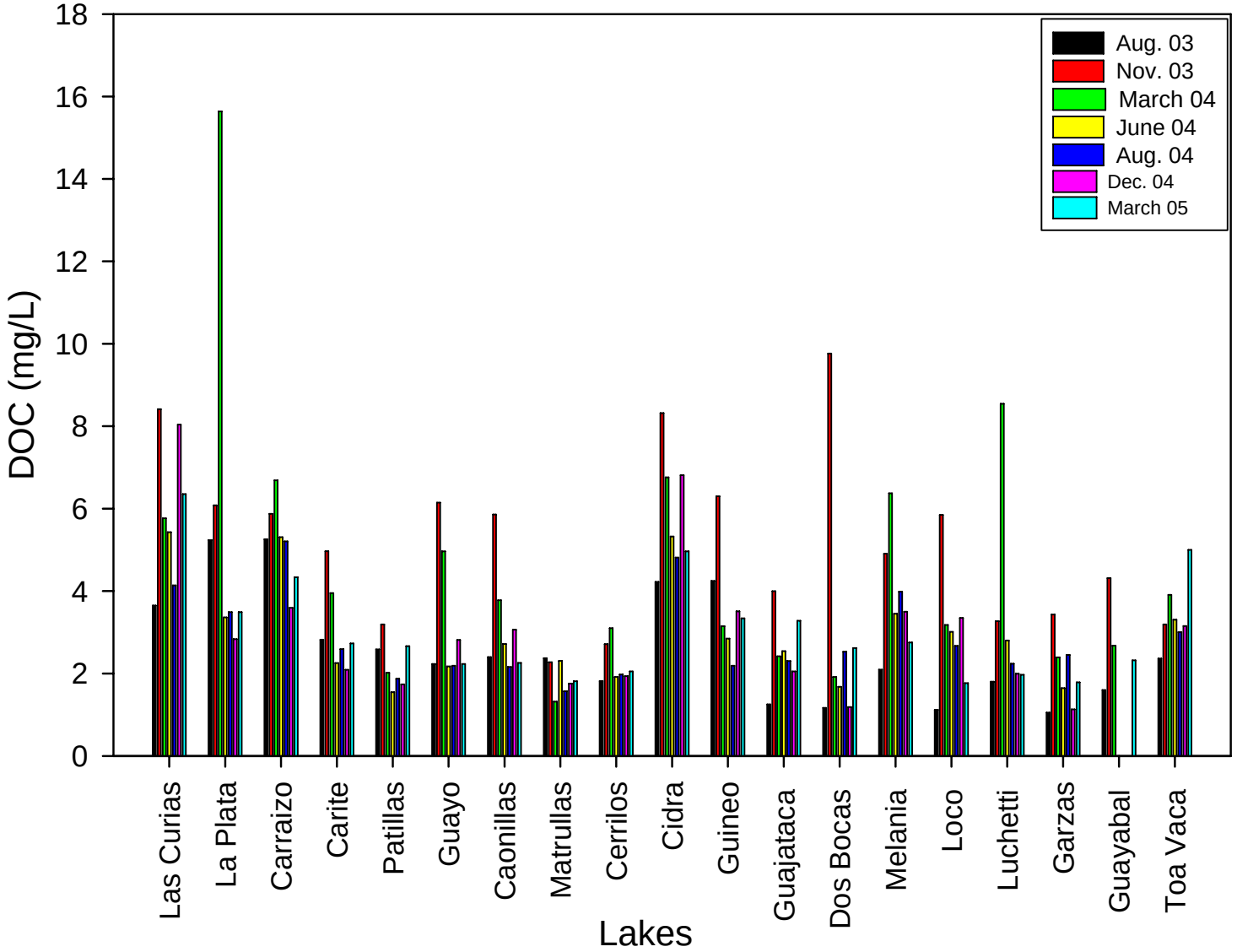


Figure 3. Average DOC concentration in lakes of Puerto Rico

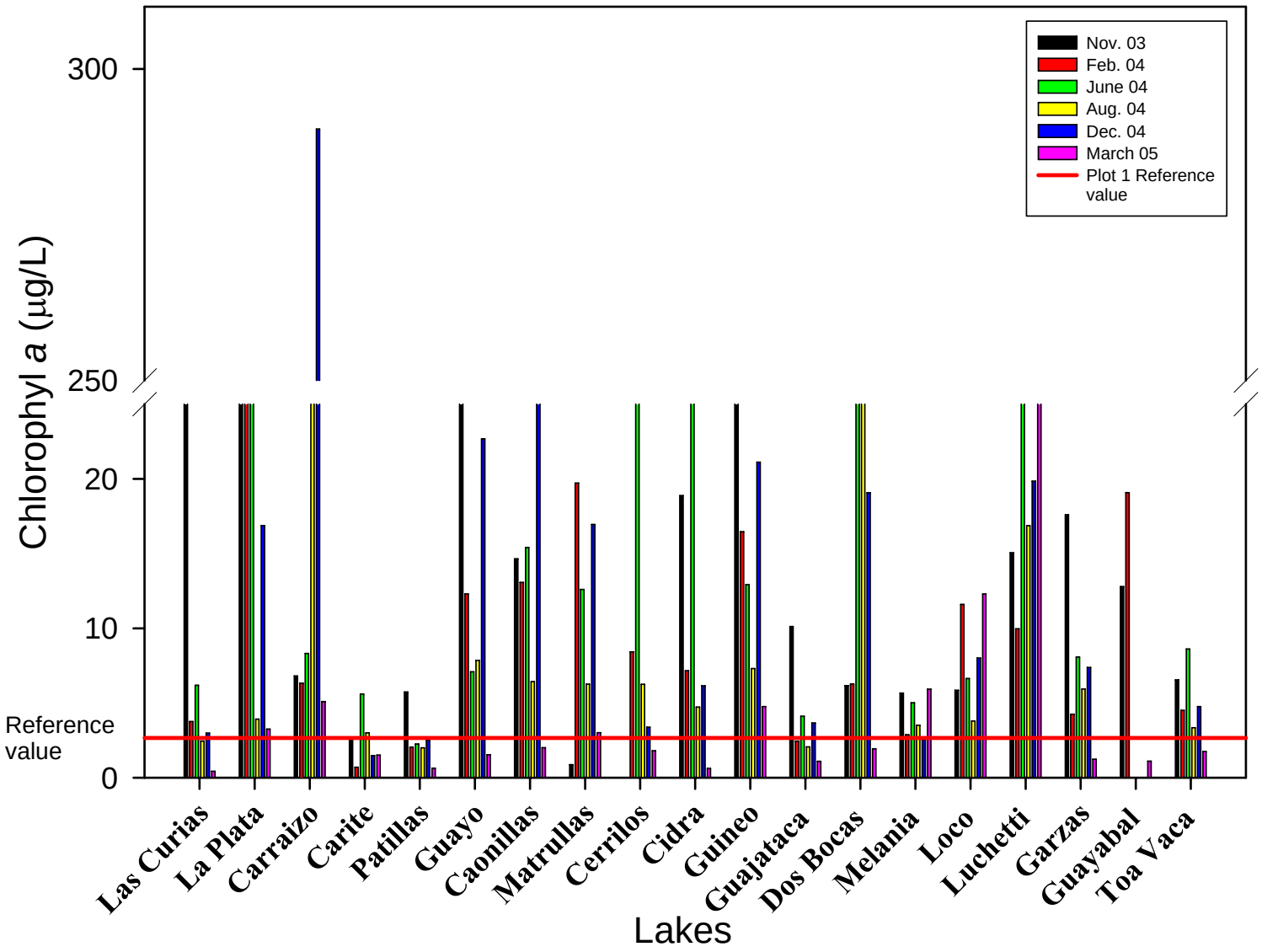


Figure 4. Chlorophyll *a* concentration in lakes of Puerto Rico (the preliminary reference value is included for illustrative purposes).

A statistical analysis was performed to identify within lake, and between lake differences, as well as to evaluate potential correlations between different chemical, biological and/or physical parameters. The analysis included all the data gathered to date. A non-parametric test with paired data (Wilcoxon Signed Rank) was used to establish differences between stations 1 (entrance) and 3 (dam), and 2 (center) and 3 (dam) since ANOVA residuals were not uniform. A summary of that analysis will be discussed next (the complete statistical report is shown in Appendix A).

Significant differences between stations 1 (lake entrance) and 3 (lake dam) were observed for all the parameters (Secchi depth, TP, TKN, DP, DOC, N/P ratio and TSITP), except pH, electrical conductivity and dissolved oxygen (DO) (Table 5). Differences between stations 2 and 3 were less evident, with only TP, DOC, and N/P ratio denoting significant differences. The results are in accord with the general behavior observed in most lakes, with higher nutrient concentrations at the lake entrance than at other reservoir sections. This results in chlorophyll *a* values being higher, and dissolved oxygen and Secchi depth values being lower at the entrance than close to the dam.

A cluster analysis was performed for each station utilizing data for TKN, TP, and chlorophyll *a.* The tree diagram for station 1 revealed the following cluster pattern (Guayabal was excluded because of insufficient data for this station), (for a more detailed tree diagram please refer to Appendix A):

- Cluster 1 – Carraízo
- Cluster 2 – Guineo

- Cluster 3 – Guayo, Dos Bocas, Cerrillo, La Plata, Caonillas, and Luchetti
- Cluster 4 – Cidra, Guajataca, Garzas, Toa Vaca, Patillas, Carite, Matrullas, Las Curias, and Loco

In the case of the dam station the tree diagram revealed the following arrangement (Carraízo was excluded because of insufficient data for this station).

- Cluster 1 – Luchetti
- Cluster 2 – Guineo, Dos Bocas, Guajataca, Cerrillo, Toa Vaca, Patillas, Carite
- Cluster 3 - La Plata
- Cluster 4 – Las Curias, Guayabal, Garzas, Loco, Cidra, Guayo Matrullas, and Caonillas

Table 5. Wilcoxon Signed Rank sample sizes and P values for median differences. P-value < 0.05 indicate significant differences between stations 1 and 3.

Parameter	Median value Station 1	Median value Station 3	P-value
Secchi Depth (m)	1.00	1.50	8.90 e -14
DO (mg/L)	7.15	7.79	1.41 e-1
TP (mg/L)	0.04	0.02	8.20 e-15
TKN (mg/L)	0.36	0.31	5.86 e-6
DP (mg/L)	0.01	0.01	5.06 e-5
DOC	2.94	2.61	1.97 e-7
Chl a	5.96	4.13	1.34 e-2
N/P	11.00	14.57	5.34 e-5
TSI Chl a	48.11	44.50	1.14 e-2
TSI TP	55.62	49.04	3.81 e-15

Spearman correlation coefficients for the complete data set show a positive correlation between TP and Chl *a* (table 6) (see Appendix 1 for complete data). This indicates that as total P loadings into the lakes increase, there will be an increase in algae biomass density and overall lake productivity. As expected increases in algae biomass density (as measured by Chl *a*) diminish the light penetration depth into the lake profile (SD). This is evidenced by the negative correlation coefficient obtained between these parameters. In fact, both Chl *a* and TP are negatively correlated with SD (table 6).

A separate correlation analyses was performed according to lake station to evaluate the effect of location on the relationship between the different parameters. Results for station 1 (lake entrance) were similar to those obtained with the complete data set (table 7). A positive correlation between TP and Chl *a*, and a negative correlation between both parameters (TP and Chl *a*) and SD was observed. In addition there was a strong positive correlation between TP and TKN (table 7) which suggest that similar transport factors are responsible for the nutrient loadings into the lakes.

Reductions in SD values may be caused either by an increase in algae biomass concentration or by inorganic (sediment) particles coming into the lake as a result of runoff events. High sediment loads will mask the effect of nutrients on aquatic biomass development. To evaluate the potential interference effect of sediment loads on our relationships a separate analysis was conducted excluding samples with SD less than 1. At this station (entrance) a significant improvement in the TP- Chl *a* relationship was observed when data with SD<1 were removed from the analysis (table 8). This suggests that a significant fraction of the TP coming into the

reservoirs is in particulate form and is not immediately available for algae use. Such mechanism should be more evident at the entrance, and, as the results indicate, it looses relevance away from the entrance as sediment particles settle into the reservoir bottoms (stations 2, and 3) (tables 10, and 12). Removing the SD<1 data from the analysis weakened the relationships between TP and Chl *a* with SD. This suggests that, in general, light penetration at this station (entrance) is more significantly influenced by algae biomass than by suspended sediment particles.

Relationships between chemical and biological parameters at the center and the dam stations were similar that those observed at the lake entrance (tables 9, and 11). In this case however removing SD<1 data from the analyses weakened the relationships involving nutrients (TP, and TKN) (tables 10, and 12). As indicated previously this is a result of the effect of suspended sediment particles loosing their relevance in the deeper portions of the reservoirs.

Table 6: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **all sampling stations combined**.

	TP	**TKN**	**SD**
Chl *a*	0.47	0.23	-0.31
TP	1.00	0.60	-0.38

Table 7: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **data from first station (lake entrance) only**.

	TP	**TKN**	**SD**
Chl *a*	0.46	0.36	-0.35
TP	1.0	0.57	-0.47

Table 8: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **data from first station (lake entrance) with Secchi depths values ≥ 1m**.

	TP	**TKN**	**SD**
Chl *a*	0.68	0.47	0.013
TP	1.00	0.52	-0.19

Table 9: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **data from second station (center of lake) only**.

	TP	**TKN**	**SD**
Chl *a*	0.45	0.21	-0.36
TP	1.00	0.54	-0.45

Table 10: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **data from second station (center of lake) with Secchi depths values ≥ 1m**.

	TP	**TKN**	**SD**
Chl *a*	0.38	0.27	-0.06
TP	1.00	0.31	-0.05

Table 11: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **data from third station (lake dam) only**.

	TP	**TKN**	**SD**
Chl *a*	0.30	0.17	-0.19
TP	1.00	0.54	-0.27

Table 12: Spearman correlation coefficients between *specific* descriptive parameters of lake trophic status; **data from third station (lake dam) with Secchi depths values ≥ 1m**.

	TP	**TKN**	**SD**
Chl *a*	0.30	0.35	-0.07
TP	1.00	0.55	-0.03

PERIPHYTOMETER STUDIES

Evaluation of limiting nutrient effect on aquatic biomass growth

As stated in our previous report (Dec, 04), a series of trials were conducted to evaluate aquatic biomass response to nutrient additions. That report included the description of the experimental approach, the data, and graphical representation for the two trials conducted with P and one experiment conducted with nitrogen. A second trial with nitrogen was conducted after finishing that report. Figures 5 and 6 show the response curves obtained with the complete data set.

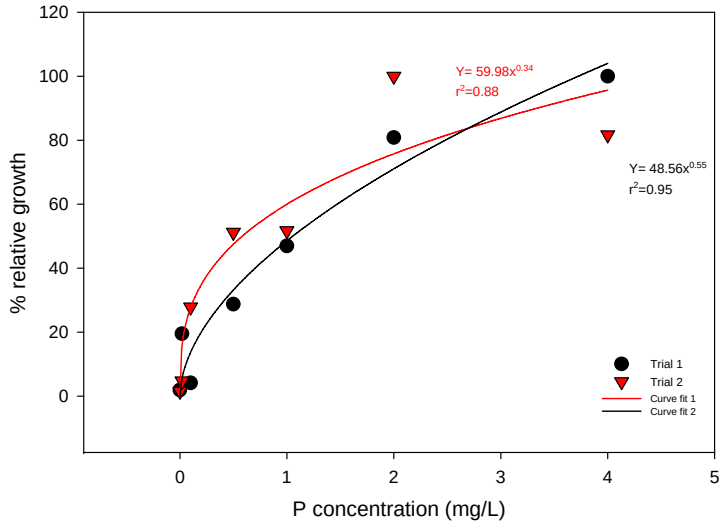


Figure 5. Relative response curve of algae growth to P additions. Lines represent empirical descriptions of the experimental points obtained through a curve fitting procedure.

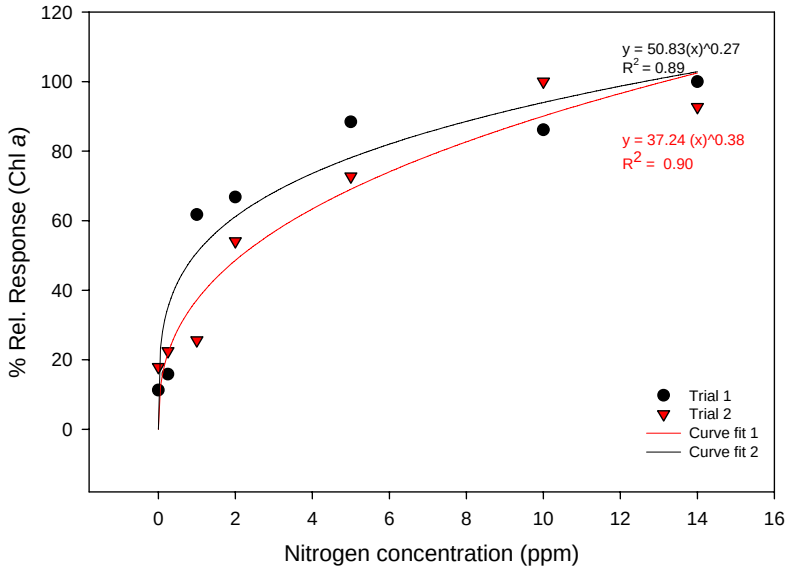


Figure 6. Relative response curve of algae growth to N additions. Lines represent empirical descriptions of the experimental points obtained through a curve fitting procedure.

Results demonstrate the importance of controlling nutrient loadings (both N and P) into our lakes/reservoirs. Our experimental approach proved extremely successful for making inferences on nutritional conditions limiting algae growth in our reservoir systems. However after much consideration we felt the approach was not sensitive enough to identify threshold concentrations representing reference conditions (numeric criteria). Thus, a systematic monitoring program was implemented at the Guajataca reservoir to evaluate phytoplankton response to seasonal changes in the reservoirs nutritional content. Our hypothesis was that, this being an oligotrophic-mesotrophic reservoir, phytoplankton community structural changes occurring as result of variations in nutritional status could potentially be used to establish a Biological Index of reference conditions applicable to other reservoirs of the island.

GUAJATACA MONITORING STUDY

The monitoring program consisted on a weekly schedule sampling at the two PREQB Guajataca lake sampling stations (i.e., 10720 (lake entrance); 10790 (dam) (Figure 7)). Sampling began on March 2, 2005 and is still presently underway. Samples are being collected at 0m (surface), 1m, and at the photic zone (determined by Secchi Depth) with a Van Dorn sampler and analyzed for TKN, TP, and Chl *a*. In addition, the following parameters are being determined *in-situ:* pH, electrical conductivity, dissolved oxygen, temperature (YSI 85 multiparameter meter), Secchi depth and turbidity. A characterization of phytoplankton diversity on the different samples is being performed according to different specialized keys (Prescott, et al., 1970; Parra, et al., 1982). To date, a total of 10 sampling events have been completed.

Figure 7. Location of sampling stations used in our monitoring program: 1) Entrance (USGS 50010720), 2) Dam (USGS 50010790).

Figures 8 through 10 show the precipitation, daily discharge, and water level registered at the reservoir during the sampling period. After a relatively dry period from February till the end of March, significant rainfall has occurred during the months of April and May.

