Smith Mountain Lake Association Water Quality Volunteer Monitoring Program

1992 Report

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Smith Mountain Lake Association

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703/297 - 4146

1992 OFFICERS

President - Joseph Wagoner

Vice President - John Barr

Secretary - F. Jean Beall

Treasurer - John Harkness

Past President - Robert C. Hawlk

1992 DIRECTORS

James Brown

James H. Spitz

Cy Cooley

James Cunningham

N. Anderson

Charles Hoover

Thomas Jobes

Paul Rundle

Wilma Schafer

Donald Ward

SMITH MOUNTAIN LAKE VOLUNTEER MONITORS

1992

Advanced Monitors

Howard & Katherine Chilton, Union Hall

Paul Rundle, Moneta

Richard Chamberlain, Moneta

Warren B. Melroy, Moneta

Ken Dugan, Moneta

Ed & Loretta Osika, Lynchburg

Carl Ostertag, Huddleston

Jim Murphy, Huddleston

Daphne Jamison, Wirtz

Andy & Ellie Anderson, Moneta

Janet & Richard Hill, Huddleston

Kaitlin Nahil & Jude Donato, Salem/Roanoke

Gary & Sally Garst, Roanoke

Gene McCullough, Huddleston

Mickie & Bob Hawlk, Union Hall

Ralph Bates, Moneta

Ray & Tina Rex, Wirtz

Stanley & Betty Reeder, Moneta

Ted Bogsrud, Hardy

William Emerick, Moneta

Raymond Strachan, Huddleston

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Roger Mueller, Moneta

Glenn Randa, Moneta

Jean Beall, Huddleston

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Tom Holt, Moneta

Mary Ann & Joseph Spahr, Moneta

Bert & Marian Thurman, Wirtz

John & Shirley Barr, Hardy

Hazel & Charles Bray, Moneta

1. INTRODUCTION

The Smith Mountain Lake Water Quality Volunteer Monitoring Program (SMLWQVMP) is a program designed to monitor the water quality of Smith Mountain Lake, located in southwestern Virginia. The program is jointly coordinated by scientists from Ferrum College in Ferrum, Virginia and members of the Smith Mountain Lake Association (SMLA), a lake residents' citizen association. This document reports on the 1992 monitoring efforts of the SMLWQVMP, which is the sixth year of this ongoing program. Detailed data, data analysis, and conclusions for the first three years (1987, 1988 and 1989) can be found in the *Final Report to the Virginia Environmental Endowment* (VEE) by Johnson and Thomas (March, 1990). The VEE provided primary funding for the project during the first three years. The detailed report on the 1990 and 1991 monitoring effort is detailed in the *Smith Mountain Lake Association Water Quality Volunteer Monitoring Program - 1990 -1991 Report* by Thomas and Johnson (December, 1991).

In May, a training session was organized and taught by the Ferrum College scientists and the SMLA Volunteer Monitoring Coordinator with assistance from the student technicians. In 1992, the student technician was G. Rick Sloan and the student lab aide was Teresa Mowry. In 1992, the training session was held at the Smith Mountain Lake Visitor Center at Hales Ford Bridge. This session was well attended with attendees including experienced monitors and new volunteer monitors. The number of monitors participating was very consistent with previous years, with some experienced monitors leaving the program but new monitors joining the program each year. The program consisted of a review of the previous year's findings and the planned schedule for the upcoming year. Experienced monitors confirmed their sample site locations on the map of Smith Mountain Lake provided by the program directors, received new supplies (sample bottles and filters), and had their monitoring equipment checked. The program co-directors worked with the new volunteer monitors to assign sample site locations, explain the sampling procedures, and issue sampling equipment and supplies.

Sample collection began the first week of June and the first sample bottles and sample filters were picked up in the second week of June. The sample bottles and sample filters were picked up and new supplies issued each Tuesday. In 1992, samples were collected for twelve weeks from the first week of June until the last week in August. Newsletters were written and published by the program co-directors and student technician during the summer, reporting on activities of the program. Announcements were included in the newsletters in addition to advice or tips on more efficient sample collection. Two newsletters were written in 1992.

At the end of the monitoring season, a meeting and social event is held. At these combination picnic/business meetings, the co-directors of the program from Ferrum College gave reports on the results of the sample collection and analyses. In addition, questions about the program and Smith Mountain Lake, in general, were discussed and plans and dates for the program were suggested for the coming year.

The results of the data analyses, conclusions, and comparisons with the previous five years' of data will be discussed in the following sections.

2. METHODS

Detailed methods of sample collection, preservation and analyses, and quality control/quality assurance procedures can be found in the *VEE Final Report* (Johnson and Thomas, 1990).

The parameters measured included: water turbidity, observed with a Secchi disc; total phosphorus, measured spectrophotometrically after persulfate digestion; and chlorophyll-*a*, determined using the acetone extraction method and fluorimetry.

The quality control and quality assurance procedures evaluated sample collection and storage by the volunteers and laboratory procedures.

3. 1992 RESULTS

The three water quality parameters monitored on Smith Mountain Lake are water turbidity, total phosphorus, and chlorophyll-*a*. In 1992, Secchi depth averaged 1.96 meters, total phosphorus averaged 36.0 ppb, and chlorophyll-*a* averaged 5.53 ppb.

In 1992, these parameters, evaluated on a weekly mean of all stations, followed a fluctuating pattern similar to the previous three years except for Secchi depth values, which appeared to exhibit an increasing trend as the summer passed (as illustrated in Figure 1). The Secchi depth exhibited the highest mean value in Week 12 (2.5 m) and the lowest mean value for Secchi depth was recorded during Week 1 (1.4 m). The large volume of rainfall in the late spring of 1992 probably had a significant effect on the June Secchi depth values. The grand mean of Secchi depth values, including all 873 values for all stations and all 12 weeks, was 1.96 ± 0.02 m. Total phosphorus concentration exhibited the lowest mean values in Week 4 (24.4 ppb based on 39 samples) and Week 11 (26.2 ppb based on 45 samples), the last week in June and the third week of August, respectively. The highest mean value (59.0 ppb) occurred in Week 1, the first week of June. The grand mean of all 462 samples was 36.01 ± 0.95 ppb. Chlorophyll-*a* concentrations exhibited the lowest mean value in Week 1 (3.9 ppb based on 42 samples) and Week 7 (3.5 ppb based on 38 samples) and the highest mean value of chlorophyll-*a* occurred during Week 5. The grand mean for chlorophyll-*a* for all stations and all weeks (493 samples) was 5.53 ± 0.17 ppb.