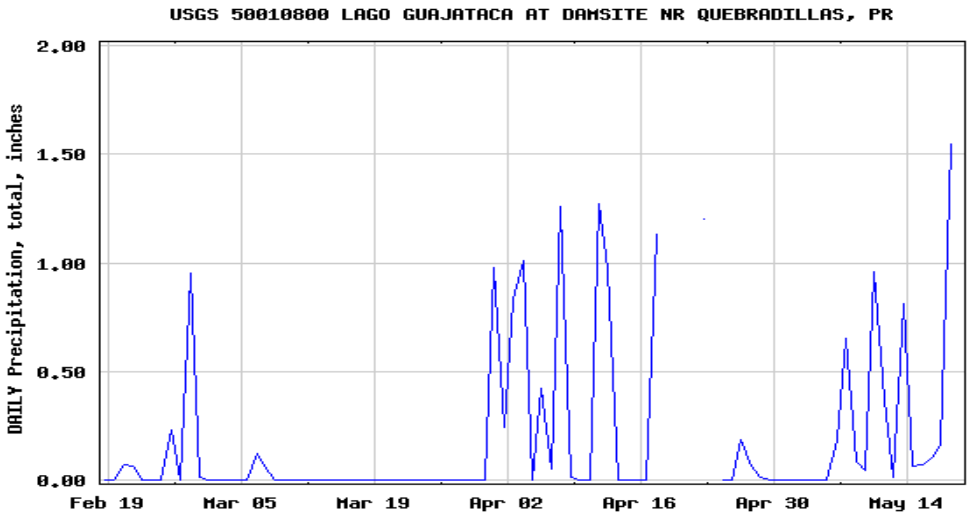


Figure 8. Precipitation recorded at Guajacata (USGS 50010800 station (dam))

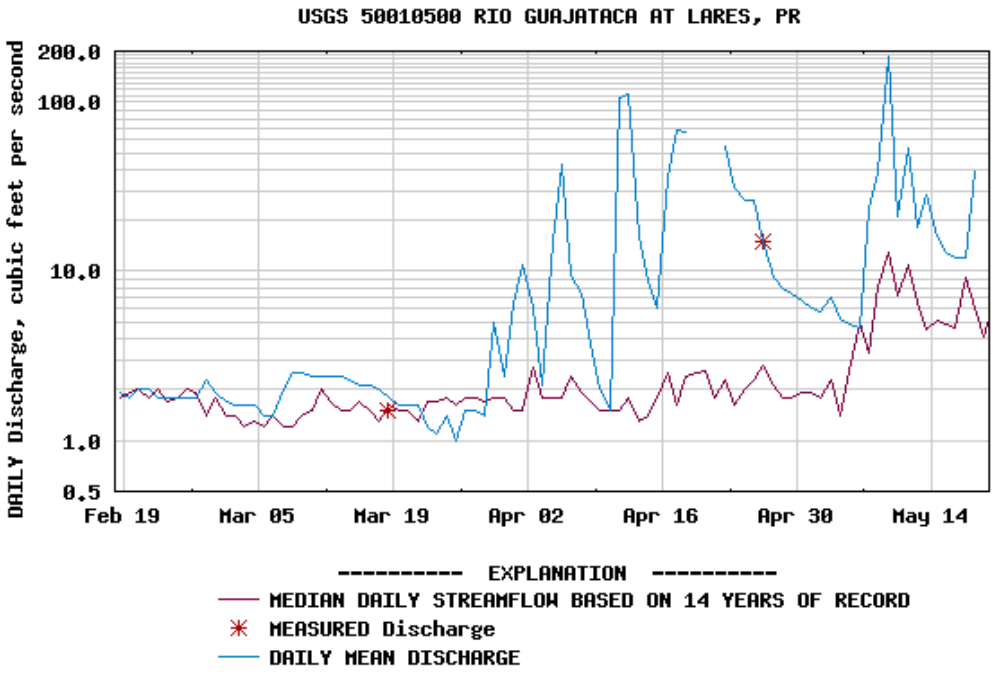


Figure 9. Daily discharge measurements at the reservoirs entrance (USGS 50010500).

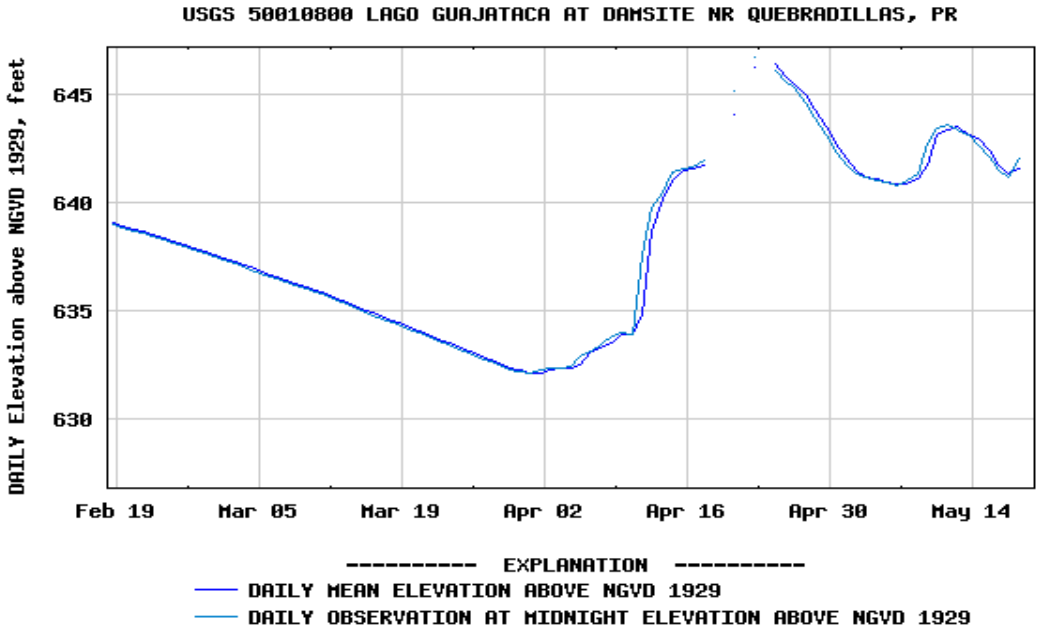


Figure 10. Reservoir's elevation during the study period (dam station -USGS 50010800).

Table 13 shows the results of the analyses completed to date. A graphical representation of average results at the different sampling depths for selected variables is depicted in Figure 11.

Table 13. Characterization of samples from the Guajataca study

Date (d/m/yr)	Station/ Depth[1]	Chl a ug/L)	TKN mg/L	TP mg/L	Temp °C	DO mg/L	Cond µS	pH	SD m	S.S mg/L
2/3/2005	1a	1.02	0.179	0.013	27.3	8.15	265.1	7.81	1.4	3.2
2/3/2005	1b	2.11	0.206	0.018	26.4	6.58	273.4	7.80		7.6
2/3/2005	1c	3.80	0.215	0.015	24.1	6.10	281.6	7.70		9.2
2/3/2005	2a	0.94	0.132	0.007	27.5	7.82	291.7	7.90	1.7	1.6
2/3/2005	2b	1.09	0.16	0.011	26.0	7.50	276.2	7.70		2.4
2/3/2005	2c	1.42	0.139	0.009	24.7	6.79	243.9	7.68		3.2
9/3/2005	1a	1.28	0.225	0.019	27.3	6.07	302.0	7.89	1.5	2.8
9/3/2005	1b	3.09	0.201	0.018	26.9	5.85	308.9	7.71		6.8

Table 13 (cont.)

Date (d/m/yr)	Station/ Depth[1]	Chl a ug/L)	TKN mg/L	TP mg/L	Temp ˚C	DO mg/L	Cond µS	pH	SD m	S.S mg/L
9/3/2005	1c	0.84	0.367	0.075	26.6	4.26	351.6	7.33		13.6
9/3/2005	2a	0.51	0.147	0.012	27.3	7.62	303.7	7.98	1.8	2.4
9/3/2005	2b	1.02	0.147	0.013	26.4	8.20	299.4	7.96		22.8
9/3/2005	2c	1.12	0.21	0.011	25.8	8.80	296.4	7.93		1.2
15/3/2005	1a	1.43	0.207	0.018	27.6	8.30	295.1	8.12	1.7	1.6
15/3/2005	1b	1.54	0.223	0.02	27.5	7.70	296.5	7.70		3.4
15/3/2005	1c	1.36	0.211	0.007	27.6	4.37	296.8	8.02		5.6
15/3/2005	2a	0.48	0.224	0.017	27.5	8.45	281.5	8.16	1.5	1.8
15/3/2005	2b	0.84	0.128	0.017	28.4	5.40	133.1	8.22		3.8
15/3/2005	2c	2.97	0.155	0.013	26.0	3.25	157.1	7.62		4
30/3/2005	1a	3.00	0.567	0.03	28.9	7.40	301.6	8.17	1.6	1
30/3/2005	1b	3.90	0.522	0.038	27.6	7.30	298.4	7.85		1.6
30/3/2005	1c	6.24	0.427	0.036	26.8	3.90	318.5	7.81		3
30/3/2005	2a	3.85	0.338	0.025	29.0	7.60	300.1	8.06	1.8	1.2
30/3/2005	2b	9.20	0.368	0.032	27.9	7.83	287.9	8.02		1
30/3/2005	2c	3.07	0.341	0.025	28.7	4.82	280.7	8.03		3.2
6/4/2005	1a	9.40	0.413	0.036	27.5	8.60	267.6	8.35	1.4	1.2
6/4/2005	1b	9.49	0.469	0.04	27.5	8.40	283.5	8.10		2
6/4/2005	1c	4.42	0.547	0.038	27.3	4.35	248.4	7.69		6
6/4/2005	2a	0.47	0.333	0.043	28.2	8.18	289.4	8.30	1.7	1.2
6/4/2005	2b	5.33	0.346	0.022	27.2	7.81	289.1	8.24		1.2
6/4/2005	2c	5.68	0.317	0.024	27.4	3.45	171.6	7.69		2
20/4/2005	1a	7.51	0.432	0.042	28.5	10.3	248.5	8.46	1.9	1.4
20/4/2005	1b	8.75	0.474	0.054	28.4	9.85	232.7	8.49		2.2
20/4/2005	1c	3.71	0.431	0.05	26.8	6.48	264.1	7.83		10.2
20/4/2005	2a	5.15	0.429	0.027	27.5	8.45	262.7	8.29	2	1.8
20/4/2005	2b	5.20	0.363	0.023	27.1	8.41	248.4	8.27		1.2
20/4/2005	2c	5.45	0.358	0.025	26.9	1.32	236.5	8.25		1
27/4/2005	1a	29.48	0.615	0.072	28.5	11.82	260.6	8.63	1.8	1.1
27/4/2005	1b	25.27	0.642	0.071	27.8	7.22	264.5	8.72		1.6
27/4/2005	1c	7.82	0.445	0.052	25.8	1.84	128.7	7.71		3.2
27/4/2005	2a	5.22	0.450	0.026	29.2	9.11	284.5	8.62	2	1.4
27/4/2005	2b	5.27	0.427	0.026	28.6	8.36	283.1	8.64		1
27/4/2005	2c	7.58	0.436	0.025	26.9	2.98	149.2	7.65		1.2
4/5/2005	1a	6.85	0.440	0.043	29.0	8.21	247.9	8.54	1.5	3.6
4/5/2005	1b	7.63	0.445	0.038	28.6	7.73	265.8	8.39		3.2
4/5/2005	1c	2.25	0.291	0.026	26.0	1.90	331.7	7.26		4
4/5/2005	2a	4.63	0.312	0.017	29.2	8.06	271.9	8.49	1.8	3.6
4/5/2005	2b	3.99	0.404	0.015	29.0	7.68	272.2	8.39		3.2
4/5/2005	2c	5.36	0.429	0.024	26.8	2.80	310.5	7.70		4.8
11/5/2005	1a	11.52	N/A	N/A	29.5	8.67	260.5	8.64	1.1	3.6
11/5/2005	1b	102.91	N/A	N/A	29.0	9.58	254.4	8.65		8
11/5/2005	1c	20.90	N/A	N/A	26.5	3.59	286.5	7.70		9.6
11/5/2005	2a	13.41	N/A	N/A	29.5	7.50	260.5	8.41	1.5	1.2
11/5/2005	2b	7.34	N/A	N/A	28.8	7.37	257.6	8.36		0

Table 13 (cont.)

Date (d/m/yr)	Station/ Depth[1]	Chl a ug/L)	TKN mg/L	TP mg/L	Temp ˚C	DO mg/L	Cond µS	pH	SD m	S.S mg/L
11/5/2005	2c	89.57	N/A	N/A	26.8	0.53	311.7	7.51		1.2
18/5/2005	1a	43.52	N/A	N/A	27.2	6.01	253.0	7.79	1.7	8
18/5/2005	1b	30.99	N/A	N/A	27.2	5.96	252.7	7.65		2.4
18/5/2005	1c	6.59	N/A	N/A	26.9	0.94	288.3	7.35		3.2
18/5/2005	2a	46.37	N/A	N/A	27.6	6.89	254.0	8.30	1.5	1.2
18/5/2005	2b	23.59	N/A	N/A	27.5	7.05	254.0	8.03		3.6
18/5/2005	2c	11.71	N/A	N/A	26.8	0.84	303.1	7.69		2.4

[1]- (1 refers to entrance station, 2 refers to dam station; a, b, and c correspond to 0m (surface), 1m and 5 m sampling depths).

N/A – results not available at the time of writing this report.

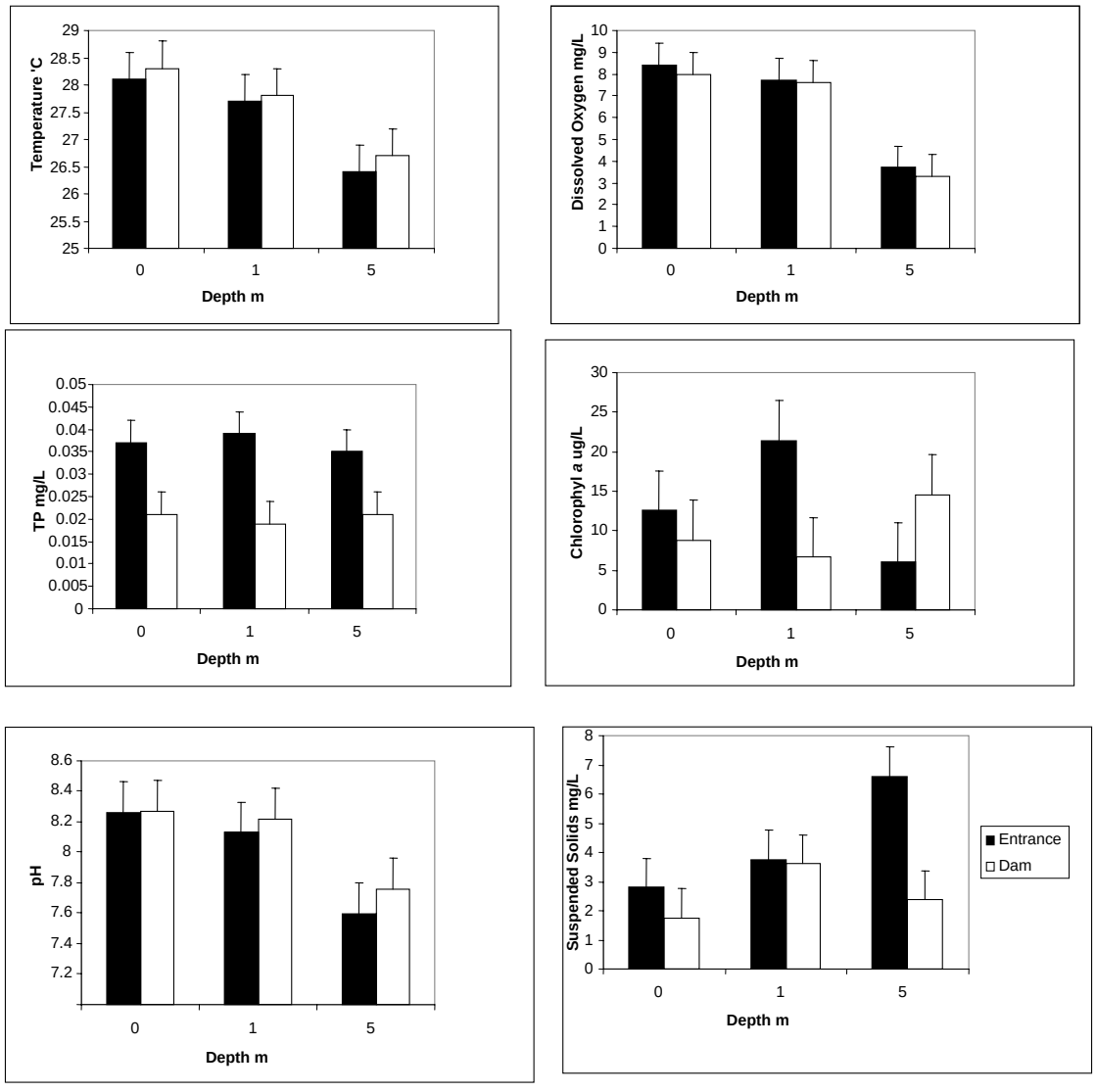


Figure 11. Effect of sampling depth on different diagnostic parameters at Guajataca lake. Results from the monitoring study.

A statistical evaluation of the results revealed significant differences between stations for TP, and TKN. Higher nutrient concentrations were observed in station 1 (average: 0.38 mg/l TKN; 0.036 mg/L TP), than in station 2 (average 0.295 mg/L TKN; 0.020mg/L TP). Both nutrients also exhibited significant differences between months, with the highest concentrations occurring in April coinciding with the initiation of the precipitation events. No significant differences were observed between sampling depths for either nutrient. A remarkable correlation between concentrations of TKN and TP was observed (figure 12). This suggests that similar transport factors are controlling the loadings of these nutrients into the reservoir.

Dissolved oxygen, Temperature, Electrical Conductivity, and pH exhibited a similar behavior denoting significant differences with depth, and between months (table 14, figure 11), but not between stations. The effects of temperature and dissolved oxygen content are similar to those reported by Townsend (1999) for two reservoirs of Australia. The author indicated that tropical waters are more susceptible to oxygen depletion than their temperate counterparts. He attributed this behavior to the reduced solubility of oxygen in warm waters coupled with higher rates of microbial metabolism. The effect is compounded by the long periods of stratification commonly exhibited by some tropical reservoirs, which causes isolation of hypolimnetic waters from surface waters oxygenated by photosynthesis and surface-air gas exchange.

Table 14: Effect of sampling depth on different diagnostic parameters at Guajataca.

Sampling Depth	Temp. °C	DO (mg/L)	E.C. (µS/cm)	pH
0m	28.19	8.16	275.09	8.25
1m	27.69	7.59	266.59	8.14
5m	26.56	3.67	262.85	7.71

The concentration of Chlorophyll a increased as time progressed. The highest concentrations were observed during the month of May (average = 24.40µg/L). These concentrations were significantly higher than those observed in March (average = 8.40µg/L), and April (average = 2.34µg/L). This behavior is probably a reflection of the increased nutrient loadings occurring as a result of the rainfall events. In fact, there was a strong positive correlation between concentrations of nutrients (TP and TKN), and Chl *a* (Figures 13 and 14). Results confirm the important role of nutrient loadings on aquatic biomass growth, as well as our findings in the periphytometer studies regarding nutrient co-limitation of algae growth in this reservoir.

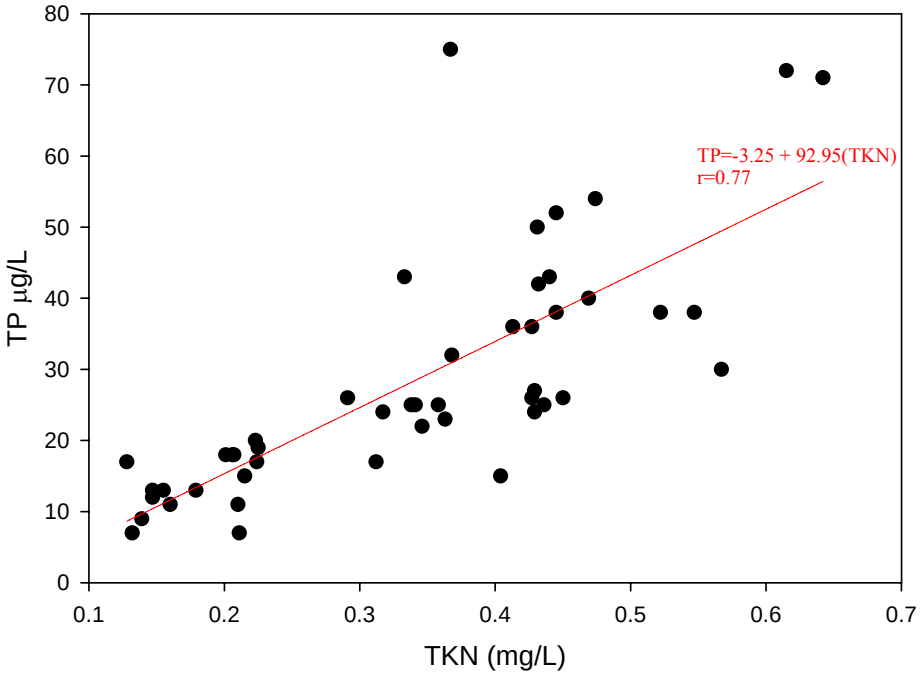


Figure 12. Relationship between TKN and TP at the Guajataca reservoir.

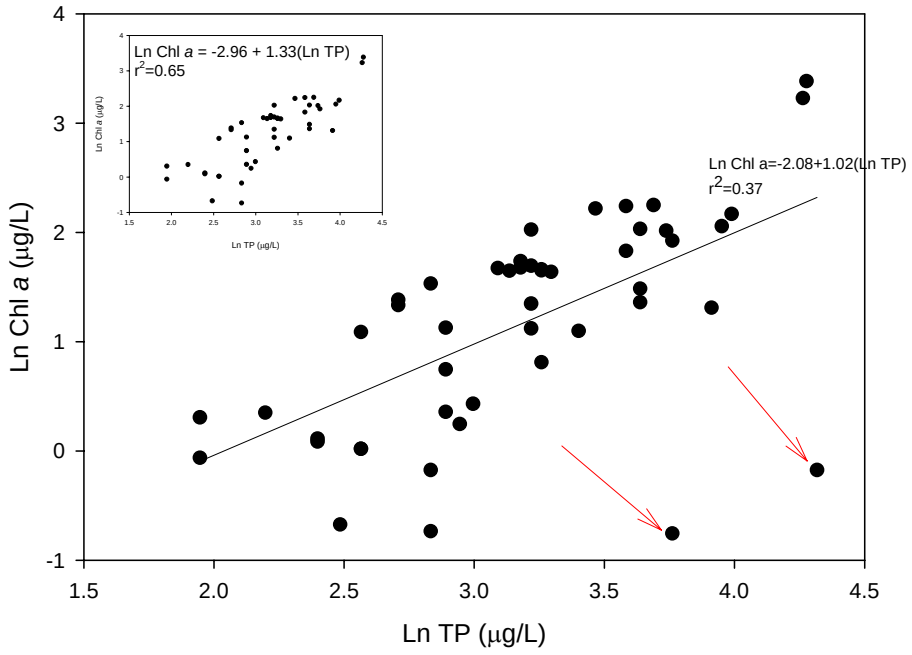


Figure 13. Relationship between total phosphorus (TP) and chlorophyll *a* at Guajataca. The graph on the insert excludes the two outliers identified by a red arrow. Outliers were identified using the Regression Diagnostic tool of Sigma Plot® 9.0.

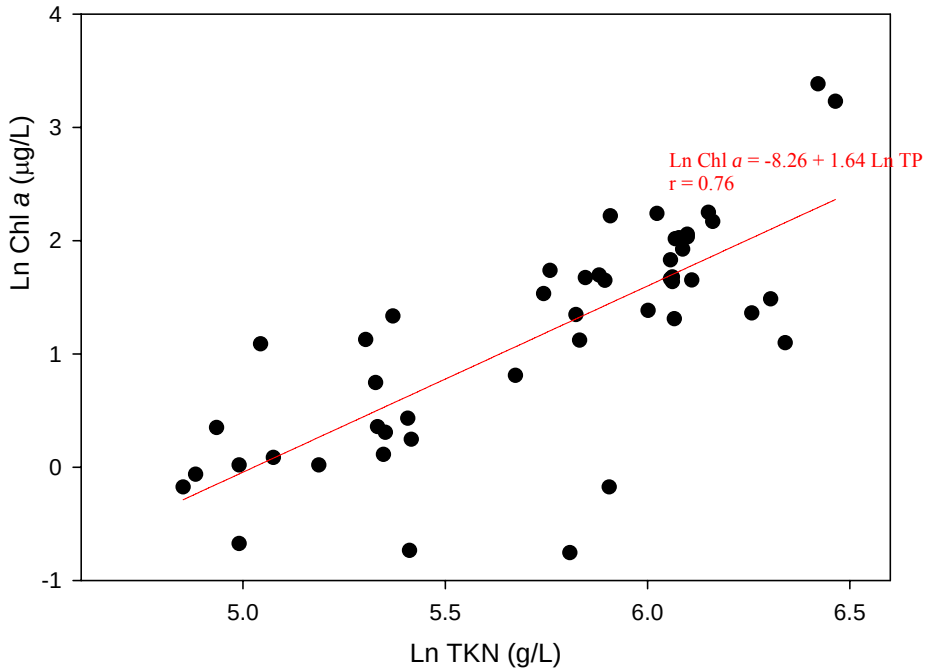


Figure 14. Relationship between TKN and chlorophyll *a* at Guajataca.

A preliminary characterization of the phytoplankton diversity of samples obtained during the monitoring study revealed four Myxophiceae genera (*Anabaena, Aphanocapsa, Chroococcus, and Polycistis*), a Xanthopicea genera (*Botrycoccus*), two Bacillariophycea (*Caloneis and Synedra*) genera, and five Chlorophycea genera (*Cosmarium, Pediastrum, Sphaerocystis, Calanoeis y Saturastrum*) *Perinidium* was the dominant organism during the study period (table 15). After three months of monitoring, results suggest little phytoplankton diversity in this reservoir, with the Chlorophytae group being the dominant one. In the coming months a more detailed characterization of the samples will be performed to correlate number of individuals (genera) to the various physicochemical parameters.

Table 15. Characterization of phytoplankton diversity for the Guajataca trial.

Station 1: Entrance		**MARCH**			**APRIL**			**MAY**	
TAXON	**O M**	**1M**	**5M**	**0M**	**1M**	**5M**	**0M**	**1M**	**5M**
Chroococcus	**X**	**x**		**x**	**X**		**X**	**x**	**X**
Polycistis	**X**	**x**	**x**	**x**	**X**	**x**	**X**		**X**
Anabaena	**X**	**x**		**x**	**X**		**X**	**x**	
Aphanocapsa				**x**					
Synedra	**X**	**x**	**x**						**X**
Botryococcus	**X**	**x**	**x**	**x**			**X**		
Cosmarium	**X**	**x**		**x**	**X**	**x**		**x**	
Peridinium	**X**	**x**	**x**	**x**	**X**		**X**	**x**	**X**
Pediastrum	**X**	**x**		**x**	**X**		**X**	**x**	
Sphaerocystis	**x**	**x**		**x**			**X**		
Staurastrum						**x**	**X**		**X**
Station 2: Dam		**MARCH**			**APRIL**			**MAY**	
	O M	**1M**	**5M**	**0M**	**1M**	**5M**	**0M**	**1M**	**5M**
Chroococcus	**X**	**X**		**x**	**X**	**x**	**X**	**x**	**X**
Polycisitis	**X**		**x**				**X**		
Anabaena	**X**	**X**		**x**	**X**			**x**	
Aphanocapsa							**X**	**x**	
Synedra	**X**	**X**		**x**					**X**
Botryococcus	**X**	**X**	**x**	**x**			**X**		
Cosmarium			**x**		**X**				**X**
Peridinium	**X**	**X**		**x**	**X**		**X**	**x**	**X**
Pediastrum	**X**	**X**		**x**	**X**		**X**	**x**	
Sphaerocystis	**X**			**x**	**X**		**X**	**x**	
Staurastrum			**x**	**x**		**x**	**X**	**x**	**X**

CHARACTERIZATION OF PHYTOPLANKTON DIVERSITY IN LAKES OF PUERTO RICO (SAMPLES FROM PREQB RESERVOIR MONITORING PROGRAM)

Emphasis has been placed on the characterization of phytoplankton diversity on two reservoirs (Carraízo and Guajataca) that differ significantly in their trophic state. The Carraízo reservoir, the most eutrophic reservoir of the island presented great abundance of *Cyanophytae* and *Euglenophytae* which are characteristic of eutrophic systems with high organic matter content. On the other hand, in the Guajataca reservoir predominated the *Chlorophytaes*, *Chrysophytaes*, and *Dynophyceaes,* characteristic of mesotrophic systems. Table 16 show a list of the genera found at Carraízo, and table 17 indicates the frequency at which they have been detected.

Table 16. Characterization of phytoplankton Genera present at Carraízo

Division	Class	Order	Family	Genera
Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Euglena*
				Lepocinclis
				Phacus
				Trachelomonas
				Strombomonas
Chlorophyta	Chlorophyceae	Chlorococcales	Dictyosphaeriaceae	*Dictyosphaerium*
			Scenedesmaceae	*Scenedesmus*
			Hydrodictyaceae	*Pediastrum*
			Micractiniaceae	*Micractinium*
		Volvocales	Volvocaceae	*Pandorina*
				Eudorina
		Tetrasporales	Oocystaceae	*Ankistrodesmus*
				Selenastrum
		Zygnematales	Desmidiaceae	*Cosmarium*
Pyrrophyta	Dinophyceae	Dinokontae	Peridiniaceae	*Peridinium*
				Peridiniopsis
Cyanophyta	Cyanophyceae	Chroococcales	Chroococcaceae	*Chroococcus*
				Microcystis
				Gomphosphaeria
Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*
				Synedra
			Naviculaceae	*Navicula*

Table 17. Frequency of the phytoplankton genera encountered at Carraízo during the different sampling events.

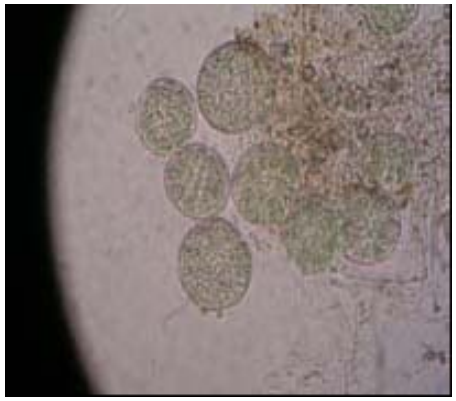
		Station 50057500		Station 50058800		
Genera	**Aug-04**	**Dec-04**	**March 05**	**Aug-04**	**Dec-04**	**March05**
Euglena	X		x	X		
Lepocinclis	X	x	x			X
Phacus	X	x				
Trachelomonas					x	
Strombomonas					x	
Dictyosphaerium	X	x	x			X
Scenedesmus	X					X
Pediastrum	X		x			X
Micractinium					x	X
Pandorina	X	x	x		x	X
Eudorina	X	x	x		x	
Ankistrodesmus		x				X
Selenastrum		x				
Cosmarium			x			X
Peridinium	X				x	X
Peridiniopsis					x	X
Chroococcus	X				x	
Microcystis	X					
Fragilaria	X	x	x		x	X
Synedra	X	x	x			X
Navicula	X	x	x	X	x	X
Sp1(Chlorophyta)	X			X		
Sp2(Chlorophyta)	X			X	x	
Sp3 (Cianophyta)				X		
Sp4(Bacilariophyta)		x				
Sp5 (Pyrrophyta)			x			

In Carraízo, the *Euglenophytae* genera were present in greater frequency at the entrance station (50057500) which generally exhibited greater concentrations of nutrients (nitrogen and phosphorus). The presence of this group has generally been associated with eutrophic to

hypereutrophic conditions with a high content of sediments and organic matter. The genera *Pandorina* and *Eudorina*, found in both stations are characteristics of eutrophic conditions with a low degree of mineralization.

The *Dinobryon* genera was the only *Chrysophytae* present at Guajataca, however it was encountered in great numbers (Tables 18 and 19). Species of these genera are typical members of the phytoplankton community in lakes, and have been found to contribute up to 50% of the biomass of lake Shield in Canada (Wehr and Sheath, 2003). (Wehr and Sheath, 2003). In general, the *Chrysophytaes* are typically found in soft-lake waters with low to moderate productivity.

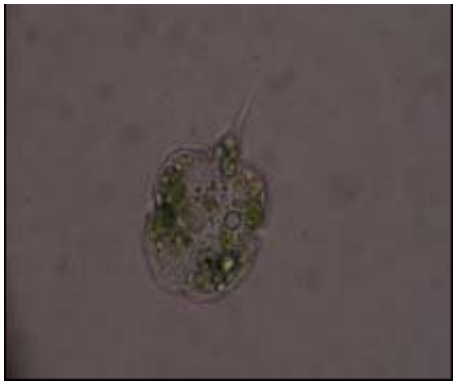
The low phosphorus concentrations found at Guajataca suggest that this reservoir is P limited during a significant portion of the year (as confirmed by the periphytometer studies). This gives advantage to the *Chrysophytae* which have proven to have the capacity to accumulate phosphorus and dominate under low P conditions (Wher, and Sheath, 2003). According to Ramírez (2000) the *Dinobryon* genera is one of the most deteriorating to water quality, confering a strong fish flavor to water even at low concentrations.



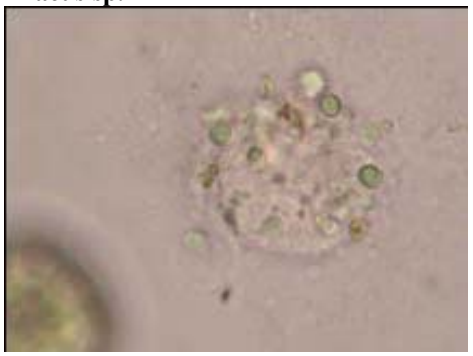
Sp. 1

Trachelomonas sp.

Peridionopsis sp.



Phacus sp.

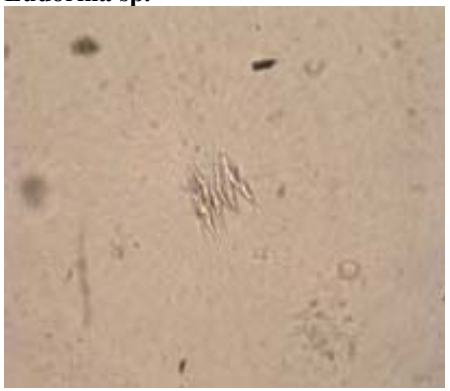


Sp. 3

Pandorina sp.

Euglena sp.

Eudorina sp.



Scenedesmus sp.

Figure 15. Nomarski microscope images of predominant algae species found at Carraízo

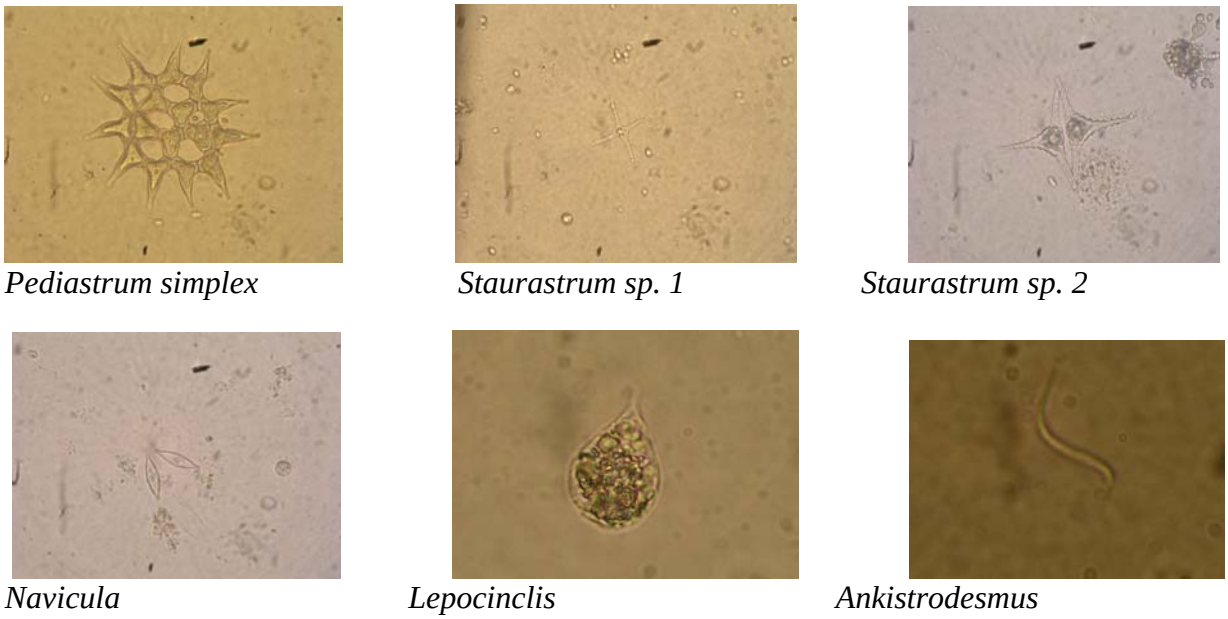
Table 18. Characterization of phytoplankton Genera present at Guatataca

Division	Class	Order	Family	Genera
Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Lepocinclis*
Chlorophyta	Chlorophyceae	Chlorococcales	Dictyosphaeriaceae	*Dictyosphaerium*
			Hydrodictyaceae	*Pediastrum*
			Palmellaceae	*Sphaerocystis*
			Chlorococcaceae	*Tetraedron*
		Volvocales	Volvocaceae	*Pandorina*
		Tetrasporales	Oocystaceae	*Ankistrodesmus*
		Zygnematales	Desmidiaceae	*Staurastrum*
Chrysophyta	Chrysophyceae	Ochromomadales	Dinobryaceae	*Dinobryon*
Pyrrophyta	Dinophyceae	Dinokontae	Peridiniaceae	*Peridinium*
Cyanophyta		Chroococcales	Chroococcaceae	*Chroococcus*
Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*
				Synedra
			Naviculaceae	*Navicula*

Table 19. Frequency of the phytoplankton genera encountered at Guajataca during the different sampling events.