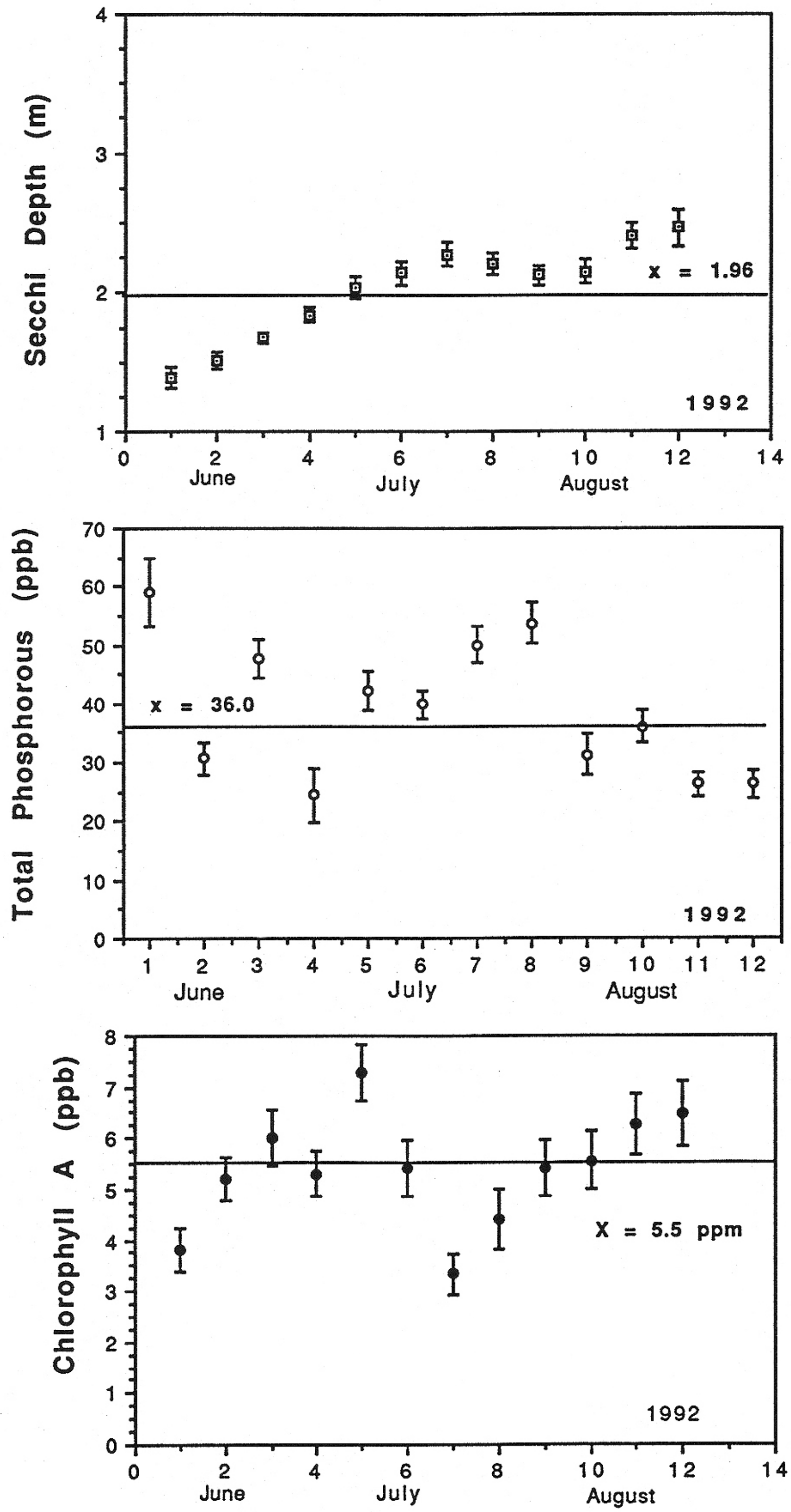

Figure 1. 1992 Smith Mountain Lake data averaged by sampling period.

When these three water quality parameters are evaluated based on the means for each station and correlated with miles to the dam, trends are exhibited which would be considered typical of a reservoir. The upper reaches of the tributaries are more riverine in water quality and the lower reaches, closer to the Smith Mountain Lake Dam, exhibit more lacustrine water quality as can be seen in Figure 2. The Secchi depth increased as miles to the Dam decreased, indicating better water clarity closer to the dam and in the larger expanse of water. The lowest water clarity as measured by Secchi depth (SD = 0.675 m) was measured at a station approximately 26.5 miles from the dam, and the highest water clarity was measured at a station approximately 2.25 miles from the dam (SD = 3.28 m). The increase in Secchi mean depth was significantly correlated with decreasing miles to the dam. The total phosphorus concentration (TP) decreased as miles to the dam decreased, indicating less nutrient-enriched water toward the main basin. The highest total phosphorus concentrations (TP = 92.2 ppb) were measured at a station approximately 27 miles from the dam, and the lowest total phosphorus (TP = 23.6 ppb) was measured at a station approximately 1.25 miles from the dam. The decrease in total phosphorus concentration was significantly correlated with decreasing miles to the dam. The chlorophyll-*a* concentration (CHA) decreased as miles to the dam decreased, indicating less algal growth as the larger expanse of water is approached. The highest chlorophyll-*a* concentration (CHA = 10.9 ppb) was sampled and measured at a station approximately 27.5 miles from the dam, and the lowest chlorophyll-*a* concentration (CHA = 1.37 ppb) was sampled and measured at a station approximately 3.25 miles from the dam. The decrease in the chlorophyll-*a* concentrations was significantly correlated with the decreasing miles to the dam.

It should be noted that the highest nutrient concentration, the highest algal population, and the lowest water clarity were all found approximately 27 miles from the dam at stations in close proximity. The lowest nutrient concentration, the lowest algal population, and the greatest water clarity were all found at stations less than 4 miles from the dam.