		Station 50010720			Station 50010790	
Genera	**Aug-04**	**Dec-04**	**March-05**	**Aug-04**	**Dec-04**	**March-05**
Lepocinclis						**X**
Dictyosphaerium					**x**	
Pediastrum	**X**	**x**	**x**	**X**		
Sphaerocystis				**X**		
Tetraedron	**X**		**x**		**x**	
Pandorina	**X**		**x**		**x**	**X**
Ankistrodesmus	**X**	**x**	**x**		**x**	
Staurastrum	**X**			**X**		**X**
Dinobryon	**X**	**x**	**x**	**X**	**x**	**X**
Peridinium	**X**	**x**				**X**
Peridiniopsis	**X**	**x**	**x**	**X**	**x**	
Chroococcus	**X**		**x**		**x**	**X**
Fragilaria			**x**	**X**		
Synedra		**x**	**x**	**X**		
Navicula	**X**		**x**	**X**		
Sp1 (Cyanophyta)		**x**			**x**	

The *Pandorina* genera were found in great frequency on the three sampling events analyzed for Guajataca. These genera are part of the flagellated green algae typically found in fresh water bodies. *Desmodesmus*, *Pediastrum*, *Golenkinia* and *Scenedesmus* are principal constituents of the phytoplankton community. The genera *Pediastrum* is common of eutrophic waters and can impart a fish flavor to water when present in great abundance (Pinilla, 2000; Wehr, and Sheath 2003). We found the specie P. simplex which is characteristic of environments enriched with salts, particularly sodium chloride and sulfate.



Pediastrum simplex *Staurastrum sp. 1* *Staurastrum sp. 2*

Navicula *Lepocinclis* *Ankistrodesmus*

Figure 16. Nomarski microscope images of various phytoplankton genera observed at Guajataca.

Preliminary results from two other reservoirs not previously reported (Caonillas and Melania) are presented next.

Caonillas

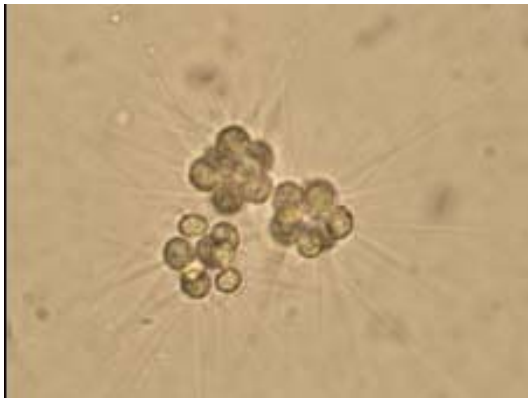
Twelve genera belonging to six algae divisions were found at this reservoir (Tables 20, and 21). The *Scenedesmus*, S*taurastrum and Peridinium* genera were the most abundant. *Scenedesmus* is probably one of the most widely reported phytoplankton genera in the world. It is present in waters rich in nutrients, particularly nitrogen. It is an indicator of mesotrophic conditions of waters with high conductivity and high sediment content (Pinilla, 2000; Wehr, and Sheath 2003). Few of the Desmidium genera are found in eutrophic waters, among them: *Cosmarium, Staurastrum* y *Closterium.* The *Saturastrum* genera are generally found in the surface waters, and near the dam structures of reservoirs. Some species of these genera impart a "pickle" odor and flavor to waters.

Table 20. Characterization of phytoplankton Genera present at Caonillas

Division	**Class**	**Order**	**Family**	**Genera**
Euglenophyta	Euglenophyceae	Euglenales	Euglenaceae	*Lepocinclis*
Chlorophyta	Chlorophyceae	Zygnematales	Desmidiaceae	*Cosmarium*
		Chlorococcales	Scenedesmaceae	*Scenedesmus*
			Hydrodictyaceae	*Pediastrum*
			Micractiniaceae	*Micractinium*
		Zygnematales	Desmidiaceae	*Staurastrum*
Pyrrophyta	Dinophyceae	Dinokontae	Peridiniaceae	*Peridinium*
				Peridiniopsis
Chrysophyta	Chrysophyceae	Ochromomadales	Dinobryaceae	*Dinobryon*
Cyanophyta	Cyanophyceae	Chroococcales	Chroococcaceae	*Chroococcus*
		Tetrasporales	Oocystaceae	*Ankistrodesmus*
Bacillariophyta	Bacillariophyceae	Pennales	Naviculaceae	*Navicula*

Table 21. Distribution of genera present at Caonillas

	Station 1	Station 2
Genera		
Lepocinclis		**x**
Cosmarium		**x**
Scenedesmus	**X**	**x**
Pediastrum		
Micractinium		
Staurastrum	**X**	**x**
Peridinium		**x**
Peridiniopsis		**x**
Dinobryon	**X**	
Chroococcus		
Ankistrodesmus		**x**
Navicula		**x**



Micractinium

Dinobryon

Figure 17. Nomarski microscope images of algae present at Caonillas.

Melania

Five genera belonging to three divisions were found at this reservoir (table 22). The *Pediastrum* and *Microcystis* genera were the most abundant. Close to 25 species of

Microcystis have been reported in numerous, highly diverse ecosystems around the world. They are known to form algae blooms in eutrophic waters. Since some of the species are highly toxic they are one of the most studied genera in limnologic studies. They impart a blue-green color to water and are indicators of organic contamination.

Table 22. Characterization of phytoplankton genera at Melania

Division	**Class**	**Order**	**Family**	**Genera**
Chlorophyta	Chlorophyceae	Chlorococcales	Hydrodictyaceae	*Pediastrum*
		Tetrasporales	Oocystaceae	*Ankistrodesmus*
Cyanophyta	Cyanophyceae	Chroococcales	Chroococcaceae	*Microcystis*
Bacillariophyta	Bacillariophyceae	Pennales	Fragilariaceae	*Fragilaria*
				Synedra

OTHER ACTIVITIES RELATED TO THE PROJECT

An estimate of the professional hours devoted to the different tasks associated with this project since our last report (December 04) is shown in Tables 23 - 25.

Table 23. Professional hours devoted to the chemical characterization of samples from the PREQB reservoir monitoring network program.

Tasks	Professional hours	Total hours since last report
Simple pick up at EQBs laboratory	8 hrs/ sampling event	8
Filtering of simples for DP, and DOC determination	8 hrs/ sampling event	8
Digestion – TKN	16 hrs/ sampling event	16
Digestion –TP	12 hrs/ sampling event	12
Cleaning glassware	40 hrs/ sampling event	40
DOC analysis	3 hrs/ sampling event	3
TP, DP analysis	8 hrs/ sampling event	8
TKN analysis	8 hrs/ sampling event	8
Preparation of laboratory Report	32 hours	32
Chlorophyll analysis - Extraction, and sample measurement	24 hrs/ sampling event	24
Data evaluation- (e.g., preparation of graphs, data manipulation)	48 hours	48
Preparation of purchase orders for materials, and supplies	48 hrs	48
Financial report preparation	10 hrs	10
Statistical Analyses	16 hrs	16
Preparation of Biannual report (May. 05)	40 hrs	40
Total hours		**321**

Table 24. Professional hours devoted in the periphytometer studies and in the Guajataca weekly sampling study.

Tasks related to the project	Professional hours	Total hours since last report*
Periphytometer studies	144 hrs/trial (3 persons @ 48 hrs each/trial)	**144**
Weekly sampling	24 hrs/sampling event (3 persons @ 8 hrs/sampling event)	**240**
Chemical and Biological analyzes (TKN, TP, DOC, Chl *a*.) –Guajataca	100 hours between digestion, analyses and reporting	**100**
Phytoplankton characterization –Guajataca study	720 slides (60 samples-6 slides per sample) @ 2 hours per slide	**720**
Total		**1,204**

Table 25. Professional hours devoted in the phytoplankton characterization study of samples from the PREQB monitoring program.

Number of lakes	Number of samples per lake	Number of visits	Number of slides scanned per sample	Time /slide (including species identification)
5	**3**	**3**	**6**	**2 hrs.**
			TIME EFFORT	**540**

Cited Literature

Candelas, G. and G, Candelas. 1964. Plankton studies on Puerto Rico freshwater lakes. Physical and chemical nature. Carb.J.Sci. 4 (4): 451-458.

Contreras, F; Castaneda, L.R; Alvarado, R.y Gutierrez, F. 1996. Nutrientes en 39 lagunas costeras mexicanas. Rev. Biol. Trop. 44 (2): 417-42

Martínez, G. A. 2002. Development of numeric nutrient criteria for lakes in Puerto Rico. J. Agric. Univ. P.R. 86(3 – 4): 139-144.

Matlock, M. D; Matlock, M. E; Storm, D., Smolen, M. D and Henley, W. 1998. Limiting nutrient determination in lotic ecosystems using a quantitative nutrient enrichment periphytometer. Journal of the American Water Resources Association. 34(5): 1141-1174.

Pinilla, G. A. 2000. Indicadores biológicos en ecosistemas acuáticos continentales de Colombia. Fundación Universidad de Bogotá, Centro de Investigaciones Científicas. Bogotá, Colombia.67 pp.

Parra, O.M. 1982. Manual Taxonómico del Fitoplancton de Aguas Continentales. Universidad de Concepción. Concepción. 232 pp.

Prescott, G. W. 1970. The Freshwater Algae. Brown Company Publ. Dobuque, Iowa, 348 pp.

Quinones, F. 1980. Limnology of lake Loiza, Puerto Rico. U.S Geological Survey. Water Resources Investigations. 109 pp.

Ramírez, J. J. 1987. Contribución al conocimiento de las condiciones limnológicas de la laguna del Parque Norte. Actualidades Biológicas 16: 12-30.

Ramírez, J. J. 2000. Fitoplancton de agua dulce. Editorial Universidad de Antioquia, Colección Ciencia y Tecnología. Medellín, Colombia, 206 pp.

Roldan, G.1992. Fundamentos de limnología neotropical. Editorial Universidad de Antioquia, Colección Ciencia y Tecnología No. 1, Medellín - Colombia.529 pp.

Stevenson, R.J. and Glover, R. 1993. Effects of algal density and current on ion transport through periphyton communities. Limnol. Oceanogr. 38(6): 1276-1281.

Suttle, C.A and Harrison, P.J. 1988. Ammonium and phosphate uptake rates, N:P supply ratios, and evidence for N and P limitation in some oligotrophic lakes. Limnol.Oceanogr. 33(2), 186-202.

Townsend, S. A. 1999. The seasonal pattern of dissolved oxygen, and hypolimnetic deoxygenation, in two tropical Australian reservoirs. Lakes & Reservoirs: Research and Management. 4: 41 – 53.

USEPA, 2000. Nutrient Criteria Technical Guidance Manual: Lakes Reservoirs. EPA. 822-B00-001

Wehr, J. y Sheath, R. 2003. Freshwater algae of North America. Editorial Academic Press, California, USA. 918 pp.

Wetzel, R. 1981. Limnología. Ediciones Omega S. A. Barcelona.

APPENDIX A

SAMPLE DISTRIBUTION BY LAKE AND STATION

	lake#																			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**All**
	N	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
station																				
1	7	7	7	7	7	7	7	7	6	7	7	7	7	.	3	7	2	1	7	110
2	.	.	4	.	4	7	7	.	7	7	.	.	.	7	.	7	.	4	7	61
3	7	7	.	7	7	6	7	7	7	7	7	7	7	.	7	7	5	4	7	113

PERCENTIL 25 (QUANTIL 1) BY STATION LAKES

		station			
		Entrada	Medio	Represa	All Lakes
pH	**Min**	6.92	7.38	7.36	6.92
	N	35	13	22	70
	Perc. 25	7.54	8.24	7.60	7.60
	Perc. 75	8.430	8.660	8.460	8.500
CE	**Min**	100.00	215.00	100.00	100.00
	N	5	2	4	11
	Perc. 25	130.00	215.00	114.00	128.00
	Perc. 75	275.000	272.000	243.000	272.000
Sechi	**Min**	0.10	0.10	0.10	0.10
	N	84	43	80	207
	Perc. 25	0.60	0.75	1.00	0.75
	Perc. 75	1.308	1.500	1.985	1.500
DO	**Min**	4.40	0.44	4.29	0.44
	N	61	30	52	143
	Perc. 25	6.20	6.70	6.15	6.25
	Perc. 75	8.020	8.210	8.325	8.200
TP(mg/L)	**Min**	0.01	0.01	0.01	0.01
	N	110	61	113	284
	Perc. 25	0.02	0.02	0.01	0.02
	Perc. 75	0.063	0.043	0.034	0.049
TKN (mg/L)	**Min**	0.01	0.04	0.02	0.01
	N	110	61	113	284
	Perc. 25	0.27	0.27	0.23	0.25
	Perc. 75	0.530	0.500	0.395	0.464

PERCENTIL 25 (QUANTIL 1) BY STATION LAKES

		station			
		Entrada	Medio	Represa	All Lakes
DP (mg/L)	**Min**	0.00	0.00	0.00	0.00
	N	109	61	112	282
	Perc. 25	0.01	0.01	0.00	0.01
	Perc. 75	0.015	0.010	0.010	0.012
DOC (mg/L)	**Min**	1.07	1.45	0.83	0.83
	N	110	61	113	284
	Perc. 25	2.31	2.14	1.89	2.06
	Perc. 75	5.030	4.140	3.600	4.080
Chl a (ug/L)	**Min**	0.29	0.18	0.56	0.18
	N	93	51	95	239
	Perc. 25	3.05	2.87	2.31	2.66
	Perc. 75	17.240	11.580	10.200	11.720
N/P	**Min**	0.19	2.06	2.00	0.19
	N	110	61	113	284
	Perc. 25	6.43	7.93	8.82	7.31
	Perc. 75	15.563	15.879	18.400	16.917
TSIChl	**Min**	18.33	13.78	24.91	13.78
	N	93	51	95	239
	Perc. 25	41.55	40.96	38.81	40.20
	Perc. 75	58.531	54.627	53.383	54.745
TSITP	**Min**	32.21	37.35	34.14	32.21
	N	110	61	113	284
	Perc. 25	45.83	48.05	42.21	45.00
	Perc. 75	63.894	58.387	55.000	60.270

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

1 Partial Variables:	Station
10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

Pearson Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000	-0.13213 0.3604	0.22197 0.1213	-0.13490 0.3503	-0.14518 0.3144	-0.28078 0.0483
Sechi **Sechi**	-0.13213 0.3604	1.00000	0.06854 0.6362	-0.19304 0.1792	-0.01441 0.9209	-0.07108 0.6238
DO **DO**	0.22197 0.1213	0.06854 0.6362	1.00000	-0.07707 0.5947	-0.14033 0.3311	-0.21704 0.1300
TP_mg_L_ **TP(mg/L)**	-0.13490 0.3503	-0.19304 0.1792	-0.07707 0.5947	1.00000	0.44566 0.0012	0.68349 <.0001
TKN__mg_L_ **TKN (mg/L)**	-0.14518 0.3144	-0.01441 0.9209	-0.14033 0.3311	0.44566 0.0012	1.00000	0.06141 0.6718
DP__mg_L_ **DP (mg/L)**	-0.28078 0.0483	-0.07108 0.6238	-0.21704 0.1300	0.68349 <.0001	0.06141 0.6718	1.00000
Chl_a__ug_L_ **Chl a (ug/L)**	0.26289 0.0651	-0.19616 0.1722	0.25096 0.0788	0.32049 0.0233	0.24940 0.0807	-0.12703 0.3794
N_P **N/P**	0.06886 0.6347	0.25986 0.0684	-0.19077 0.1845	-0.63045 <.0001	0.10426 0.4712	-0.37168 0.0079
TSIChl **TSIChl**	0.20302 0.1574	-0.18373 0.2015	0.22010 0.1246	0.36567 0.0090	0.31517 0.0258	-0.05157 0.7221

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

Pearson Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
TSITP **TSITP**	-0.12671 0.3806	-0.23805 0.0960	-0.02756 0.8493	0.93051 <.0001	0.47431 0.0005	0.50114 0.0002

Pearson Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.26289 0.0651	0.06886 0.6347	0.20302 0.1574	-0.12671 0.3806
Sechi **Sechi**	-0.19616 0.1722	0.25986 0.0684	-0.18373 0.2015	-0.23805 0.0960
DO **DO**	0.25096 0.0788	-0.19077 0.1845	0.22010 0.1246	-0.02756 0.8493
TP_mg_L_ **TP(mg/L)**	0.32049 0.0233	-0.63045 <.0001	0.36567 0.0090	0.93051 <.0001
TKN__mg_L_ **TKN (mg/L)**	0.24940 0.0807	0.10426 0.4712	0.31517 0.0258	0.47431 0.0005
DP__mg_L_ **DP (mg/L)**	-0.12703 0.3794	-0.37168 0.0079	-0.05157 0.7221	0.50114 0.0002
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000	-0.32470 0.0214	0.86683 <.0001	0.42051 0.0024

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

Pearson Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.32470 0.0214	1.00000	-0.32257 0.0223	-0.75853 <.0001
TSIChl **TSIChl**	0.86683 <.0001	-0.32257 0.0223	1.00000	0.47609 0.0005
TSITP **TSITP**	0.42051 0.0024	-0.75853 <.0001	0.47609 0.0005	1.00000

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

Spearman Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000	-0.02705 0.8521	0.29356 0.0385	-0.08639 0.5508	-0.20054 0.1626	-0.44890 0.0011
Sechi **Sechi**	-0.02705 0.8521	1.00000	0.09628 0.5060	-0.38302 0.0060	-0.10951 0.4490	-0.27625 0.0521
DO **DO**	0.29356 0.0385	0.09628 0.5060	1.00000	-0.04386 0.7623	-0.22680 0.1132	-0.10481 0.4688
TP_mg_L_ **TP(mg/L)**	-0.08639 0.5508	-0.38302 0.0060	-0.04386 0.7623	1.00000	0.52216 0.0001	0.44441 0.0012
TKN__mg_L_ **TKN (mg/L)**	-0.20054 0.1626	-0.10951 0.4490	-0.22680 0.1132	0.52216 0.0001	1.00000	0.15580 0.2800
DP__mg_L_ **DP (mg/L)**	-0.44890 0.0011	-0.27625 0.0521	-0.10481 0.4688	0.44441 0.0012	0.15580 0.2800	1.00000
Chl_a__ug_L_ **Chl a (ug/L)**	0.15931 0.2691	-0.23411 0.1018	0.33450 0.0176	0.49010 0.0003	0.27446 0.0537	0.14835 0.3039
N_P **N/P**	-0.00779 0.9572	0.39340 0.0047	-0.10473 0.4692	-0.74545 <.0001	0.12189 0.3991	-0.37652 0.0070
TSIChl **TSIChl**	0.15931 0.2691	-0.23411 0.1018	0.33450 0.0176	0.49010 0.0003	0.27446 0.0537	0.14835 0.3039

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

Spearman Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
TSITP **TSITP**	-0.08639 0.5508	-0.38302 0.0060	-0.04386 0.7623	1.00000 <.0001	0.52216 0.0001	0.44441 0.0012