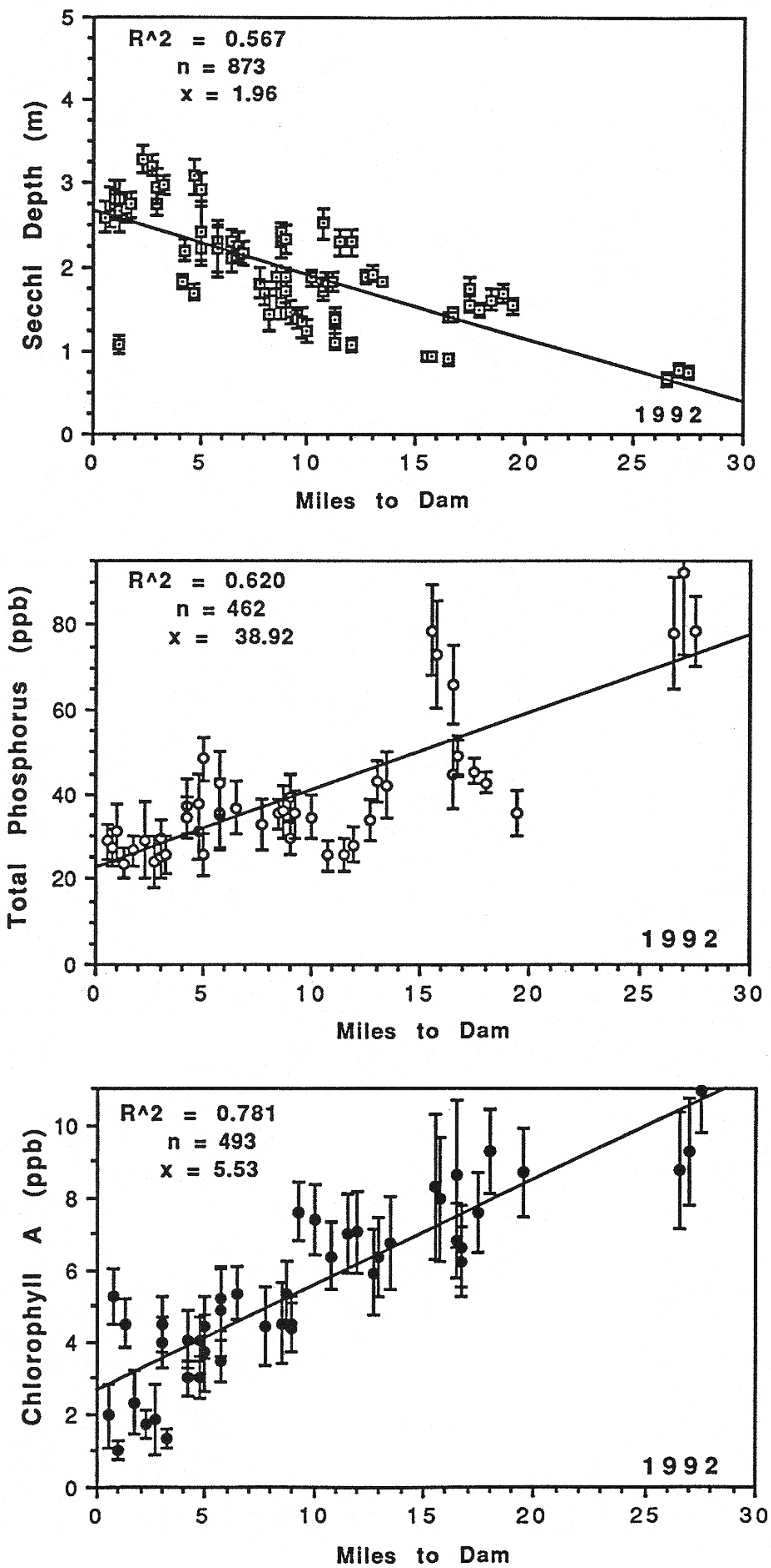

Figure 2. 1992 sample site average data versus miles to the SML Dam.

4. WATER QUALITY TRENDS

The grand means of the three parameters for the entire summer and for all stations are listed in Table 1. These values, except for total phosphorus, indicate good water quality in Smith Mountain Lake when compared to other southern lakes and reservoirs. The phosphorus mean was slightly higher than the average for the southern lakes and reservoirs.

Table 1. Comparison of water quality data from Smith Mountain Lake with data from other southeastern lakes and reservoirs.

Parameter	**Averages for Smith Mountain Lake**						Average of
	1987	1988	1989	1990	1991	1992	80 S.E. Lakes*
Total Phosphorus (ppb)	19.7	20.9	27.8	25.2	25.9	36.0	33.0
Chlorophyll-*a* (ppb)	3.8	2.6	3.7	4.5	3.7	5.5	8.1
Secchi Disk Depth (m)	2.4	2.7	2.2	2.4	2.6	2.0	1.7

*(Reckhow, *Water Resources Bulletin*, 24(4), 1988)

To identify water quality trends in Smith Mountain Lake as quickly as possible, we need to continue finding more powerful means for comparing the data with respect to location and time. For example, by correlating the three water quality parameters with distance from the dam (see Figure 2), the lower water quality in the upper channels became apparent. This trend needs to be watched carefully to see if the river "plumes" move toward the main body of the lake. The time over which the lake can continue to assimilate the loading is not known. It is apparent that monitoring water quality as a function of location can help us anticipate trends in water quality with time. The average value of the three water quality parameters by year is displayed in Figure 3. The same comparison has been presented in previous reports to help identify trends in water quality over time.

All three parameters indicate a decrease in water quality. However, this is a one-year trend and should not be cause for alarm. The preceding year's average values for Secchi depth and chlorophyll-*a* indicated an improvement over the average values of two years ago while the total phosphorus concentration remained nearly constant.

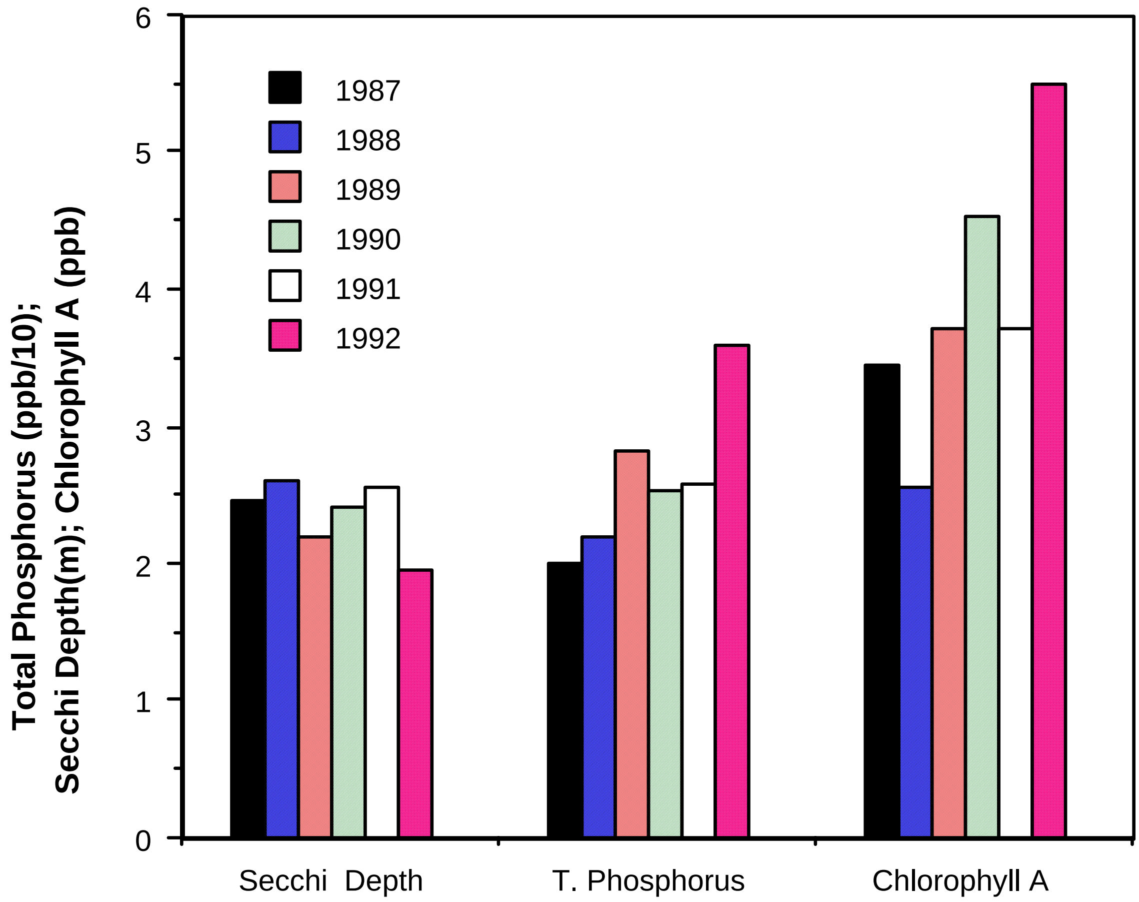

Figure 3. **Comparison of water quality parameters by year for Smith Mountain Lake.**

The spring of 1992 included several intense precipitation events, accompanied by heavy runoff, siltation, and nutrient loading. This year's decline is probably the short-term effect of an unusually wet spring. It would be helpful if the information from each of the three water quality parameters could somehow be quantitatively combined. When summary statistics (such as annual average value) for water quality parameters are combined, the result is termed a water quality index. To make more meaningful comparisons of water quality parameters, a method combining Secchi depth, chlorophyll-*a*, and phosphorus has been incorporated into this year's report. The particular index chosen is the Carlson's Trophic State Index and it is explained and presented in the next section.

5. CARLSON'S TROPHIC STATE INDEX APPLIED TO SMITH MT. LAKE

The trophic status of a lake indicates the degree of nutrient enrichment and the resulting suitability of that lake for various uses. The process of eutrophication is described at the beginning of the Training Manual for the monitoring program. Phosphorus is most often the nutrient that limits algal production and attempts have been made to relate the trophic status of a lake to concentration of phosphorus. Table 2 shows one such effort.

The algal growth resulting from inputs of phosphorus can also be used to evaluate the trophic status of a lake. This is done by extracting the green pigment (chlorophyll-*a*) from algae and determining its concentration. Table 3 shows the assignment of trophic status based on the concentration of chlorophyll-*a*. It also shows that the evaluation of trophic status is a matter of professional judgment, not a parameter to be exactly measured.

Table 2. Proposed relationships among phosphorus concentration, trophic state, and lake use for northern temperate lakes.

Phosphorus Concentration (ppb)	Trophic State	Lake Use
< 10	Oligotrophic	Suitable for water-based recreation and cold water fisheries. Very high water clarity and aesthetically pleasing.
10-20	Mesotrophic	Suitable for recreation, often not for cold water fisheries. Clarity less than in oligotrophic lakes.
20-50	Eutrophic	Reduction in aesthetic properties reduces enjoyment from body contact recreation. Generally productive for warm water fish.
> 50	Hypereutrophic	A typical "old-aged" lake in advanced succession. Some fisheries, but high levels of sedimentation and algae or macrophyte growth diminish open water surface area.

(Reckhow and Chapra, 1983)

Table 3. Trophic status related to chlorophyll-*a* concentration in different studies (Reckhow and Chapra, 1983).

	Chlorophyll-*a* Concentration (ppb)			
Trophic Status	Sakamoto	NAS	Dobson	EPA-NES
Oligotrophic	0.3-2.5	0-4	0-4.3	<7
Mesotrophic	1-15	4-10	4.3-8.8	7-12
Eutrophic	5-140	>10	>8.8	>12

Trophic status can also be evaluated from Secchi disk measurements since algal growth decreases water clarity. Researchers have also attempted to relate water quality parameters such as conductivity and total organic nitrogen to trophic status. Regardless of how trophic status is evaluated, a particular status is used to summarize the water quality in a lake with respect to certain uses. The particular summary term, such as mesotrophic, is assigned to a lake based on a summary statistic, such as the average total phosphorus concentration. Further, researchers have devised water quality indices based on one or more summary statistics to better communicate water quality information to the general public. Using an index, water quality can be placed on a scale from 1 to 100, with 1 being the best. An index can be derived from any summary statistic by means of a mathematical transformation and provides a way of directly comparing various parameters that are measured in very different units. For example, without indexing, most people would have a hard time comparing the significance of 14 ppb total phosphorus concentration with a 3.5 meter Secchi depth.

The State of Virginia makes use of one of the best-known trophic state indices (TSI), called the Carlson Trophic State Index after the researcher who developed it. We will also use this index to help interpret the water quality data collected on Smith Mountain Lake. Carlson's TSI may be calculated from any of the parameters we monitor: total phosphorus concentration (TP), chlorophyll-*a* concentration (CA), or Secchi disk depth (SD). The index obtained from each of these parameters can be averaged to give a combined TSI. This is important because any of the individual parameters can be misleading in some situations. Secchi disk readings are a misleading indicator of trophic status in lakes with non-algal turbidity caused by soil erosion, such as in the upper river channels and near shore areas of Smith Mountain Lake. Phosphorus will not be a good indicator in lakes where algal growth is not limited by availability of phosphorus (we are confident that algal growth in Smith Mountain Lake is phosphorus limited). Chlorophyll-*a* may be the best indicator during the growing season and the worst at other times. By examining the TSI derived from each of the three parameters and the combined TSI, the most reliable evaluation of trophic status can be made. The following equations are used for the calculation of TSIs:

$$TSI(TP) = 14.42 \ln TP + 4.15$$
$$TSI(CA) = 9.81 \ln CA + 30.6$$
$$TSI(SD) = 60 - 14.41 \ln SD$$
$$TSI(combined) = [TSI(TP)+TSI(CA)+TSI(SD)]/3$$

Table 4 shows the input data for calculating the TSIs and gives data to help interpret the water quality data from Smith Mt. Lake. Table 5 displays the TSIs that were calculated from the values in Table 4.

Table 4. Input data for calculation of TSI.

	SD (m)	TP (ug/L)	CA (ug/L)
Smith Mt Lake 1987	2.5	20	3.4
1988	2.6	22	2.6
1989	2.2	28	3.7
1990	2.4	25	4.5
1991	2.6	26	4.2
1992	2.0	36	5.5
Main Basin	4.0	10	1.0
Upper Arm	1.5	50	8.0
Oligotrophic*	3.7	10	7.0
Eutrophic*	2.0	20	12.0
Avg SE lake**	1.7	33	8.1

*EPA-NES (1974)
**Reckhow, WRB (1988)

Table 5. Calculated values for Carlson's Trophic State Index.

	Trophic Status Index (TSI)			
	TSI-SD	TSI-TP	TSI-CA	Combined
1987	47	47	43	46
1988	46	49	40	45
1989	49	52	43	48
1990	47	51	45	48
1991	47	51	45	47
1992	50	56	47	51
Main Basin	40	37	31	36
Upper Arm	54	61	51	55
Oligotrophic*	41	37	50	43
Eutrophic*	50	47	55	51
Avg SE lake**	52	55	51	53

Finally, the TSIs are displayed for each year of the Smith Mountain Lake Volunteer Water Quality Monitoring Program in Figures 4 and 5.

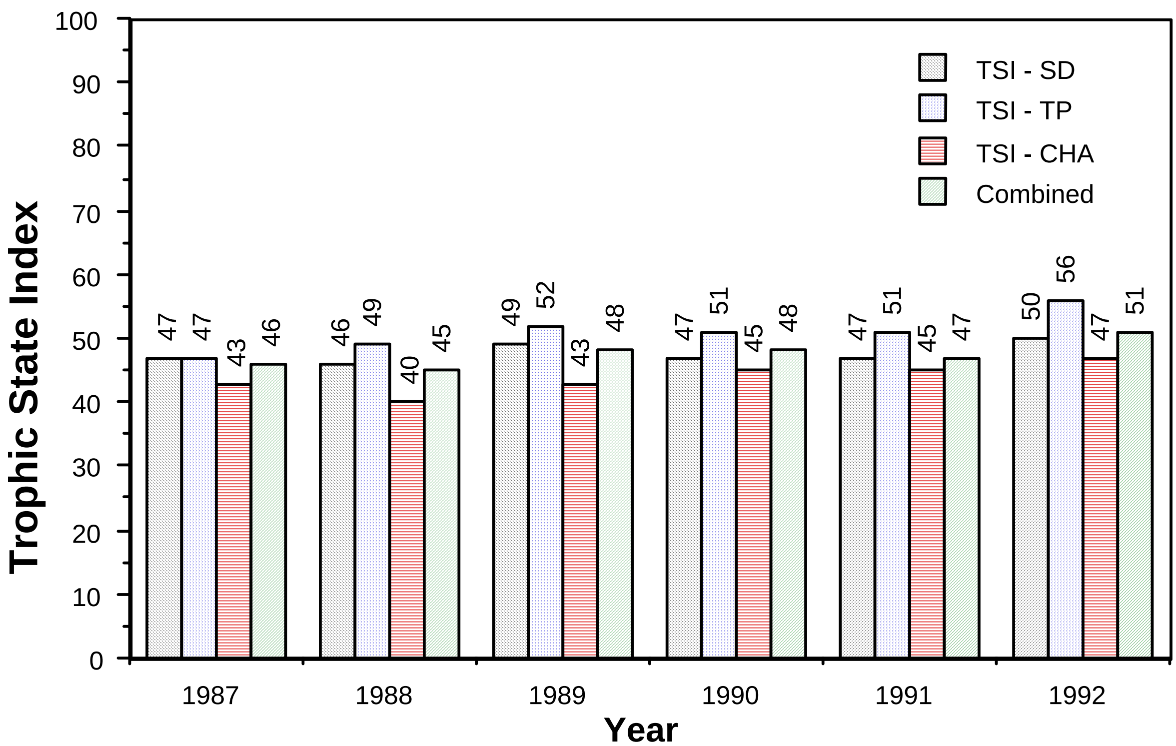

Figure 4. Trophic State Index for Smith Mountain Lake (1987 – 1992).