Spearman Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.15931 0.2691	-0.00779 0.9572	0.15931 0.2691	-0.08639 0.5508
Sechi **Sechi**	-0.23411 0.1018	0.39340 0.0047	-0.23411 0.1018	-0.38302 0.0060
DO **DO**	0.33450 0.0176	-0.10473 0.4692	0.33450 0.0176	-0.04386 0.7623
TP_mg_L_ **TP(mg/L)**	0.49010 0.0003	-0.74545 <.0001	0.49010 0.0003	1.00000 <.0001
TKN__mg_L_ **TKN (mg/L)**	0.27446 0.0537	0.12189 0.3991	0.27446 0.0537	0.52216 0.0001
DP__mg_L_ **DP (mg/L)**	0.14835 0.3039	-0.37652 0.0070	0.14835 0.3039	0.44441 0.0012
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000	-0.33210 0.0185	1.00000 <.0001	0.49010 0.0003

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION

The CORR Procedure

Spearman Partial Correlation Coefficients, N = 51 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.33210 0.0185	1.00000	-0.33210 0.0185	-0.74545 <.0001
TSIChl **TSIChl**	1.00000 <.0001	-0.33210 0.0185	1.00000	0.49010 0.0003
TSITP **TSITP**	0.49010 0.0003	-0.74545 <.0001	0.49010 0.0003	1.00000

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

1 Partial Variables:	Station
10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

Pearson Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000	-0.18717 0.3220	0.17564 0.3532	-0.11665 0.5393	-0.32431 0.0804	-0.19364 0.3052
Sechi **Sechi**	-0.18717 0.3220	1.00000	0.05802 0.7607	-0.15721 0.4067	-0.10383 0.5850	-0.07567 0.6910
DO **DO**	0.17564 0.3532	0.05802 0.7607	1.00000	0.09791 0.6067	-0.05426 0.7758	0.00613 0.9743
TP_mg_L_ **TP(mg/L)**	-0.11665 0.5393	-0.15721 0.4067	0.09791 0.6067	1.00000	0.52143 0.0031	0.61046 0.0003
TKN__mg_L_ **TKN (mg/L)**	-0.32431 0.0804	-0.10383 0.5850	-0.05426 0.7758	0.52143 0.0031	1.00000	-0.07526 0.6926
DP__mg_L_ **DP (mg/L)**	-0.19364 0.3052	-0.07567 0.6910	0.00613 0.9743	0.61046 0.0003	-0.07526 0.6926	1.00000
Chl_a__ug_L_ **Chl a (ug/L)**	-0.14788 0.4355	-0.18708 0.3222	0.20410 0.2793	0.49600 0.0053	0.67079 <.0001	-0.02014 0.9159
N_P **N/P**	0.05352 0.7788	0.08413 0.6585	-0.26360 0.1593	-0.72307 <.0001	-0.17206 0.3633	-0.44910 0.0128

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

Pearson Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
TSIChl **TSIChl**	-0.03110 0.8704	-0.09782 0.6071	0.12042 0.5262	0.50933 0.0040	0.60478 0.0004	0.07483 0.6943
TSITP **TSITP**	-0.18045 0.3400	-0.11277 0.5530	0.09019 0.6355	0.94177 <.0001	0.59428 0.0005	0.48015 0.0072

Pearson Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.14788 0.4355	0.05352 0.7788	-0.03110 0.8704	-0.18045 0.3400
Sechi **Sechi**	-0.18708 0.3222	0.08413 0.6585	-0.09782 0.6071	-0.11277 0.5530
DO **DO**	0.20410 0.2793	-0.26360 0.1593	0.12042 0.5262	0.09019 0.6355
TP_mg_L_ **TP(mg/L)**	0.49600 0.0053	-0.72307 <.0001	0.50933 0.0040	0.94177 <.0001
TKN__mg_L_ **TKN (mg/L)**	0.67079 <.0001	-0.17206 0.3633	0.60478 0.0004	0.59428 0.0005

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

Pearson Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
DP__mg_L_ **DP (mg/L)**	-0.02014 0.9159	-0.44910 0.0128	0.07483 0.6943	0.48015 0.0072
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000	-0.27413 0.1427	0.87123 <.0001	0.51521 0.0036
N_P **N/P**	-0.27413 0.1427	1.00000	-0.24624 0.1896	-0.81811 <.0001
TSIChl **TSIChl**	0.87123 <.0001	-0.24624 0.1896	1.00000	0.53513 0.0023
TSITP **TSITP**	0.51521 0.0036	-0.81811 <.0001	0.53513 0.0023	1.00000

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

Spearman Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000	0.09712 0.6097	0.32198 0.0827	-0.25095 0.1810	-0.37753 0.0397	-0.63788 0.0001
Sechi **Sechi**	0.09712 0.6097	1.00000	-0.05258 0.7826	-0.25423 0.1752	-0.31073 0.0947	-0.20191 0.2846
DO **DO**	0.32198 0.0827	-0.05258 0.7826	1.00000	0.07138 0.7078	-0.23886 0.2037	0.03737 0.8446
TP_mg_L_ **TP(mg/L)**	-0.25095 0.1810	-0.25423 0.1752	0.07138 0.7078	1.00000	0.65507 <.0001	0.53727 0.0022
TKN__mg_L_ **TKN (mg/L)**	-0.37753 0.0397	-0.31073 0.0947	-0.23886 0.2037	0.65507 <.0001	1.00000	0.36553 0.0470
DP__mg_L_ **DP (mg/L)**	-0.63788 0.0001	-0.20191 0.2846	0.03737 0.8446	0.53727 0.0022	0.36553 0.0470	1.00000
Chl_a__ug_L_ **Chl a (ug/L)**	-0.20953 0.2664	-0.29775 0.1100	0.20820 0.2696	0.56678 0.0011	0.57432 0.0009	0.30794 0.0978
N_P **N/P**	0.02275 0.9050	0.11943 0.5296	-0.18997 0.3147	-0.81583 <.0001	-0.21895 0.2451	-0.39343 0.0315

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

Spearman Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
TSIChl **TSIChl**	-0.20953 0.2664	-0.29775 0.1100	0.20820 0.2696	0.56678 0.0011	0.57432 0.0009	0.30794 0.0978
TSITP **TSITP**	-0.25095 0.1810	-0.25423 0.1752	0.07138 0.7078	1.00000 <.0001	0.65507 <.0001	0.53727 0.0022

Spearman Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.20953 0.2664	0.02275 0.9050	-0.20953 0.2664	-0.25095 0.1810
Sechi **Sechi**	-0.29775 0.1100	0.11943 0.5296	-0.29775 0.1100	-0.25423 0.1752
DO **DO**	0.20820 0.2696	-0.18997 0.3147	0.20820 0.2696	0.07138 0.7078
TP_mg_L_ **TP(mg/L)**	0.56678 0.0011	-0.81583 <.0001	0.56678 0.0011	1.00000 <.0001
TKN__mg_L_ **TKN (mg/L)**	0.57432 0.0009	-0.21895 0.2451	0.57432 0.0009	0.65507 <.0001

Partial correlation adjusted for station effect

PARTIAL CORRELATION CONTROLED BY STATION SECHI>=1

The CORR Procedure

Spearman Partial Correlation Coefficients, N = 31 Prob > |r| under H0: Partial Rho=0				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
DP__mg_L_ **DP (mg/L)**	0.30794 0.0978	-0.39343 0.0315	0.30794 0.0978	0.53727 0.0022
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000	-0.36915 0.0447	1.00000 <.0001	0.56678 0.0011
N_P **N/P**	-0.36915 0.0447	1.00000	-0.36915 0.0447	-0.81583 <.0001
TSIChl **TSIChl**	1.00000 <.0001	-0.36915 0.0447	1.00000	0.56678 0.0011
TSITP **TSITP**	0.56678 0.0011	-0.81583 <.0001	0.56678 0.0011	1.00000

Partial correlation adjusted for station effect

CORRELATION BY STATION

The CORR Procedure

station=1

10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

CORRELATION BY STATION

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 35	0.06288 0.74133 30	0.29087 0.13328	-0.21398 0.21713 35	-0.06152 0.72553 35	-0.25211 0.15033 34
Sechi **Sechi**	0.06288 0.74133 30	1.00000 84	0.18990 0.14975 59	-0.23154 0.03418 84	-0.22982 0.03558 84	-0.26832 0.01428 83
DO **DO**	0.29087 0.13328	0.18990 0.14975 59	1.00000 61	0.08623 0.50886 61	0.01560 0.90506 61	-0.12158 0.35486 60
TP_mg_L_ **TP(mg/L)**	-0.21398 0.21713 35	-0.23154 0.03418 84	0.08623 0.50886 61	1.00000 110	0.44373 <.0001 110	0.62462 <.0001 109
TKN__mg_L_ **TKN (mg/L)**	-0.06152 0.72553 35	-0.22982 0.03558 84	0.01560 0.90506 61	0.44373 <.0001 110	1.00000 110	0.28580 0.00268 109
DP__mg_L_ **DP (mg/L)**	-0.25211 0.15033 34	-0.26832 0.01428 83	-0.12158 0.35486 60	0.62462 <.0001 109	0.28580 0.00268 109	1.00000 109
Chl_a__ug_L_ **Chl a (ug/L)**	0.33106 0.06423 32	-0.17459 0.12387 79	0.13463 0.30516 60	0.88163 <.0001 93	0.37326 0.00026 93	0.35666 0.00056 92

CORRELATION BY STATION

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
N_P **N/P**	0.18791 0.279735	0.28722 0.008184	-0.07578 0.561661	-0.34579 0.0002 110	0.12051 0.2098 110	-0.36237 0.0001 109
TSIChl **TSIChl**	0.26873 0.137032	-0.28088 0.012279	0.15119 0.248960	0.40802 <.0001 93	0.40146 <.0001 93	0.09101 0.3882 92
TSITP **TSITP**	-0.20886 0.228635	-0.40222 0.000184	0.11252 0.387961	0.68026 <.0001 110	0.57550 <.0001 110	0.58510 <.0001 109

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.33106 0.064232	0.18791 0.279735	0.26873 0.137032	-0.20886 0.228635
Sechi **Sechi**	-0.17459 0.123879	0.28722 0.008184	-0.28088 0.012279	-0.40222 0.000184

CORRELATION BY STATION

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
DO **DO**	0.13463 0.3051 60	-0.07578 0.5616 61	0.15119 0.2489 60	0.11252 0.3879 61
TP_mg_L_ **TP(mg/L)**	0.88163 <.0001 93	-0.34579 0.0002 110	0.40802 <.0001 93	0.68026 <.0001 110
TKN__mg_L_ **TKN (mg/L)**	0.37326 0.0002 93	0.12051 0.2098 110	0.40146 <.0001 93	0.57550 <.0001 110
DP__mg_L_ **DP (mg/L)**	0.35666 0.0005 92	-0.36237 0.0001 109	0.09101 0.3882 92	0.58510 <.0001 109
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 93	-0.21586 0.0377 93	0.60292 <.0001 93	0.50284 <.0001 93
N_P **N/P**	-0.21586 0.0377 93	1.00000 110	-0.26598 0.0100 93	-0.63226 <.0001 110

CORRELATION BY STATION

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
TSIChl **TSIChl**	0.60292 <.0001 93	-0.26598 0.0100 93	1.00000 93	0.49630 <.0001 93
TSITP **TSITP**	0.50284 <.0001 93	-0.63226 <.0001 110	0.49630 <.0001 93	1.00000 110

CORRELATION BY STATION

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 35	0.07300 0.7015 30	0.23765 0.2233 28	-0.23284 0.1783 35	-0.15648 0.3694 35	-0.22582 0.1991 34
Sechi **Sechi**	0.07300 0.7015 30	1.00000 84	0.15098 0.2537 59	-0.47128 <.0001 84	-0.28041 0.0098 84	-0.35714 0.0009 83
DO **DO**	0.23765 0.2233 28	0.15098 0.2537 59	1.00000 61	0.04759 0.7157 61	-0.01046 0.9362 61	-0.01585 0.9043 60
TP_mg_L_ **TP(mg/L)**	-0.23284 0.1783 35	-0.47128 <.0001 84	0.04759 0.7157 61	1.00000 110	0.56719 <.0001 110	0.45886 <.0001 109
TKN__mg_L_ **TKN (mg/L)**	-0.15648 0.3694 35	-0.28041 0.0098 84	-0.01046 0.9362 61	0.56719 <.0001 110	1.00000 110	0.09075 0.3480 109
DP__mg_L_ **DP (mg/L)**	-0.22582 0.1991 34	-0.35714 0.0009 83	-0.01585 0.9043 60	0.45886 <.0001 109	0.09075 0.3480 109	1.00000 109
Chl_a__ug_L_ **Chl a (ug/L)**	0.24947 0.1685 32	-0.34679 0.0017 79	0.17594 0.1787 60	0.46075 <.0001 93	0.36241 0.0004 93	0.21907 0.0359 92

CORRELATION BY STATION

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
N_P **N/P**	0.16052 0.35703 5	0.40853 0.00018 4	-0.01917 0.88346 1	-0.69718 <.0001 110	0.08001 0.40601 10	-0.47442 <.0001 109
TSIChl **TSIChl**	0.24947 0.16853 2	-0.34679 0.00177 9	0.17594 0.17876 0	0.46075 <.0001 93	0.36241 0.00049 3	0.21907 0.03599 2
TSITP **TSITP**	-0.23284 0.17833 5	-0.47128 <.0001 84	0.04759 0.71576 1	1.00000 <.0001 110	0.56719 <.0001 10	0.45886 <.0001 109

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.24947 0.16853 2	0.16052 0.35703 5	0.24947 0.16853 2	-0.23284 0.17833 5
Sechi **Sechi**	-0.34679 0.00177 9	0.40853 0.00018 4	-0.34679 0.00177 9	-0.47128 <.0001 84

CORRELATION BY STATION

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
DO **DO**	0.17594 0.1787 60	-0.0191 7 0.8834 61	0.17594 0.1787 60	0.04759 0.7157 61
TP_mg_L_ **TP(mg/L)**	0.46075 <.0001 93	-0.6971 8 <.0001 110	0.46075 <.0001 93	1.00000 <.0001 110
TKN__mg_L_ **TKN (mg/L)**	0.36241 0.0004 93	0.08001 0.4060 110	0.36241 0.0004 93	0.56719 <.0001 110
DP__mg_L_ **DP (mg/L)**	0.21907 0.0359 92	-0.4744 2 <.0001 109	0.21907 0.0359 92	0.45886 <.0001 109
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 93	-0.2925 3 0.0044 93	1.00000 <.0001 93	0.46075 <.0001 93
N_P **N/P**	-0.29253 0.0044 93	1.00000 110	-0.2925 3 0.0044 93	-0.6971 8 <.0001 110

CORRELATION BY STATION

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
TSIChl **TSIChl**	1.00000 <.0001 93	-0.29253 0.0044 93	1.00000 93	0.46075 <.0001 93
TSITP **TSITP**	0.46075 <.0001 93	-0.69718 <.0001 110	0.46075 <.0001 93	1.00000 110

CORRELATION BY STATION

The CORR Procedure

station=2

10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

CORRELATION BY STATION

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 13	-0.45788 0.1833 10	0.10008 0.7570 12	0.30472 0.3114 13	-0.26485 0.3819 13	-0.25035 0.4094 13
Sechi **Sechi**	-0.45788 0.1833 10	1.00000 43	0.06903 0.7271 28	-0.39061 0.0096 43	-0.35690 0.0188 43	-0.29579 0.0541 43
DO **DO**	0.10008 0.7570 12	0.06903 0.7271 28	1.00000 30	0.05575 0.7698 30	-0.07600 0.6898 30	-0.04182 0.8263 30
TP_mg_L_ **TP(mg/L)**	0.30472 0.3114 13	-0.39061 0.0096 43	0.05575 0.7698 30	1.00000 61	0.51492 <.0001 61	0.50547 <.0001 61
TKN__mg_L_ **TKN (mg/L)**	-0.26485 0.3819 13	-0.35690 0.0188 43	-0.07600 0.6898 30	0.51492 <.0001 61	1.00000 61	0.32706 0.0101 61
DP__mg_L_ **DP (mg/L)**	-0.25035 0.4094 13	-0.29579 0.0541 43	-0.04182 0.8263 30	0.50547 <.0001 61	0.32706 0.0101 61	1.00000 61

CORRELATION BY STATION

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	0.26422 0.4066 12	-0.28004 0.07254 2	0.13919 0.46323 0	0.43820 0.0013 51	0.29596 0.0350 51	0.40550 0.0032 51
N_P **N/P**	-0.41438 0.1592 13	0.12704 0.4169 43	-0.19182 0.3099 30	-0.46072 0.0002 61	0.28786 0.0245 61	-0.13738 0.2911 61
TSIChl **TSIChl**	0.06681 0.8365 12	-0.24991 0.1105 42	0.13953 0.4621 30	0.39888 0.0037 51	0.27909 0.0473 51	0.33848 0.0151 51
TSITP **TSITP**	0.18083 0.5544 13	-0.37983 0.0120 43	0.13610 0.4733 30	0.91242 <.0001 61	0.62030 <.0001 61	0.37699 0.0027 61

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.26422 0.4066 12	-0.41438 0.1592 13	0.06681 0.8365 12	0.18083 0.5544 13

CORRELATION BY STATION

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.28004 0.0725 42	0.1270 4 0.4169 43	- 0.2499 1 0.1105 42	- 0.3798 3 0.0120 43
DO **DO**	0.13919 0.4632 30	- 0.1918 2 0.3099 30	0.1395 3 0.4621 30	0.1361 0 0.4733 30
TP_mg_L_ **TP(mg/L)**	0.43820 0.0013 51	- 0.4607 2 0.0002 61	0.3988 8 0.0037 51	0.9124 2 <.0001 61
TKN__mg_L_ **TKN (mg/L)**	0.29596 0.0350 51	0.2878 6 0.0245 61	0.2790 9 0.0473 51	0.6203 0 <.0001 61
DP__mg_L_ **DP (mg/L)**	0.40550 0.0032 51	- 0.1373 8 0.2911 61	0.3384 8 0.0151 51	0.3769 9 0.0027 61
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 51	- 0.2024 5 0.1542 51	0.7771 7 <.0001 51	0.4334 3 0.0015 51

CORRELATION BY STATION

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.20245 0.1542 51	1.00000 61	-0.21249 0.13445 1	-0.45223 0.00036 1
TSIChl **TSIChl**	0.77717 <.0001 51	-0.21249 0.13445 1	1.00000 51	0.45699 0.00075 1
TSITP **TSITP**	0.43343 0.0015 51	-0.45223 0.00036 1	0.45699 0.00075 1	1.00000 61

CORRELATION BY STATION

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 13	-0.20374 0.5724 10	0.04196 0.8970 12	0.23077 0.4481 13	-0.19231 0.5291 13	-0.50794 0.0764 13
Sechi **Sechi**	-0.20374 0.5724 10	1.00000 43	0.09303 0.6378 28	-0.45242 0.0023 43	-0.43270 0.0038 43	-0.28778 0.0613 43
DO **DO**	0.04196 0.8970 12	0.09303 0.6378 28	1.00000 30	0.13662 0.4716 30	-0.10080 0.5961 30	-0.01519 0.9365 30
TP_mg_L_ **TP(mg/L)**	0.23077 0.4481 13	-0.45242 0.0023 43	0.13662 0.4716 30	1.00000 61	0.53930 <.0001 61	0.14879 0.2524 61
TKN__mg_L_ **TKN (mg/L)**	-0.19231 0.5291 13	-0.43270 0.0038 43	-0.10080 0.5961 30	0.53930 <.0001 61	1.00000 61	0.15910 0.2207 61
DP__mg_L_ **DP (mg/L)**	-0.50794 0.0764 13	-0.28778 0.0613 43	-0.01519 0.9365 30	0.14879 0.2524 61	0.15910 0.2207 61	1.00000 61