Figure 5. Combined Trophic State Index for Smith Mountain Lake (1987 – 1992).

5.1 References for the Trophic State Index

Carlson, R.E. 1977. "A Trophic State Index for Lakes", *Limnol. Oceanog.* 22(2):361-369.

Reckhow, K.H. and Chapra, S.C. 1983. *Engineering Approaches to Lake Management, Vol. 1: Data Analysis and Empirical Modeling*, pp 189-193, Ann Arbor Science Book Publishers, Ann Arbor, MI.

U.S. Environmental Protection Agency. 1974. "The Relationships of Phosphorous and Nitrogen to the Trophic State of Northeast and North-Central Lakes and Reservoirs", National Eutrophication Paper No. 23, U.S. EPA, Corvallis, Oregon.

6. QUALITY ASSURANCE AND CONTROL

The results of the quality assurance program for 1992 indicate generally high quality data, although parts of the QA/QC data for total phosphorus are cause for concern. (The detailed description and results of the full quality assurance program, examining the validity of all sample collection, preservation, and analytical techniques is presented in the 1990 VEE report.) As in 1990 and 1991, we continue to examine certain aspects of the program, especially those involving new personnel. In 1992, the quality assurance program included duplicate analyses to check the precision of analytical procedures and the use of field blanks and surrogate samples of known concentrations to check the precision and accuracy of the entire analytical scheme (sample collection, preservation, and analysis) for total phosphorus and chlorophyll-*a*.

6.1 QA/QC for Total Phosphorus

The primary test of reliability for total phosphorus data is the use of field blanks and surrogate samples, distributed randomly among volunteer monitors during the summer. The field blanks (distilled water) and surrogate samples (20 ppb standards) are placed in used sample bottles that have been treated in the same manner as all other sample bottles. They are carried into the field by the monitors, handled and stored in the same manner as the other samples, and analyzed along with all the samples collected in a given week. The results are shown in Table 6. These data are troublesome, both because the average values are not close to target values and because the standard deviation indicates a lack of precision. We are not able to explain the results and they are not consistent with other aspects of the QA/QC program for phosphorus which indicate good reliability. The phosphorus data is consistent with the chlorophyll-*a* and Secchi data as well (see the section on the Carlson Trophic State Index). Perhaps there was a mix-up on the bottles used for field blanks and surrogate samples.

Table 7 gives 1992 instrument calibration data. The intercept is much higher than it has been in the past. This means that the absorbance reading of a distilled water blank is much higher. This was noticed during preliminary analysis before the season began and considerable work was done to determine the cause. Although distilled water from several sources was used, glassware was acid washed and rinsed twice, and new reagents were purchased, the high blank reading persisted. However, Figure 6 indicates that correcting the absorbance readings for the reagent blank gives very similar calibration curves in 1991 and 1992, although the slope (instrument sensitivity) is slightly decreased in 1992. The Beckman spectrophotometer should be serviced before next year to be sure the optics are clean and correctly aligned and that the detector is operating according to specifications. The last column of Table 7 gives the values for R^2, the correlation coefficient, and is a measure of how well the calibration curve fits the absorbance readings of the standards. A correlation coefficient of exactly one is the highest value possible and indicates a perfect fit. The weekly values are all very nearly one and indicate very good consistency. The method for determining phosphate reliably reflects what is in the sample container and errors stem primarily from the collection, handling, storage, and transfer of the water samples.

Table 6. Values for field blanks and surrogate samples, 1992.

	Field Blanks (ppb)	20 ppb Surrogates	40 ppb Surrogates
	9.8	37.0	50.2
	29.6	40.8	54.0
	11.7	8.6	67.1
	-2.1	25.6	37.4
	6.4	16.6	41.7
	3.2	70.0	39.6
	36.8	90.0	100.0
	27.7	59.2	59.2
	23.9	66.5	72.8
	21.8	45.8	81.9
	4.3	54.8	61.2
	9.6	28.7	132.3
	14.6	28.7	58.0
	-1.6	48.9	48.9
	-22.2	17.8	63.8
		11.4	31.9
			27.6
			38.4
Avg	11.6	40.7	59.2
Stdev	15.0	23.3	25.8

Table 7. Slope, intercept, and R^2 from the 1992 Phosphate Calibration Curves.

Week	Slope	Intercept	R^2
1	.00194	.132	.992
2	.00191	.132	.992
3	.00212	.132	.989
4	.00213	.133	.984
5	.00187	.136	.998
6	.00187	.135	.999
7	.00252	.094	.958
8	.00206	.144	.998
9	.00155	.117	.995
10	.00188	.124	.994
11	.00223	.123	.984
12	.00185	.113	.990
Avg	.00190	.123	.991
Std Dev	.00006	.013	.001

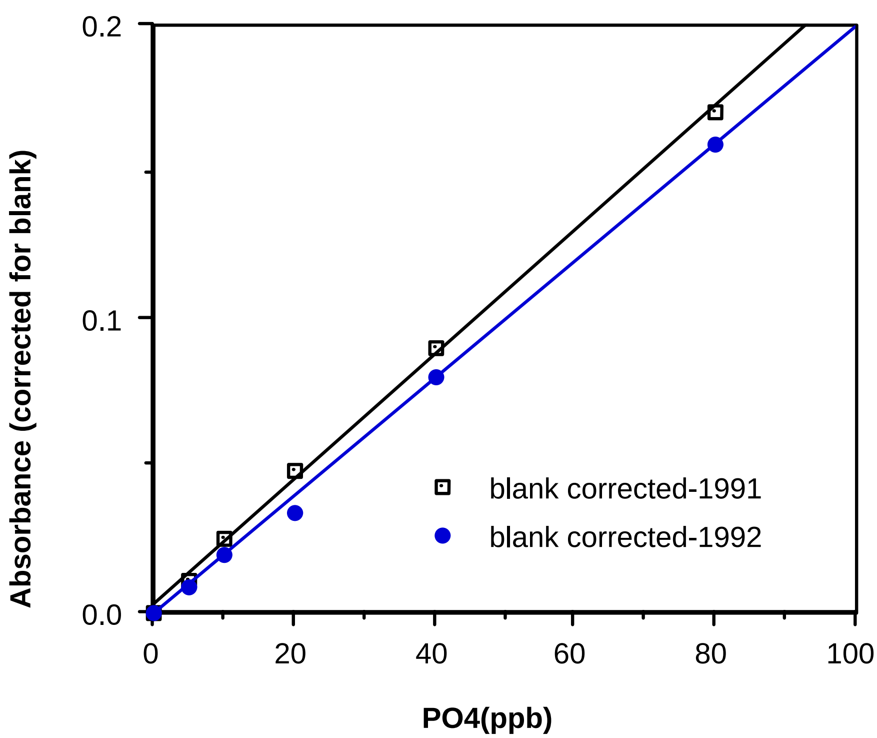

Figure 6. Comparison of 1991 and 1992 calibration curves corrected for blank absorbance.

6.2 QA/QC for Chlorophyll-a

Reliability of the chlorophyll-*a* data was tested by collecting sets of samples from two advanced monitoring sites, each set consisting of 10 samples. The filters were then cut into two equal pieces, one half being analyzed the day after collection (6/24/92) and the other half analyzed after the season had ended (10/1/92). The results, shown in Table 8, indicate a mean of 3.7 ppb with a standard deviation of 0.9 ppb (24%) for the first set, and a mean of 4.4 ppb with a standard deviation of 0.6 ppb (14%) for the second set. In this QA test, the overall precision is being checked because variability in the sample composition and in the analytical procedure is contributing to variability in the results. This is good reproducibility for chlorophyll-*a*, an inherently imprecise measurement. The average relative deviation of 19% is very similar to the 1991 relative deviation of 21%. The average chlorophyll concentration decreased by 35% in set 1 and by 7% in set 2 between June and October.

Table 8. Quality control data for 1992 chlorophyll-*a* analysis.

	Fluor (6/24/92)	Chlor-*a* (ppb)	Fluor (10/1/92)	Chlor-*a* (ppb)
Set 1	28	2.8	25	2.5
	25	2.5	25	2.5
	33	3.3	23	2.3
	32	3.2	24	2.4
	55	5.5	22	2.2
	41	4.1	22	2.2
	39	3.9	25	2.5
	37	3.7	22	2.2
	31	3.1	25	2.5
	47	4.7	23	2.3
avg	36.8	3.7	23.6	2.4
stdev	9.1	0.9	1.3	0.1
Set 2	48	4.8	34	3.4
	44	4.4	31	3.1
	40	4.0	45	4.5
	52	5.2	43	4.3
	41	4.1	47	4.7
	39	3.9	43	4.3
	55	5.5	43	4.3
	42	4.2	49	4.9
	38	3.8	40	4.0
	41	4.1	35	3.5
avg	44.0	4.4	41.0	4.1
stdev	5.8	0.6	5.9	0.6

7. SAMPLING EFFICIENCY

The monitoring program depends on volunteers for sample collection, and one measure of success for the program is the consistency with which these volunteers attend to their stations. Table 9 presents the collection efficiency for 1992. While the sampling efficiency of advanced monitors decreased slightly, the overall sampling efficiency was up a percent due to the great work of the basic monitors. The figures show that the volunteer monitors are very conscientious about sample collection. The sampling efficiency among the volunteer monitors is as good or better than that of the professionals in government agencies responsible for environmental sampling. This degree of commitment no doubt carries over to the care with which samples are collected, and is evidence of their dedication to the program.

Table 9. Comparison of sampling efficiency for 1991 and 1992.

Parameter	**1991 Sampling Efficiency (%)**	**1992 Sampling Efficiency (%)**
Secchi disk measurements	86	90
total phosphorous samples	96	93
chlorophyll-*a* samples	95	93
overall	**91**	**92**

APPENDIX

Table A1. 1992 Total Phosphorus Data.

ST/WK	92/1	92/2	92/3	92/4	92/5	92/6	92/7	92/8	92/9	92/10	92/11	92/12	St Avg	Stdev
ST 1	45.4	36.6	46.2	44.6	40.0	26.8	50.0	31.0	6.5	32.6	29.3	34.2	35.3	11.7
ST 2	40.2	25.7	41.5	5.2	41.1	30.0	46.0	80.5	19.4	30.5	12.2	20.5	32.7	19.6
ST 3	46.4	28.3	33.5	7.0	36.8	25.8	38.9	50.0	19.4	25.3	24.8	18.4	29.6	12.2
ST 4	51.5	16.8	37.7	0.5	26.3	30.0	37.3	42.4	25.8	32.6	13.1	22.6	28.1	13.8
ST 5	40.7	10.5	36.8	3.3	29.5	27.9	37.3	41.4	29.0	29.5	13.1	10.5	25.8	13.1
ST 6	40.2	15.7	35.8	4.2	23.2	24.7	47.6	24.3	23.2	25.3	18.5	23.7	25.5	11.4
ST 7	42.3	33.0			38.9	61.6	63.5	71.0	32.3		37.4	56.3	48.5	14.7
ST 8	42.3	16.8			35.8	53.2	77.8	49.0	64.5		7.7	36.3	42.6	21.9
ST 9	39.2	20.9			18.9	38.4	85.7	39.5	38.7		8.6	26.3	35.1	22.0
ST 16	61.3	39.3	50.9	9.9	54.7			56.7	34.8	29.5	42.8	51.1	43.1	15.4
ST 17	56.7	25.7	24.4	2.3	45.3			90.0	50.3	51.6	27.5	48.4	42.2	23.8
ST 18	42.3	28.3	53.8	8.0	24.2			57.6	41.3	29.5	20.3	32.1	33.7	15.2
ST 19			38.7	8.0	21.1	23.7	42.1	47.1	16.8	19.5	25.7	13.2	25.6	12.9
ST 20			46.2	5.2	20.0	19.5	61.1	30.0	13.5	21.1	20.3	2.6	24.0	17.9
ST 21			97.2	5.2	24.7	22.6	32.5	49.0	14.2	16.8	8.6	19.5	29.0	27.0
ST 40	50.5	3.1	73.6	10.8	41.1	32.1	56.3	60.5	43.9	30.5	16.7	26.8	37.2	21.2
ST 41	40.2	19.9	52.8	14.6	37.9	56.3	36.5	99.5	27.1	32.6	23.0	13.2	37.8	23.8
ST 42	33.0	12.0	52.8	17.4	40.0	39.5	36.5	71.9	29.7	40.0	25.7	14.2	34.4	16.9
ST 43	31.4	9.4	43.4	11.7	29.5	39.5	54.0	75.7	7.7	24.7	14.9		31.1	21.1
ST 44	34.0	15.7	27.4	7.0	31.6	37.4	38.1	52.9	15.5	27.4	38.3		29.6	13.0
ST 45	35.1	11.5	17.9	7.0	55.8	26.3	47.6	25.2	7.7	26.3	20.3		25.5	15.6
ST 49	90.7	27.2	34.0	22.1	44.2	58.4	38.9	30.0	18.1	27.4	15.8	24.7	36.0	20.9
ST 50	77.3	39.8	34.0	20.2	38.9	42.6	60.3	22.4	24.5	22.1	32.0	10.0	35.3	18.6
ST 51	76.3	29.3	41.5	24.9	54.7	38.4	41.3	13.8	27.1	28.4	23.9	15.3	34.6	17.5
ST 55	54.6	53.4	74.5		49.5	41.6	58.7	59.5	40.0	43.2	28.4	35.3	49.0	13.0
ST 56	66.0	58.6	64.2		38.9	48.9	75.4	47.1	33.5	43.2	38.3	25.8	49.1	15.3
ST 57	49.5	59.7	92.5		0.0	58.4	38.1	71.9	25.8	40.0	29.3	27.9	44.8	25.3
ST 64	26.8	32.5	48.1	0.5	12.6	32.1	34.9	51.9	10.3	30.5	20.3	2.6	25.3	16.5
ST 65	24.7	14.1	44.3	12.7	14.7	32.1	30.2	44.3	16.8	17.9	19.8	11.1	23.6	11.7
ST 66	25.8	40.8	12.3	14.6	61.6	43.7	27.0	26.7	12.9	25.3	23.0	15.3	27.4	14.7
ST 70	61.9	30.4	42.5	36.6	50.5	57.4	42.9	58.6	38.7	36.8	46.4	43.7	45.5	9.8
ST 71	58.2	33.5	35.8	38.5	40.0	57.4	36.5	55.7	42.6	38.9	37.4	39.5	42.8	8.9
ST 72	64.9	28.3	44.3	3.3	28.4	57.4	39.7	51.0	29.7	41.1	24.8	13.2	35.5	17.8
ST 79	42.3	17.8	42.5	26.8	41.1	28.9	25.4	53.8	18.1	15.8	13.1	18.4	28.7	13.2
ST 80	37.1	12.6	90.6	18.3	36.8	32.1	27.0	51.0	19.4	23.2	14.0	8.9	30.9	22.4
ST 81	34.0	25.1	29.2	14.6	50.5	33.2	28.6	37.8	21.9	23.2	9.9	12.1	26.7	11.6
ST 82	59.8	29.3	84.9	30.5	33.7	40.5	51.6	33.8	25.8	29.5	18.5	33.2	39.3	18.2
ST 83	57.7	27.2	52.8	21.1	47.9	27.9	88.1	28.1	19.4	26.3	11.3	33.2	36.8	21.4
ST 84	29.9	19.9	33.0	25.4	116.8	24.7	42.1	51.0	23.2	30.5	14.9	13.2	35.4	27.8
ST 85	78.4	95.3		128.2	81.1			59.5		51.6	58.1		78.9	26.6
ST 86	74.2	46.1		130.0	95.8			51.9		69.5	44.6		73.2	31.0
ST 87	76.3	40.8		70.0	95.8			44.3		90.5	45.5		66.2	22.9
ST 97	134.0	56.5		48.4	75.8	80.5	76.2	106.2	100.0	76.8	56.8	53.2	78.6	26.1
ST 98	227.8	51.3		45.5			102.4	113.8	99.4	78.9	46.4	64.7	92.2	56.9
ST 99	176.3	51.3		47.4	28.4	63.7	92.1	104.3	105.2	78.9	59.0	52.6	78.1	40.8
Avg	59.0	30.7	47.5	24.4	42.1	39.9	49.9	53.6	31.3	36.1	26.2	26.3	**Gr Avg**	**38.9**
Stdev	38.9	17.7	20.3	29.4	22.8	14.5	19.7	23.1	23.2	18.1	13.9	15.7	**Stdev**	**24.9**