CORRELATION BY STATION

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	-0.14685 0.64881 12	-0.36069 0.01894 2	0.28015 0.13383 0	0.45282 0.00085 1	0.20752 0.14405 1	0.41908 0.00225 1
N_P **N/P**	-0.49451 0.08581 3	0.21276 0.17074 3	-0.09858 0.60433 0	-0.41581 0.00096 1	0.41014 0.00106 1	-0.10337 0.42796 1
TSIChl **TSIChl**	-0.14685 0.64881 2	-0.36069 0.01894 2	0.28015 0.13383 0	0.45282 0.00085 1	0.20752 0.14405 1	0.41908 0.00225 1
TSITP **TSITP**	0.23077 0.44813 3	-0.45242 0.00234 3	0.13662 0.47163 0	1.00000 <.0001 1	0.53930 <.0001 1	0.14879 0.25241 1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.14685 0.64881 12	-0.49451 0.08581 3	-0.14685 0.64881 2	0.23077 0.44813 3

CORRELATION BY STATION

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.36069 0.0189 42	0.2127 6 0.1707 43	- 0.3606 9 0.0189 42	- 0.4524 2 0.0023 43
DO **DO**	0.28015 0.1338 30	- 0.0985 8 0.6043 30	0.2801 5 0.1338 30	0.1366 2 0.4716 30
TP_mg_L_ **TP(mg/L)**	0.45282 0.0008 51	- 0.4158 1 0.0009 61	0.4528 2 0.0008 51	1.0000 0 <.0001 61
TKN__mg_L_ **TKN (mg/L)**	0.20752 0.1440 51	0.4101 4 0.0010 61	0.2075 2 0.1440 51	0.5393 0 <.0001 61
DP__mg_L_ **DP (mg/L)**	0.41908 0.0022 51	- 0.1033 7 0.4279 61	0.4190 8 0.0022 51	0.1487 9 0.2524 61
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 51	- 0.2217 2 0.1179 51	1.0000 0 <.0001 51	0.4528 2 0.0008 51

CORRELATION BY STATION

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.22172 0.1179 51	1.0000 0 61	- 0.2217 2 0.1179 51	- 0.4158 1 0.0009 61
TSIChl **TSIChl**	1.00000 <.0001 51	- 0.2217 2 0.1179 51	1.0000 0 51	0.4528 2 0.0008 51
TSITP **TSITP**	0.45282 0.0008 51	- 0.4158 1 0.0009 61	0.4528 2 0.0008 51	1.0000 0 61

CORRELATION BY STATION

The CORR Procedure

station=3

10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

CORRELATION BY STATION

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 22	-0.22327 0.373218	0.44855 0.054119	0.09036 0.689222	0.03538 0.875822	-0.33654 0.135821
Sechi **Sechi**	-0.22327 0.373218	1.00000 80	0.00071 0.996247	-0.15020 0.183680	-0.26005 0.019880	-0.07987 0.484179
DO **DO**	0.44855 0.054119	0.00071 0.996247	1.00000 52	-0.02836 0.841852	-0.26130 0.061352	0.00052 0.997151
TP_mg_L_ **TP(mg/L)**	0.09036 0.689222	-0.15020 0.183680	-0.02836 0.841852	1.00000 113	0.49770 <.0001 113	0.39176 <.0001 112
TKN__mg_L_ **TKN (mg/L)**	0.03538 0.875822	-0.26005 0.019880	-0.26130 0.061352	0.49770 <.0001 113	1.00000 113	0.01772 0.8529 112
DP__mg_L_ **DP (mg/L)**	-0.33654 0.135821	-0.07987 0.484179	0.00052 0.997151	0.39176 <.0001 112	0.01772 0.8529 112	1.00000 112

CORRELATION BY STATION

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	0.16512 0.48662 20	-0.24608 0.03727 20	0.13549 0.34325 20	0.22821 0.02619 95	0.16994 0.09979 95	-0.03081 0.76829 94
N_P **N/P**	0.03456 0.87872 22	-0.02818 0.80408 22	-0.21115 0.13295 22	-0.46146 <.0001 113	0.36857 <.0001 113	-0.31334 0.00080 112
TSIChl **TSIChl**	0.16477 0.48762 20	-0.14485 0.22472 20	0.19228 0.17645 20	0.16854 0.10259 95	0.10982 0.28949 95	-0.00383 0.97080 94
TSITP **TSITP**	0.11206 0.61952 22	-0.18790 0.09518 20	0.04930 0.72865 22	0.92027 <.0001 113	0.53432 <.0001 113	0.33490 0.00030 112

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.16512 0.48662 20	0.03456 0.87872 22	0.16477 0.48762 20	0.11206 0.61952 22

CORRELATION BY STATION

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.24608 0.0372 72	-0.02818 0.80408 80	-0.14485 0.22472 72	-0.18790 0.09518 80
DO **DO**	0.13549 0.34325 1	-0.21115 0.13295 2	0.19228 0.17645 1	0.04930 0.72865 2
TP_mg_L_ **TP(mg/L)**	0.22821 0.02619 5	-0.46146 <.0001 113	0.16854 0.10259 5	0.92027 <.0001 113
TKN__mg_L_ **TKN (mg/L)**	0.16994 0.09975 5	0.36857 <.0001 113	0.10982 0.28945 5	0.53432 <.0001 113
DP__mg_L_ **DP (mg/L)**	-0.03081 0.76829 4	-0.31334 0.00081 12	-0.00383 0.97089 4	0.33490 0.00031 12
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 5	-0.14858 0.15079 5	0.85579 <.0001 5	0.30022 0.00315 5

CORRELATION BY STATION

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.14858 0.1507 95	1.0000 0 113	- 0.1638 3 0.1127 95	- 0.4818 7 <.0001 113
TSIChl **TSIChl**	0.85579 <.0001 95	- 0.1638 3 0.1127 95	1.0000 0 95	0.2751 5 0.0070 95
TSITP **TSITP**	0.30022 0.0031 95	- 0.4818 7 <.0001 113	0.2751 5 0.0070 95	1.0000 0 113

CORRELATION BY STATION

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 22	-0.13551 0.59191 8	0.46444 0.04511 9	0.22373 0.31692 2	0.01300 0.95422	-0.37909 0.09012 1
Sechi **Sechi**	-0.13551 0.59191 8	1.00000 80	0.07296 0.62604 7	-0.27341 0.01418 0	-0.31859 0.00408 0	0.07504 0.51107 9
DO **DO**	0.46444 0.04511 9	0.07296 0.62604 7	1.00000 52	0.11647 0.41095 2	-0.20444 0.14605 2	0.12449 0.38415 1
TP_mg_L_ **TP(mg/L)**	0.22373 0.31692 2	-0.27341 0.01418 0	0.11647 0.41095 2	1.00000 113	0.53958 <.0001 113	0.15907 0.09391 12
TKN__mg_L_ **TKN (mg/L)**	0.01300 0.95422	-0.31859 0.00408 0	-0.20444 0.14605 2	0.53958 <.0001 113	1.00000 113	-0.09569 0.31561 12
DP__mg_L_ **DP (mg/L)**	-0.37909 0.09012 1	0.07504 0.51107 9	0.12449 0.38415 1	0.15907 0.09391 12	-0.09569 0.31561 12	1.00000 112

CORRELATION BY STATION

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	0.09330 0.6956 20	-0.19440 0.1018 72	0.22251 0.1166 51	0.29691 0.0035 95	0.16521 0.1096 95	0.06120 0.5579 94
N_P **N/P**	-0.07456 0.7416 22	0.01239 0.9132 80	-0.17237 0.2217 52	-0.49532 <.0001 113	0.33209 0.0003 113	-0.26438 0.0049 112
TSIChl **TSIChl**	0.09330 0.6956 20	-0.19440 0.1018 72	0.22251 0.1166 51	0.29691 0.0035 95	0.16521 0.1096 95	0.06120 0.5579 94
TSITP **TSITP**	0.22373 0.3169 22	-0.27341 0.0141 80	0.11647 0.4109 52	1.00000 <.0001 113	0.53958 <.0001 113	0.15907 0.0939 112

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	0.09330 0.6956 20	-0.07456 0.7416 22	0.09330 0.6956 20	0.22373 0.3169 22

CORRELATION BY STATION

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.19440 0.1018 72	0.0123 9 0.9132 80	- 0.1944 0 0.1018 72	- 0.2734 1 0.0141 80
DO **DO**	0.22251 0.1166 51	- 0.1723 7 0.2217 52	0.2225 1 0.1166 51	0.1164 7 0.4109 52
TP_mg_L_ **TP(mg/L)**	0.29691 0.0035 95	- 0.4953 2 <.0001 113	0.2969 1 0.0035 95	1.0000 0 <.0001 113
TKN__mg_L_ **TKN (mg/L)**	0.16521 0.1096 95	0.3320 9 0.0003 113	0.1652 1 0.1096 95	0.5395 8 <.0001 113
DP__mg_L_ **DP (mg/L)**	0.06120 0.5579 94	- 0.2643 8 0.0049 112	0.0612 0 0.5579 94	0.1590 7 0.0939 112
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 95	- 0.1975 1 0.0550 95	1.0000 0 <.0001 95	0.2969 1 0.0035 95

CORRELATION BY STATION

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.19751 0.0550 95	1.0000 0 113	- 0.1975 1 0.0550 95	- 0.4953 2 <.0001 113
TSIChl **TSIChl**	1.00000 <.0001 95	- 0.1975 1 0.0550 95	1.0000 0 95	0.2969 1 0.0035 95
TSITP **TSITP**	0.29691 0.0035 95	- 0.4953 2 <.0001 113	0.2969 1 0.0035 95	1.0000 0 113

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 13	0.16971 0.5794 13	0.17814 0.5604 13	-0.21156 0.4878 13	-0.29059 0.3355 13	-0.15578 0.6288 12
Sechi **Sechi**	0.16971 0.5794 13	1.00000 41	0.16750 0.3763 30	-0.14445 0.3676 41	-0.23350 0.1418 41	-0.11552 0.4778 40
DO **DO**	0.17814 0.5604 13	0.16750 0.3763 30	1.00000 30	0.30700 0.0989 30	0.07235 0.7040 30	0.06432 0.7403 29
TP_mg_L_ **TP(mg/L)**	-0.21156 0.4878 13	-0.14445 0.3676 41	0.30700 0.0989 30	1.00000 41	0.36653 0.0184 41	0.61690 <.0001 40
TKN__mg_L_ **TKN (mg/L)**	-0.29059 0.3355 13	-0.23350 0.1418 41	0.07235 0.7040 30	0.36653 0.0184 41	1.00000 41	0.03882 0.8120 40
DP__mg_L_ **DP (mg/L)**	-0.15578 0.6288 12	-0.11552 0.4778 40	0.06432 0.7403 29	0.61690 <.0001 40	0.03882 0.8120 40	1.00000 40
Chl_a__ug_L_ **Chl a (ug/L)**	-0.22656 0.4789 12	-0.11844 0.4727 39	0.07463 0.7004 29	0.58860 <.0001 39	0.65086 <.0001 39	0.20808 0.2100 38

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
N_P **N/P**	0.34219 0.25241 3	-0.01381 0.93174 1	-0.13793 0.46733 0	-0.61413 <.0001 41	0.16433 0.30464 1	-0.35316 0.02544 0
TSIChl **TSIChl**	0.05010 0.87711 2	-0.04482 0.78643 9	0.09319 0.63062 9	0.61153 <.0001 39	0.54720 0.00033 9	0.29707 0.07013 8
TSITP **TSITP**	-0.33590 0.26181 3	-0.13245 0.40914 1	0.29395 0.11493 0	0.94135 <.0001 41	0.43986 0.00404 1	0.53230 0.00044 0

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.22656 0.47891 2	0.34219 0.25241 3	0.05010 0.87711 2	-0.33590 0.26181 3
Sechi **Sechi**	-0.11844 0.47273 9	-0.01381 0.93174 1	-0.04482 0.78643 9	-0.13245 0.40914 1

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
DO **DO**	0.07463 0.7004 29	- 0.1379 3 0.4673 30	0.0931 9 0.6306 29	0.2939 5 0.1149 30
TP_mg_L_ **TP(mg/L)**	0.58860 <.0001 39	- 0.6141 3 <.0001 41	0.6115 3 <.0001 39	0.9413 5 <.0001 41
TKN__mg_L_ **TKN (mg/L)**	0.65086 <.0001 39	0.1643 3 0.3046 41	0.5472 0 0.0003 39	0.4398 6 0.0040 41
DP__mg_L_ **DP (mg/L)**	0.20808 0.2100 38	- 0.3531 6 0.0254 40	0.2970 7 0.0701 38	0.5323 0 0.0004 40
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 39	- 0.2394 9 0.1420 39	0.8543 8 <.0001 39	0.5796 8 0.0001 39
N_P **N/P**	-0.23949 0.1420 39	1.0000 0 41	- 0.3099 8 0.0548 39	- 0.7046 9 <.0001 41

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
TSIChl **TSIChl**	0.85438 <.0001 39	-0.30998 0.0548 39	1.00000 39	0.62987 <.0001 39
TSITP **TSITP**	0.57968 0.0001 39	-0.70469 <.0001 41	0.62987 <.0001 39	1.00000 41

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 13	0.24414 0.4215 13	0.00551 0.9857 13	-0.33288 0.2664 13	-0.26685 0.3781 13	-0.51489 0.0867 12
Sechi **Sechi**	0.24414 0.4215 13	1.00000 41	-0.13838 0.4659 30	-0.18885 0.2370 41	-0.23650 0.1366 41	0.00665 0.9675 40
DO **DO**	0.00551 0.9857 13	-0.13838 0.4659 30	1.00000 30	0.24591 0.1902 30	0.26906 0.1505 30	0.27473 0.1492 29
TP_mg_L_ **TP(mg/L)**	-0.33288 0.2664 13	-0.18885 0.2370 41	0.24591 0.1902 30	1.00000 41	0.52490 0.0004 41	0.57251 0.0001 40
TKN__mg_L_ **TKN (mg/L)**	-0.26685 0.3781 13	-0.23650 0.1366 41	0.26906 0.1505 30	0.52490 0.0004 41	1.00000 41	0.28228 0.0776 40
DP__mg_L_ **DP (mg/L)**	-0.51489 0.0867 12	0.00665 0.9675 40	0.27473 0.1492 29	0.57251 0.0001 40	0.28228 0.0776 40	1.00000 40

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	-0.06305 0.8457 12	0.01287 0.9380 39	0.16188 0.4015 29	0.68071 <.0001 39	0.47128 0.0025 39	0.50570 0.0012 38
N_P **N/P**	0.19257 0.5285 13	0.05706 0.7231 41	-0.00289 0.9879 30	-0.78407 <.0001 41	0.00479 0.9763 41	-0.32840 0.0386 40
TSIChl **TSIChl**	-0.06305 0.8457 12	0.01287 0.9380 39	0.16188 0.4015 29	0.68071 <.0001 39	0.47128 0.0025 39	0.50570 0.0012 38
TSITP **TSITP**	-0.33288 0.2664 13	-0.18885 0.2370 41	0.24591 0.1902 30	1.00000 <.0001 41	0.52490 0.0004 41	0.57251 0.0001 40

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.06305 0.8457 12	0.19257 0.5285 13	-0.06305 0.8457 12	-0.33288 0.2664 13

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	0.01287 0.9380 39	0.0570 6 0.7231 41	0.0128 7 0.9380 39	- 0.1888 5 0.2370 41
DO **DO**	0.16188 0.4015 29	- 0.0028 9 0.9879 30	0.1618 8 0.4015 29	0.2459 1 0.1902 30
TP_mg_L_ **TP(mg/L)**	0.68071 <.0001 39	- 0.7840 7 <.0001 41	0.6807 1 <.0001 39	1.0000 0 <.0001 41
TKN__mg_L_ **TKN (mg/L)**	0.47128 0.0025 39	0.0047 9 0.9763 41	0.4712 8 0.0025 39	0.5249 0 0.0004 41
DP__mg_L_ **DP (mg/L)**	0.50570 0.0012 38	- 0.3284 0 0.0386 40	0.5057 0 0.0012 38	0.5725 1 0.0001 40
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 39	- 0.4445 3 0.0046 39	1.0000 0 <.0001 39	0.6807 1 <.0001 39

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=1

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.44453 0.0046 39	1.0000 0 41	- 0.4445 3 0.0046 39	- 0.7840 7 <.0001 41
TSIChl **TSIChl**	1.00000 <.0001 39	- 0.4445 3 0.0046 39	1.0000 0 39	0.6807 1 <.0001 39
TSITP **TSITP**	0.68071 <.0001 39	- 0.7840 7 <.0001 41	0.6807 1 <.0001 39	1.0000 0 41

CORRELATION BY STATION
SECHI>=1

The CORR Procedure

station=2

10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 8	-0.32211 0.43658	0.11603 0.78448	0.22305 0.59548	-0.45111 0.26198	-0.60655 0.11098
Sechi **Sechi**	-0.32211 0.43658	1.00000 27	0.07118 0.77219	-0.03106 0.87782 7	-0.13505 0.50182 7	0.09433 0.63982 7
DO **DO**	0.11603 0.78448	0.07118 0.77219	1.00000 19	0.41996 0.07341 9	-0.07724 0.75331 9	0.11335 0.64401 9
TP_mg_L_ **TP(mg/L)**	0.22305 0.59548	-0.03106 0.87782 7	0.41996 0.07341 9	1.00000 27	0.31806 0.10592 7	0.33682 0.08582 7
TKN__mg_L_ **TKN (mg/L)**	-0.45111 0.26198	-0.13505 0.50182 7	-0.07724 0.75331 9	0.31806 0.10592 7	1.00000 27	0.31864 0.10532 7
DP__mg_L_ **DP (mg/L)**	-0.60655 0.11098	0.09433 0.63982 7	0.11335 0.64401 9	0.33682 0.08582 7	0.31864 0.10532 7	1.00000 27

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	-0.25757 0.5380 8	-0.07175 0.7276 26	0.14998 0.5400 19	0.48668 0.0117 26	0.31988 0.1111 26	0.27728 0.1702 26
N_P **N/P**	-0.39008 0.3394 8	-0.13564 0.4999 27	-0.37910 0.1094 19	-0.55254 0.0028 27	0.53101 0.0044 27	0.00133 0.9947 27
TSIChl **TSIChl**	-0.30826 0.4576 8	0.07172 0.7277 26	0.12481 0.6107 19	0.44652 0.0222 26	0.29342 0.1457 26	0.34085 0.0884 26
TSITP **TSITP**	0.11838 0.7801 8	-0.02197 0.9134 27	0.39670 0.0926 19	0.96927 <.0001 27	0.37475 0.0541 27	0.31622 0.1081 27

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.25757 0.5380 8	-0.39008 0.3394 8	-0.30826 0.4576 8	0.11838 0.7801 8