Table A2. 1992 Chlorophyll-*a* Data.

ST/WK	92/1	92/2	92/3	92/4	92/5	92/6	92/7	92/8	92/9	92/10	92/11	92/12	Sta Avg	Stdev
ST 1	1.0	3.5	9.2	13.0	5.9	3.3	1.8	1.1	1.5	7.3	3.3	3.4	4.5	3.7
ST 2	2.0	9.2	7.1	3.8	8.7	2.4	1.1	0.7	0.8	2.7	3.8	11.0	4.4	3.6
ST 3	9.0	3.6	3.9	4.8	5.4	2.8	2.3	0.9	2.2	9.4	3.5	6.3	4.5	2.6
ST 4	8.6	2.7	12.8	8.1	5.1	7.9	3.8	3.2	11.3	3.6	4.7	12.8	7.1	3.7
ST 5	3.3	3.0	12.5	8.0	11.4	7.8	4.6	2.5	6.2	5.1	6.9	13.0	7.0	3.7
ST 6	4.3	2.8	11.4	5.1	6.2	6.7	3.1	4.0	7.4	4.9	8.9	12.0	6.4	3.0
ST 7	1.6	1.9		3.9	12.4	3.5	4.0	1.7	2.2		4.0	1.8	3.7	3.2
ST 8	2.6	11.9		2.6	11.8	4.4	2.8	2.3	3.0		3.9	3.3	4.9	3.7
ST 9	2.0	5.4		5.4	5.0	4.9	2.4	1.8	2.0		4.3	1.5	3.5	1.7
ST 16	5.3	2.5	12.9	9.4	8.4	2.2		2.2	7.2	4.5	5.9	9.4	6.4	3.5
ST 17	4.5	5.3	11.2	4.3	11.5	0.6		2.8	6.3	3.9	12.5	11.4	6.8	4.1
ST 18	2.1	4.9	4.1	4.6	6.4	9.5		2.7	4.6	2.1	12.6	11.8	5.9	3.7
ST 19			2.0	1.9	1.3	0.8	0.6	0.6	1.8	0.8	3.0	0.9	1.4	0.8
ST 20			0.2	9.7	0.1	0.1	0.5	0.5	1.9	2.1	1.9	1.6	1.9	2.9
ST 21			1.0	4.1	2.3	2.0	0.9	0.6	2.3	0.2	2.7	1.2	1.7	1.2
ST 40	4.7	11.1	4.2	5.1	5.2	2.4	3.7	0.7	2.3	2.2	3.5	3.9	4.1	2.6
ST 41	4.8	7.1	2.0	4.3	3.4	2.2	0.6	0.7	2.0	2.0	4.4	2.6	3.0	1.9
ST 42	2.4	4.9	1.5	2.8	1.8	5.9	4.2	0.5	2.3	1.7	4.5	3.6	3.0	1.6
ST 43	1.3	5.7	5.2	3.2	8.4	3.9	4.0	1.6	4.0	3.0	4.4		4.1	2.0
ST 44	1.1	4.9	8.3	3.1	7.5	4.5	4.0	1.2	3.7	2.8	3.0		4.0	2.3
ST 45	2.3	7.3	8.6	4.5	8.3	5.5	2.7	1.5	3.3	3.4	1.1		4.4	2.7
ST 49	2.4	11.3	5.3	9.7	8.5	3.7	5.0	4.3	4.1	3.4	1.9	4.3	5.3	2.9
ST 50	5.6	9.6	5.9	12.0	10.0	7.7	11.1	5.0	6.9	8.5	3.1	6.0	7.6	2.7
ST 51	7.0	11.4	5.6	11.1	11.2	11.3	3.6	4.0	8.5	5.7	4.4	4.8	7.4	3.1
ST 55	1.7	4.8	11.1	8.5	6.5	4.1	4.0	3.4	7.1	4.0	12.1	7.7	6.3	3.2
ST 56	2.3	8.7	11.1	7.4	6.1	0.9	6.9	2.8	5.7	4.2	12.4	11.3	6.7	3.7
ST 57	3.2	5.6	7.6	7.8	8.5	1.4	2.2	5.7	6.1	9.7	12.2	11.8	6.8	3.5
ST 64	1.6	4.6	8.2	5.4	5.3		0.9	1.2	6.5	3.7	5.8	6.3	4.5	2.4
ST 65	1.5	3.1	9.0	6.5	6.3		3.1	4.0	4.8	5.0	2.1	4.3	4.5	2.2
ST 66	2.3	8.2	8.7	7.5	8.5		2.6	4.6	5.2	4.3	2.5	3.6	5.3	2.5
ST 70	4.2	5.8	5.4	5.1	7.4	11.2	1.5	5.6	11.5	11.4	13.5	8.7	7.6	3.6
ST 71	11.2	4.8	3.1	6.3	12.6	11.3	2.6	11.6	11.3	12.3	12.7	11.2	9.3	3.9
ST 72	9.7	3.9	4.1	5.6	12.4	6.0	1.8	11.6	11.6	11.9	13.1	12.2	8.7	4.1
ST 79	1.2	1.9	1.4	4.3	0.1	0.3	0.1	10.4	0.5	1.4	1.0	1.1	2.0	2.9
ST 80	0.7	2.5	2.3	0.6	0.2	0.7	0.1	0.4	0.8	1.2	0.6	2.2	1.0	0.8
ST 81	1.7	3.4	1.1	2.5		0.7	0.2	0.5	0.5	0.8	8.9	5.5	2.3	2.7
ST 82	2.7	5.1	6.6	4.3	2.7	9.5	4.7	5.8	3.7	3.8	0.9	2.7	4.4	2.2
ST 83	11.5	3.1	7.7	4.9	4.5	4.6	3.8	4.0	2.6	5.7	6.7	5.2	5.4	2.4
ST 84	4.8	4.9	5.5	11.4	9.7	4.5	3.6	2.0	3.0	7.1	2.6	3.3	5.2	2.9
ST 85	1.7	3.2		1.3	12.7	11.4		13.6		12.4	10.0		8.3	5.3
ST 86	8.3	4.8		0.3	7.6	4.8		13.6		11.3	12.9		8.0	4.6
ST 87	0.7	4.9		1.5	13.0	11.7		13.1		12.0	12.2		8.6	5.3
ST 97	10.6	2.2		6.8	12.0	12.6	8.7	13.4	12.9	13.0	13.4	14.4	10.9	3.7
ST 98	1.4	2.0		8.4	4.1	12.4	9.2	13.5	12.0	13.9	12.1	12.6	9.2	4.7
ST 99	1.3	1.1		9.6	1.2	12.2	9.3	13.6	12.9	13.4	12.2	9.3	8.7	5.1
Per Avg	3.9	5.2	6.3	5.8	7.0	5.4	3.4	4.5	5.2	5.8	6.5	6.7	**Gr Avg**	**5.3**
Stdev	3.1	2.9	3.7	3.1	3.8	3.9	2.6	4.5	3.7	4.1	4.4	4.3	**Stdev**	**3.7**