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.07175 0.7276 26	-0.13564 0.4999 27	0.07172 0.7277 26	-0.02197 0.9134 27
DO **DO**	0.14998 0.5400 19	-0.37910 0.1094 19	0.12481 0.6107 19	0.39670 0.0926 19
TP_mg_L_ **TP(mg/L)**	0.48668 0.0117 26	-0.55254 0.0028 27	0.44652 0.0222 26	0.96927 <.0001 27
TKN__mg_L_ **TKN (mg/L)**	0.31988 0.1111 26	0.53101 0.0044 27	0.29342 0.1457 26	0.37475 0.0541 27
DP__mg_L_ **DP (mg/L)**	0.27728 0.1702 26	0.00133 0.9947 27	0.34085 0.0884 26	0.31622 0.1081 27
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 26	-0.06322 0.7590 26	0.81472 <.0001 26	0.44513 0.0227 26

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.06322 0.7590 26	1.0000 0 27	- 0.0646 6 0.7537 26	- 0.5469 9 0.0032 27
TSIChl **TSIChl**	0.81472 <.0001 26	- 0.0646 6 0.7537 26	1.0000 0 26	0.4472 3 0.0220 26
TSITP **TSITP**	0.44513 0.0227 26	- 0.5469 9 0.0032 27	0.4472 3 0.0220 26	1.0000 0 27

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 8	0.13503 0.74998	0.33333 0.41988	-0.09524 0.82258	-0.28571 0.49278	-0.66712 0.07078
Sechi **Sechi**	0.13503 0.74998	1.00000 27	-0.10920 0.65631 19	-0.04613 0.81932 27	-0.22849 0.25172 27	0.02555 0.89942 27
DO **DO**	0.33333 0.41988	-0.10920 0.65631 19	1.00000 19	0.50088 0.02891 19	0.00000 1.00000 19	0.24890 0.30421 19
TP_mg_L_ **TP(mg/L)**	-0.09524 0.82258	-0.04613 0.81932 27	0.50088 0.02891 19	1.00000 27	0.31045 0.11502 27	0.38968 0.04452 27
TKN__mg_L_ **TKN (mg/L)**	-0.28571 0.49278	-0.22849 0.25172 27	0.00000 1.00000 19	0.31045 0.11502 27	1.00000 27	0.34022 0.08252 27
DP__mg_L_ **DP (mg/L)**	-0.66712 0.07078	0.02555 0.89942 27	0.24890 0.30421 19	0.38968 0.04452 27	0.34022 0.08252 27	1.00000 27

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	-0.69048 0.05808	-0.05894 0.774926	0.32646 0.172519	0.37712 0.0575 26	0.27150 0.1797 26	0.43723 0.0255 26
N_P **N/P**	-0.21429 0.61038	-0.14064 0.484127	-0.40456 0.085819	-0.51063 0.0065 27	0.58198 0.0014 27	0.06615 0.7431 27
TSIChl **TSIChl**	-0.69048 0.05808	-0.05894 0.774926	0.32646 0.172519	0.37712 0.0575 26	0.27150 0.1797 26	0.43723 0.0255 26
TSITP **TSITP**	-0.09524 0.82258	-0.04613 0.819327	0.50088 0.028919	1.00000 <.0001 27	0.31045 0.1150 27	0.38968 0.0445 27

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.69048 0.05808	-0.21429 0.61038	-0.69048 0.05808	-0.09524 0.82258

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.05894 0.7749 26	-0.14064 0.4841 27	-0.05894 0.7749 26	-0.04613 0.8193 27
DO **DO**	0.32646 0.1725 19	-0.40456 0.0858 19	0.32646 0.1725 19	0.50088 0.0289 19
TP_mg_L_ **TP(mg/L)**	0.37712 0.0575 26	-0.51063 0.0065 27	0.37712 0.0575 26	1.00000 <.0001 27
TKN__mg_L_ **TKN (mg/L)**	0.27150 0.1797 26	0.58198 0.0014 27	0.27150 0.1797 26	0.31045 0.1150 27
DP__mg_L_ **DP (mg/L)**	0.43723 0.0255 26	0.06615 0.7431 27	0.43723 0.0255 26	0.38968 0.0445 27
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 26	-0.02017 0.9221 26	1.00000 <.0001 26	0.37712 0.0575 26

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=2

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	-0.02017 0.9221 26	1.00000 27	-0.02017 0.9221 26	-0.51063 0.0065 27
TSIChl **TSIChl**	1.00000 <.0001 26	-0.02017 0.9221 26	1.00000 26	0.37712 0.0575 26
TSITP **TSITP**	0.37712 0.0575 26	-0.51063 0.0065 27	0.37712 0.0575 26	1.00000 27

CORRELATION BY STATION
SECHI>=1

The CORR Procedure

station=3

10 Variables:	pH Sechi DO TP_mg_L_ TKN__mg_L_ DP__mg_L_ Chl_a__ug_L_ N_P TSIChl TSITP

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 15	-0.27084 0.3289 15	0.36391 0.2216 13	-0.17437 0.5343 15	-0.29053 0.2935 15	-0.53603 0.0482 14
Sechi **Sechi**	-0.27084 0.3289 15	1.00000 67	-0.14278 0.3925 38	0.04453 0.7205 67	-0.13612 0.2721 67	0.08196 0.5130 66
DO **DO**	0.36391 0.2216 13	-0.14278 0.3925 38	1.00000 38	0.15587 0.3501 38	0.04997 0.7658 38	0.29856 0.0727 37
TP_mg_L_ **TP(mg/L)**	-0.17437 0.5343 15	0.04453 0.7205 67	0.15587 0.3501 38	1.00000 67	0.54461 <.0001 67	0.27387 0.0261 66
TKN__mg_L_ **TKN (mg/L)**	-0.29053 0.2935 15	-0.13612 0.2721 67	0.04997 0.7658 38	0.54461 <.0001 67	1.00000 67	0.09227 0.4612 66
DP__mg_L_ **DP (mg/L)**	-0.53603 0.0482 14	0.08196 0.5130 66	0.29856 0.0727 37	0.27387 0.0261 66	0.09227 0.4612 66	1.00000 66

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	-0.05384 0.85501 4	-0.14738 0.26116 60	0.18462 0.26723 8	0.17158 0.18996 0	0.28228 0.02896 0	0.02739 0.83685 9
N_P **N/P**	0.01436 0.95951 5	-0.14765 0.23316 7	-0.19561 0.23923 8	-0.49073 <.0001 67	0.30458 0.01226 7	-0.23898 0.05336 6
TSIChl **TSIChl**	-0.10293 0.72621 4	-0.03351 0.79946 0	0.17340 0.29783 8	0.12145 0.35536 0	0.23909 0.06586 0	0.05243 0.69339 9
TSITP **TSITP**	-0.14389 0.60895 5	0.02346 0.85056 7	0.21546 0.19393 8	0.89723 <.0001 67	0.51444 <.0001 7	0.30256 0.01356 6

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.05384 0.85501 4	0.01436 0.95951 5	-0.10293 0.72621 4	-0.14389 0.60895 5

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.14738 0.2611 60	-0.14765 0.2331 67	-0.03351 0.7994 60	0.02346 0.8505 67
DO **DO**	0.18462 0.2672 38	-0.19561 0.2392 38	0.17340 0.2978 38	0.21546 0.1939 38
TP_mg_L_ **TP(mg/L)**	0.17158 0.1899 60	-0.49073 <.0001 67	0.12145 0.3553 60	0.89723 <.0001 67
TKN__mg_L_ **TKN (mg/L)**	0.28228 0.0289 60	0.30458 0.0122 67	0.23909 0.0658 60	0.51444 <.0001 67
DP__mg_L_ **DP (mg/L)**	0.02739 0.8368 59	-0.23898 0.0533 66	0.05243 0.6933 59	0.30256 0.0135 66
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 60	0.00463 0.9720 60	0.87099 <.0001 60	0.26671 0.0394 60

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P **N/P**	0.00463 0.9720 60	1.0000 0 67	- 0.0201 5 0.8786 60	- 0.5966 5 <.0001 67
TSIChl **TSIChl**	0.87099 <.0001 60	- 0.0201 5 0.8786 60	1.0000 0 60	0.2573 5 0.0471 60
TSITP **TSITP**	0.26671 0.0394 60	- 0.5966 5 <.0001 67	0.2573 5 0.0471 60	1.0000 0 67

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
pH **pH**	1.00000 15	-0.14746 0.60001 15	0.34388 0.25001 13	-0.13118 0.64121 15	-0.17889 0.52351 15	-0.65191 0.01151 14
Sechi **Sechi**	-0.14746 0.60001 15	1.00000 67	-0.09086 0.58743 38	-0.03542 0.77601 67	-0.19867 0.10701 67	0.19190 0.12271 66
DO **DO**	0.34388 0.25001 13	-0.09086 0.58743 38	1.00000 38	0.21971 0.18501 38	-0.01401 0.93351 38	0.31801 0.05511 37
TP_mg_L_ **TP(mg/L)**	-0.13118 0.64121 15	-0.03542 0.77601 67	0.21971 0.18501 38	1.00000 67	0.55042 <.0001 67	0.25552 0.03841 66
TKN__mg_L_ **TKN (mg/L)**	-0.17889 0.52351 15	-0.19867 0.10701 67	-0.01401 0.93351 38	0.55042 <.0001 67	1.00000 67	0.07980 0.52421 66
DP__mg_L_ **DP (mg/L)**	-0.65191 0.01151 14	0.19190 0.12271 66	0.31801 0.05511 37	0.25552 0.03841 66	0.07980 0.52421 66	1.00000 66

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations						
	pH	**Sechi**	**DO**	**TP_mg_L_**	**TKN__mg_L_**	**DP__mg_L_**
Chl_a__ug_L_ **Chl a (ug/L)**	-0.23762 0.41331 4	-0.06835 0.60386 0	0.20842 0.20923 8	0.29836 0.02066 0	0.34534 0.00696 0	0.11047 0.40495 9
N_P **N/P**	-0.00715 0.97981 5	-0.12981 0.29516 7	-0.14613 0.38143 8	-0.67385 <.0001 67	0.13022 0.29367	-0.21437 0.08396 6
TSIChl **TSIChl**	-0.23762 0.41331 4	-0.06835 0.60386 0	0.20842 0.20923 8	0.29836 0.02066 0	0.34534 0.00696 0	0.11047 0.40495 9
TSITP **TSITP**	-0.13118 0.64121 5	-0.03542 0.77606 7	0.21971 0.18503 8	1.00000 <.0001 67	0.55042 <.0001 67	0.25552 0.03846 6

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
pH **pH**	-0.23762 0.41331 4	-0.00715 0.97981 5	-0.23762 0.41331 4	-0.13118 0.64121 5

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
Sechi **Sechi**	-0.06835 0.6038 60	-0.12981 0.2951 67	-0.06835 0.6038 60	-0.03542 0.7760 67
DO **DO**	0.20842 0.2092 38	-0.14613 0.3814 38	0.20842 0.2092 38	0.21971 0.1850 38
TP_mg_L_ **TP(mg/L)**	0.29836 0.0206 60	-0.67385 <.0001 67	0.29836 0.0206 60	1.00000 <.0001 67
TKN__mg_L_ **TKN (mg/L)**	0.34534 0.0069 60	0.13022 0.2936 67	0.34534 0.0069 60	0.55042 <.0001 67
DP__mg_L_ **DP (mg/L)**	0.11047 0.4049 59	-0.21437 0.0839 66	0.11047 0.4049 59	0.25552 0.0384 66
Chl_a__ug_L_ **Chl a (ug/L)**	1.00000 60	-0.09275 0.4809 60	1.00000 <.0001 60	0.29836 0.0206 60

CORRELATION BY STATION SECHI>=1

The CORR Procedure

station=3

Spearman Correlation Coefficients Prob > |r| under H0: Rho=0 Number of Observations				
	Chl_a__ug_L_	**N_P**	**TSIChl**	**TSITP**
N_P N/P	-0.09275 0.4809 60	1.0000 0 67	- 0.0927 5 0.4809 60	- 0.6738 5 <.0001 67
TSIChl TSIChl	1.00000 <.0001 60	- 0.0927 5 0.4809 60	1.0000 0 60	0.2983 6 0.0206 60
TSITP TSITP	0.29836 0.0206 60	- 0.6738 5 <.0001 67	0.2983 6 0.0206 60	1.0000 0 67

CORRELATION OF TD vs TP
DP>0.020

The CORR Procedure

2 Variables:	TP_mg_L_ DP__mg_L_

Pearson Correlation Coefficients, N = 31 Prob > |r| under H0: Rho=0		
	TP_mg_L_	**DP__mg_L_**
TP_mg_L_ TP(mg/L)	1.00000	0.55850 0.0011
DP__mg_L_ DP (mg/L)	0.55850 0.0011	1.00000

Spearman Correlation Coefficients, N = 31 Prob > |r| under H0: Rho=0		
	TP_mg_L_	**DP__mg_L_**
TP_mg_L_ TP(mg/L)	1.00000	0.72390 <.0001
DP__mg_L_ DP (mg/L)	0.72390 <.0001	1.00000

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
lake#					
1	pH	Mean	7.73	.	7.91
	CE	Mean	275.00	.	270.00
	Sechi	Mean	0.77	.	1.19
	DO	Mean	5.72	.	6.40
	TP(mg/L)	Mean	0.03	.	0.03
	TKN (mg/L)	Mean	0.53	.	0.50
	DP (mg/L)	Mean	0.01	.	0.01
	DOC (mg/L)	Mean	5.96	.	5.92
	Chl a (ug/L)	Mean	8.10	.	9.72
	N/P	Mean	17.60	.	16.74
	TSIChl	Mean	43.65	.	43.20
	TSITP	Mean	52.89	.	52.82
2	pH	Mean	8.73	.	8.53
	CE	Mean	.	.	.
	Sechi	Mean	1.16	.	1.76
	DO	Mean	9.75	.	9.11
	TP(mg/L)	Mean	0.07	.	0.04
	TKN (mg/L)	Mean	0.41	.	0.32
	DP (mg/L)	Mean	0.02	.	0.01
	DOC (mg/L)	Mean	5.64	.	5.82
	Chl a (ug/L)	Mean	17.94	.	15.39
	N/P	Mean	7.34	.	10.70
	TSIChl	Mean	53.78	.	50.59
	TSITP	Mean	63.46	.	54.57

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
3	pH	Mean	7.65	.	.
	CE	Mean	275.00	272.00	.
	Sechi	Mean	0.63	0.50	.
	DO	Mean	7.09	6.70	.
	TP(mg/L)	Mean	0.26	0.08	.
	TKN (mg/L)	Mean	0.59	0.48	.
	DP (mg/L)	Mean	0.12	0.03	.
	DOC (mg/L)	Mean	5.20	4.57	.
	Chl a (ug/L)	Mean	76.19	32.66	.
	N/P	Mean	3.19	7.26	.
	TSIChl	Mean	53.63	57.09	.
	TSITP	Mean	79.09	64.19	.
4	pH	Mean	8.02	.	7.96
	CE	Mean	.	.	.
	Sechi	Mean	1.20	.	1.34
	DO	Mean	6.74	.	6.94
	TP(mg/L)	Mean	0.01	.	0.01
	TKN (mg/L)	Mean	0.33	.	0.25
	DP (mg/L)	Mean	0.01	.	0.01
	DOC (mg/L)	Mean	3.06	.	3.04
	Chl a (ug/L)	Mean	2.46	.	2.59
	N/P	Mean	25.47	.	21.43
	TSIChl	Mean	36.68	.	38.52
	TSITP	Mean	40.81	.	40.24

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
5	**pH**	**Mean**	8.43	8.45	.
	CE	**Mean**	130.00	.	128.00
	Sechi	**Mean**	1.18	1.53	1.46
	DO	**Mean**	6.72	7.17	6.55
	TP(mg/L)	**Mean**	0.02	0.02	0.02
	TKN (mg/L)	**Mean**	0.25	0.25	0.27
	DP (mg/L)	**Mean**	0.01	0.00	0.01
	DOC (mg/L)	**Mean**	2.36	1.97	2.05
	Chl a (ug/L)	**Mean**	2.28	2.54	2.65
	N/P	**Mean**	15.50	12.76	16.86
	TSIChl	**Mean**	36.84	36.71	38.24
	TSITP	**Mean**	43.66	46.78	44.44
6	**pH**	**Mean**	8.57	8.48	8.43
	CE	**Mean**	.	.	.
	Sechi	**Mean**	0.79	1.25	1.20
	DO	**Mean**	7.16	6.28	7.70
	TP(mg/L)	**Mean**	0.04	0.03	0.03
	TKN (mg/L)	**Mean**	0.46	0.38	0.32
	DP (mg/L)	**Mean**	0.01	0.01	0.01
	DOC (mg/L)	**Mean**	3.53	3.13	2.68
	Chl a (ug/L)	**Mean**	23.02	9.48	11.58
	N/P	**Mean**	12.89	14.84	13.60
	TSIChl	**Mean**	55.28	49.27	51.38
	TSITP	**Mean**	56.70	52.54	49.84

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
7	pH	Mean	7.34	9.02	8.23
	CE	Mean	225.00	215.00	216.00
	Sechi	Mean	0.69	1.06	1.28
	DO	Mean	6.83	7.24	7.42
	TP(mg/L)	Mean	0.05	0.05	0.02
	TKN (mg/L)	Mean	0.45	0.45	0.36
	DP (mg/L)	Mean	0.01	0.01	0.01
	DOC (mg/L)	Mean	3.32	3.13	2.95
	Chl a (ug/L)	Mean	18.89	11.57	12.17
	N/P	Mean	10.10	10.42	16.64
	TSIChl	Mean	55.56	51.68	51.61
	TSITP	Mean	58.53	58.44	48.02
8	pH	Mean	7.92	.	8.30
	CE	Mean	.	.	.
	Sechi	Mean	1.14	.	1.49
	DO	Mean	8.37	.	8.42
	TP(mg/L)	Mean	0.03	.	0.02
	TKN (mg/L)	Mean	0.29	.	0.33
	DP (mg/L)	Mean	0.01	.	0.01
	DOC (mg/L)	Mean	1.87	.	2.02
	Chl a (ug/L)	Mean	7.47	.	12.53
	N/P	Mean	11.83	.	16.86
	TSIChl	Mean	44.94	.	51.77
	TSITP	Mean	51.89	.	48.02

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
9	pH	Mean	7.91	8.68	.
	CE	Mean	.	.	.
	Sechi	Mean	1.30	1.89	2.08
	DO	Mean	5.85	7.20	6.53
	TP(mg/L)	Mean	0.04	0.02	0.02
	TKN (mg/L)	Mean	0.43	0.32	0.28
	DP (mg/L)	Mean	0.01	0.01	0.01
	DOC (mg/L)	Mean	2.43	2.11	2.09
	Chl a (ug/L)	Mean	16.58	3.50	3.75
	N/P	Mean	10.32	13.64	17.05
	TSIChl	Mean	51.96	41.18	41.49
	TSITP	Mean	56.91	49.17	44.77
10	pH	Mean	7.43	7.88	.
	CE	Mean	.	.	.
	Sechi	Mean	0.63	0.80	0.94
	DO	Mean	6.52	7.16	4.70
	TP(mg/L)	Mean	0.05	0.04	0.04
	TKN (mg/L)	Mean	0.47	0.49	0.55
	DP (mg/L)	Mean	0.01	0.02	0.01
	DOC (mg/L)	Mean	6.24	5.60	5.60
	Chl a (ug/L)	Mean	10.64	15.00	8.66
	N/P	Mean	12.00	15.50	19.45
	TSIChl	Mean	49.10	48.53	44.84
	TSITP	Mean	58.79	55.02	53.39

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
11	**pH**	**Mean**	7.83	.	7.85
	CE	**Mean**	100.00	.	100.00
	Sechi	**Mean**	1.31	.	1.83
	DO	**Mean**	8.08	.	7.70
	TP(mg/L)	**Mean**	0.05	.	0.02
	TKN (mg/L)	**Mean**	0.59	.	0.28
	DP (mg/L)	**Mean**	0.01	.	0.01
	DOC (mg/L)	**Mean**	4.31	.	3.06
	Chl a (ug/L)	**Mean**	38.24	.	5.82
	N/P	**Mean**	12.71	.	12.83
	TSIChl	**Mean**	60.52	.	46.91
	TSITP	**Mean**	57.80	.	47.80
12	**pH**	**Mean**	7.95	.	8.35
	CE	**Mean**	.	.	.
	Sechi	**Mean**	2.02	.	2.34
	DO	**Mean**	7.51	.	8.04
	TP(mg/L)	**Mean**	0.02	.	0.02
	TKN (mg/L)	**Mean**	0.30	.	0.23
	DP (mg/L)	**Mean**	0.01	.	0.01
	DOC (mg/L)	**Mean**	2.59	.	2.49
	Chl a (ug/L)	**Mean**	3.92	.	3.99
	N/P	**Mean**	19.20	.	16.70
	TSIChl	**Mean**	41.64	.	41.29
	TSITP	**Mean**	43.28	.	42.60

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
13	**pH**	**Mean**	7.76	.	8.55
	CE	**Mean**	.	.	.
	Sechi	**Mean**	0.59	.	1.46
	DO	**Mean**	6.73	.	7.35
	TP(mg/L)	**Mean**	0.09	.	0.03
	TKN (mg/L)	**Mean**	0.36	.	0.32
	DP (mg/L)	**Mean**	0.03	.	0.01
	DOC (mg/L)	**Mean**	2.99	.	2.90
	Chl a (ug/L)	**Mean**	22.53	.	5.20
	N/P	**Mean**	4.69	.	10.95
	TSIChl	**Mean**	55.41	.	44.35
	TSITP	**Mean**	65.70	.	52.11
14	**pH**	**Mean**	.	8.39	.
	CE	**Mean**	.	.	.
	Sechi	**Mean**	.	0.66	.
	DO	**Mean**	.	7.62	.
	TP(mg/L)	**Mean**	.	0.03	.
	TKN (mg/L)	**Mean**	.	0.40	.
	DP (mg/L)	**Mean**	.	0.01	.
	DOC (mg/L)	**Mean**	.	3.87	.
	Chl a (ug/L)	**Mean**	.	4.26	.
	N/P	**Mean**	.	13.74	.
	TSIChl	**Mean**	.	44.29	.
	TSITP	**Mean**	.	51.08	.

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
15	**pH**	**Mean**	7.87	.	8.10
	CE	**Mean**	.	.	.
	Sechi	**Mean**	0.20	.	0.72
	DO	**Mean**	6.17	.	7.35
	TP(mg/L)	**Mean**	0.06	.	0.04
	TKN (mg/L)	**Mean**	0.27	.	0.32
	DP (mg/L)	**Mean**	0.03	.	0.01
	DOC (mg/L)	**Mean**	3.50	.	2.80
	Chl a (ug/L)	**Mean**	6.29	.	8.78
	N/P	**Mean**	6.41	.	8.30
	TSIChl	**Mean**	48.15	.	50.07
	TSITP	**Mean**	55.73	.	55.19
16	**pH**	**Mean**	8.13	8.24	8.06
	CE	**Mean**	.	.	.
	Sechi	**Mean**	0.60	1.56	1.56
	DO	**Mean**	9.15	7.27	6.85
	TP(mg/L)	**Mean**	0.05	0.04	0.03
	TKN (mg/L)	**Mean**	0.39	0.40	0.40
	DP (mg/L)	**Mean**	0.01	0.01	0.01
	DOC (mg/L)	**Mean**	4.38	2.21	2.18
	Chl a (ug/L)	**Mean**	22.78	21.03	21.34
	N/P	**Mean**	9.39	12.13	14.49
	TSIChl	**Mean**	58.86	58.34	58.98
	TSITP	**Mean**	58.10	54.94	51.71

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
17	**pH**	**Mean**	8.82	.	7.63
	CE	**Mean**	.	.	.
	Sechi	**Mean**	1.41	.	2.17
	DO	**Mean**	9.50	.	7.15
	TP(mg/L)	**Mean**	0.03	.	0.02
	TKN (mg/L)	**Mean**	0.34	.	0.19
	DP (mg/L)	**Mean**	0.01	.	0.01
	DOC (mg/L)	**Mean**	2.05	.	1.96
	Chl a (ug/L)	**Mean**	7.01	.	7.61
	N/P	**Mean**	14.27	.	9.46
	TSIChl	**Mean**	49.58	.	46.60
	TSITP	**Mean**	49.75	.	46.92
18	**pH**	**Mean**	.	.	.
	CE	**Mean**	.	.	.
	Sechi	**Mean**	.	0.75	1.00
	DO	**Mean**	.	8.10	8.35
	TP(mg/L)	**Mean**	0.01	0.03	0.04
	TKN (mg/L)	**Mean**	0.05	0.26	0.32
	DP (mg/L)	**Mean**	0.01	0.02	0.01
	DOC (mg/L)	**Mean**	1.70	2.92	2.52
	Chl a (ug/L)	**Mean**	.	12.39	10.42
	N/P	**Mean**	5.00	7.61	7.58
	TSIChl	**Mean**	.	50.85	45.85
	TSITP	**Mean**	37.35	52.92	54.19

MEANS OF VARIABLES BY LAKE/STATION

			station		
			Entrada	Medio	Represa
19	pH	Mean	7.98	8.38	.
	CE	Mean	.	.	.
	Sechi	Mean	1.20	2.10	2.25
	DO	Mean	7.67	7.72	7.97
	TP(mg/L)	Mean	0.05	0.03	0.05
	TKN (mg/L)	Mean	0.41	0.32	0.38
	DP (mg/L)	Mean	0.02	0.01	0.01
	DOC (mg/L)	Mean	3.74	3.27	3.34
	Chl a (ug/L)	Mean	10.16	3.20	2.62
	N/P	Mean	7.71	11.87	11.24
	TSIChl	Mean	50.27	40.81	39.14
	TSITP	Mean	59.22	50.89	53.97

DESCRIPTIVES STATISTICS FOR STATION 1 AND 3
All Lakes with station 1 and 3

		station		
		Entrada	**Represa**	**All Lakes**
pH	**N**	31	19	50
	Mean	7.94	8.19	8.03
	Median	7.81	8.30	8.04
	Std	0.54	0.54	0.55
CE	**N**	4	4	8
	Mean	182.50	178.50	180.50
	Median	177.50	172.00	173.00
	Std	81.50	78.51	74.11
Sechi	**N**	74	72	146
	Mean	1.03	1.56	1.29
	Median	1.00	1.50	1.00
	Std	0.57	0.72	0.70
DO	**N**	55	45	100
	Mean	7.31	7.42	7.36
	Median	7.15	7.79	7.50
	Std	1.80	1.42	1.63
TP(mg/L)	**N**	100	100	200
	Mean	0.04	0.03	0.03
	Median	0.04	0.02	0.03
	Std	0.03	0.02	0.03
TKN (mg/L)	**N**	100	100	200
	Mean	0.39	0.34	0.37
	Median	0.36	0.31	0.34
	Std	0.20	0.18	0.19

DESCRIPTIVES STATISTICS FOR STATION 1 AND 3
All Lakes with station 1 and 3

		station		
		Entrada	Represa	All Lakes
DP (mg/L)	**N**	99	99	198
	Mean	0.01	0.01	0.01
	Median	0.01	0.01	0.01
	Std	0.01	0.01	0.01
DOC (mg/L)	**N**	100	100	200
	Mean	3.71	3.26	3.48
	Median	2.94	2.61	2.74
	Std	2.45	2.17	2.32
Chl a (ug/L)	**N**	84	84	168
	Mean	14.43	8.56	11.50
	Median	5.96	4.13	5.56
	Std	20.32	10.53	16.40
N/P	**N**	100	100	200
	Mean	12.31	14.98	13.64
	Median	11.00	14.57	12.51
	Std	7.70	7.65	7.77
TSIChl	**N**	84	84	168
	Mean	49.46	46.09	47.77
	Median	48.11	44.50	47.44
	Std	12.60	10.40	11.64
TSITP	**N**	100	100	200
	Mean	54.66	48.87	51.76
	Median	55.62	49.04	51.40
	Std	10.53	8.53	9.99

Wilcoxon Signed Rank
P-value for Mean Differences
P-value<0.05 indicate significance difference between station 1 and 3

n_dpH	n_dCE	n_dSechi	n_dDO	n_dTP_mg_L_	n_dTKN__mg_L_	n_dDP__mg_L_	n_dDOC__mg_L_
18	4	68	45	100	100	99	100

n_dChl_a__ug_L_	n_dN_P	n_dTSIChl	n_dTSITP	dpH	dCE	dSechi	dDO	dTP_mg_L_
84	100	84	100	0.10583	0.25	8.9043E-14	0.14098	8.2051E-15

dTKN__mg_L_	dDP__mg_L_	dDOC__mg_L_	dChl_a__ug_L_	dN_P	dTSIChl	dTSITP
.000005862	.000050612	.000000197	0.013452	.000053423	0.011480	3.8149E-15

DESCRIPTIVES STATISTICS FOR STATION 2 AND 3
All Lakes with station 2 and 3

		station		
		Medio	Represa	All Lakes
pH	**N**	9	5	14
	Mean	8.38	8.20	8.32
	Median	8.45	8.43	8.44
	Std	0.60	0.64	0.59
CE	**N**	1	1	2
	Mean	215.00	216.00	215.50
	Median	215.00	216.00	215.50
	Std	.	.	0.71
Sechi	**N**	35	36	71
	Mean	1.42	1.52	1.47
	Median	1.32	1.41	1.32
	Std	0.78	0.76	0.76
DO	**N**	24	18	42
	Mean	7.43	6.97	7.23
	Median	7.72	7.49	7.58
	Std	1.23	1.41	1.31
TP(mg/L)	**N**	49	49	98
	Mean	0.04	0.03	0.03
	Median	0.03	0.03	0.03
	Std	0.02	0.02	0.02
TKN (mg/L)	**N**	49	49	98
	Mean	0.37	0.37	0.37
	Median	0.39	0.33	0.35
	Std	0.17	0.21	0.19

DESCRIPTIVES STATISTICS FOR STATION 2 AND 3
All Lakes with station 2 and 3

		station		
		Medio	Repres a	All Lakes
DP (mg/L)	**N**	49	49	98
	Mean	0.01	0.01	0.01
	Median	0.01	0.01	0.01
	Std	0.01	0.01	0.01
DOC (mg/L)	**N**	49	49	98
	Mean	3.09	3.00	3.05
	Median	2.62	2.44	2.60
	Std	1.52	1.59	1.55
Chl a (ug/L)	**N**	41	41	82
	Mean	10.14	9.37	9.76
	Median	5.58	4.57	5.03
	Std	11.20	10.10	10.61
N/P	**N**	49	49	98
	Mean	12.47	14.66	13.57
	Median	11.11	14.26	11.97
	Std	6.56	7.74	7.22
TSIChl	**N**	41	41	82
	Mean	47.40	46.69	47.04
	Median	47.47	45.51	46.44
	Std	12.05	11.29	11.61
TSITP	**N**	49	49	98
	Mean	52.96	50.42	51.69
	Median	53.67	50.57	51.13
	Std	8.67	9.24	9.01

Wilcoxon Signed Rank
P-value for Mean Differences
P-value<0.05 indicate significance difference between station 2 and 3

n_dpH	n_dCE	n_dSechi	n_dDO	n_dTP_mg_L_	n_dTKN__mg_L_	n_dDP__mg_L_	n_dDOC__mg_L_
3	1	33	18	49	49	49	49

n_dChl_a__ug_L_	n_dN_P	n_dTSIChl	n_dTSITP	dpH	dCE	dSechi	dDO	dTP_mg_L_
41	49	41	49	0.75	1	0.27771	0.15715	0.017261

dTKN__mg_L_	dDP__mg_L_	dDOC__mg_L_	dChl_a__ug_L_	dN_P	dTSIChl	dTSITP
0.072437	0.61138	0.012483	0.46302	0.022394	0.35382	.005282607

CLUSTER ANALYSIS FOR STATION 1

The CLUSTER Procedure
Average Linkage Cluster Analysis

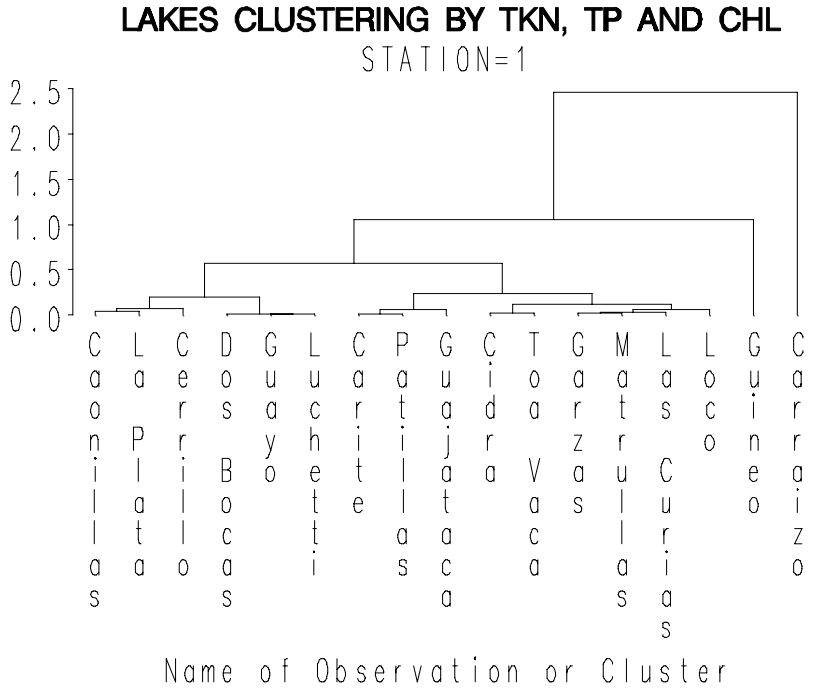
Root-Mean-Square Total-Sample Standard Deviation = 10.39667
Root-Mean-Square Distance Between Observations = 25.46654

Cluster History					
NCL	**Clusters Joined**		**FREQ**	**Norm RMS Dist**	**Tie**
16	Carite	Patillas	14	0.0076	
15	Guayo	Luchetti	14	0.0098	
14	Dos Bocas	CL15	21	0.0157	
13	Garzas	Matrullas	9	0.0182	
12	Cidra	Toa Vaca	14	0.0191	
11	CL13	Las Curias	15	0.0316	
10	Caonillas	La Plata	14	0.0376	
9	CL11	Loco	18	0.0565	
8	CL16	Guajataca	21	0.0609	
7	CL10	Cerrillo	20	0.0745	
6	CL12	CL9	32	0.1196	
5	CL7	CL14	41	0.1965	
4	CL8	CL6	53	0.2392	
3	CL5	CL4	94	0.5708	

CLUSTER ANALYSIS FOR STATION 1

The CLUSTER Procedure
Average Linkage Cluster Analysis

Cluster History					
NCL	**Clusters Joined**		**FREQ**	**Norm RMS Dist**	**Tie**
2	CL3	Guineo	101	1.0526	
1	CL2	Carraizo	108	2.4608	


LAKES CLUSTERING BY TKN, TP AND CHL
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2.0
1.5
1.0
0.5
0.0
Canilas
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Cerrillo
Dos Bocas
Guayo
Luchetti
Carite
Patillas
Guajataca
Cidra
Toa Vaca
Garzas
Matrullas
Las Curias
Loco
Guineo
Carraizo
Name of Observation or Cluster

CLUSTER ANALYSIS FOR STATION 3

The CLUSTER Procedure
Average Linkage Cluster Analysis

Root-Mean-Square Total-Sample Standard Deviation = 2.967358
Root-Mean-Square Distance Between Observations = 7.268512

Cluster History					
NCL	**Clusters Joined**		**FREQ**	**Norm RMS Dist**	**Tie**
16	Carite	Patillas	14	0.0081	
15	CL16	Toa Vaca	21	0.0164	
14	Cerrillo	Guajataca	14	0.0328	
13	Cidra	Loco	14	0.0358	
12	Caonillas	Matrullas	14	0.0503	
11	Dos Bocas	Guineo	14	0.0858	
10	Guayabal	Las Curias	10	0.1013	
9	CL12	Guayo	20	0.1096	
8	CL13	Garzas	19	0.1572	
7	CL15	CL14	35	0.1727	
6	CL8	CL10	29	0.2324	
5	CL7	CL11	49	0.3421	
4	CL9	CL6	49	0.4527	
3	CL4	La Plata	56	0.7445	

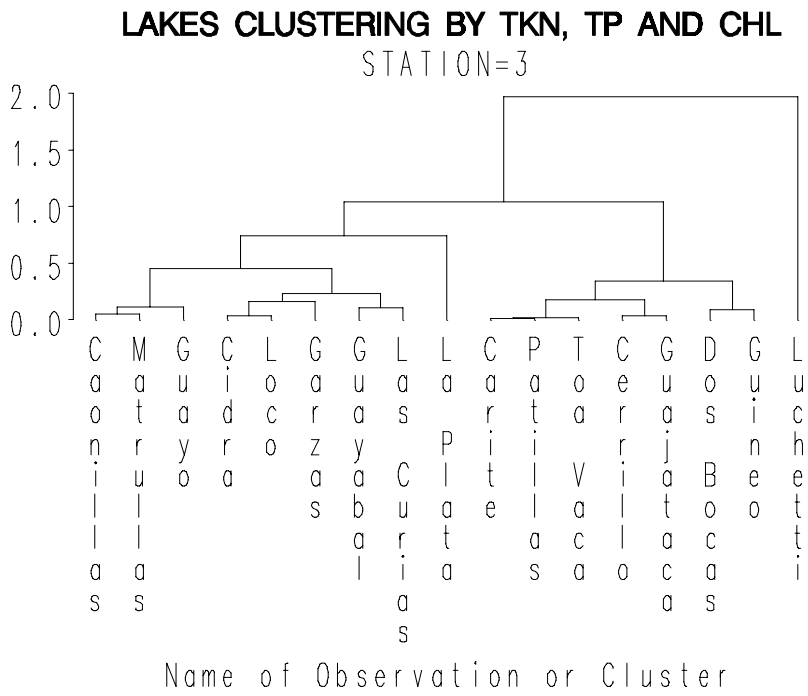
CLUSTER ANALYSIS FOR STATION 3

The CLUSTER Procedure
Average Linkage Cluster Analysis

Cluster History					
NCL	**Clusters Joined**		**FREQ**	**Norm RMS Dist**	**Tie**
2	CL3	CL5	105	1.0409	
1	CL2	Luchetti	112	1.9705	

CLUSTER ANALYSIS FOR STATION 3

The CLUSTER Procedure
Average Linkage Cluster Analysis



CLUSTER ANALYSIS FOR STATION 3

The CLUSTER Procedure
Average Linkage Cluster Analysis