Table A3. 1992 Secchi Depth Data.

ST/WK	92/1	92/2	92/3	92/4	92/5	92/6	92/7	92/8	92/9	92/10	92/11	92/12	Sta Avg	Stdev
ST 1	1.50	1.50	1.50	1.50	1.80	1.50	2.00	2.00	2.00	2.00	2.50	3.00	1.90	0.47
ST 2	1.50	1.30	1.00	1.30	1.50	1.50	2.00	2.00	2.00	2.30	2.50	3.00	1.83	0.58
ST 3	1.25	1.25	1.50	1.25	1.50	1.50	1.50	1.50	2.00	2.50	2.50	2.50	1.73	0.51
ST 4	1.50	2.50	1.50	2.00	2.50	3.00	3.00	2.50	2.00	2.50	2.50	2.00	2.29	0.50
ST 5	1.50	2.50	1.50	2.00	2.50	3.00	3.00	2.50	2.00	2.50	2.50	2.00	2.29	0.50
ST.6	1.50	2.00	1.70	2.00	2.50	3.00	3.00	3.00	3.00	3.00	3.00	2.50	2.52	0.57
ST.7	2.00	1.50	1.25	1.75	3.50	4.00				2.25	3.00		2.41	0.99
ST.8	1.75	1.50	1.25	1.75	3.50	3.50				2.00	2.50		2.22	0.87
ST.9	2.00	1.50	1.50	1.75	3.50	2.50				2.00	3.00		2.22	0.73
ST.10	1.50	1.50	1.75	2.00	2.00	2.50	2.75	3.00	2.75	2.75	2.75	2.75	2.33	0.55
ST.11	1.50	1.50	1.50	2.00	2.00	2.50	3.00	3.00	2.75	2.50	2.75	2.50	2.29	0.57
ST.12	2.00	1.75	2.00	2.25	2.25	2.25	2.50	3.00	2.75	2.50	2.75	3.00	2.42	0.40
ST.13	1.50	1.50	1.50	1.50	1.75	2.00	2.00	2.25	2.50	2.00	2.00	2.00	1.88	0.33
ST.14	1.50	1.25	1.50	1.50	1.75	2.00	2.00	2.25	2.25	2.00	2.00	2.00	1.83	0.33
ST.15	1.50	1.25	1.50	1.50	2.00	2.00	2.00	2.25	2.25	1.75	2.00	2.00	1.83	0.33
ST.16	1.75	1.40	1.50	1.70	2.20	2.50	2.20	2.00		1.90	2.10	1.90	1.92	0.33
ST.17	1.75	2.00	1.50	1.60	2.10	2.00	1.90	1.80		2.00	1.90	1.60	1.83	0.20
ST.18	1.75	2.00	1.50	1.70	2.30	2.30	2.00	1.90		1.80	2.00	1.50	1.89	0.27
ST.19				2.75	3.25	2.75	3.25	2.75	2.50	3.00	3.00	3.50	2.97	0.32
ST.20				3.25	3.00	3.25	3.00	2.75	3.00	3.25	3.33	4.00	3.20	0.35
ST.21				3.00	3.25	3.00	3.25	2.75	3.00	3.50	3.25	4.50	3.28	0.51
ST 25	1.75	1.50	2.00	2.00	2.00	2.25	2.50	2.75	2.50	3.00	2.50	3.00	2.31	0.48
ST 26	1.75	1.25	1.75	2.00	2.00	2.50	2.50	2.75	2.25	2.75	2.50	3.00	2.25	0.51
ST 27	1.75	1.50	2.00	2.00	2.00	2.25	2.25	2.50	2.00	2.75	2.00	3.00	2.17	0.42
ST 28	2.00	1.75	2.25	2.25	2.50	3.00	2.75	2.75	2.75	3.25	4.00	4.25	2.79	0.75
ST 29	2.25	2.00	2.00	2.50	2.50	3.00	2.50	2.50	2.50	3.25	3.75	4.75	2.79	0.80
ST 30	2.25	2.00	2.25	2.50	2.50	3.00	2.50	2.50	2.50	3.00	3.25	4.25	2.71	0.60
ST 34	0.75	1.00	1.25		1.00		1.50			1.00			1.08	0.26
ST 35	0.75	1.00	1.25		1.25		1.25			1.25			1.13	0.21
ST 36	0.75	1.00	1.25		1.00		1.25			1.25			1.08	0.20
ST 40	2.00	1.50	1.75	1.75	2.00	2.25	2.25	1.50	1.75	1.50	2.00	1.75	1.83	0.27
ST 41	1.50	1.50	1.50	1.75	1.50	2.25	2.00	2.25	1.50	1.50	1.75	1.50	1.71	0.30
ST 42	1.75	1.75	2.00	1.75	2.25	2.75	2.75	3.00	2.25	2.25	2.00	2.00	2.21	0.42
ST 43	2.35	2.25	2.25	2.50	3.00	2.75	3.50	3.00	3.25	3.50	4.00	4.50	3.07	0.71
ST 44	2.50	2.00	2.25	2.25	2.75	3.00	3.50	2.75	3.25	3.25	3.75	4.25	2.96	0.67
ST 45	2.25	2.00	2.25	2.50	2.75	3.25	3.25	2.75	3.00	3.25	3.75	4.00	2.92	0.62
ST 46	0.05	1.00	1.50	1.00	1.50	1.75			2.00	2.00	1.75	2.00	1.46	0.62
ST 47	0.25	1.00	1.50	1.50	2.00	1.75			2.00	1.75	2.00	2.00	1.58	0.57
ST 48	0.25	0.75	1.00	1.00	1.50	1.75			2.00	1.75	1.75	1.75	1.35	0.57
ST 49	0.75	1.00	1.75	1.25	1.75	1.50	2.00	2.00	2.00	2.00	2.25	2.00	1.69	0.47

(Continued on next page)

Table A3. 1992 Secchi Depth Data (cont'd).

ST/WK	92/1	92/2	92/3	92/4	92/5	92/6	92/7	92/8	92/9	92/10	92/11	92/12	Sta Avg	Stdev
ST 50	0.50	1.00	1.50	1.00	1.50	1.25	1.50	2.00	1.75	1.75	2.00	2.00	1.48	0.47
ST 51	0.50	0.75	1.50	1.00	1.00	1.00	1.50	1.50	1.00	1.75	1.75	1.75	1.25	0.43
ST 52		2.25	1.25	1.50	2.00	1.75	2.00	1.75	1.75	2.00	2.00	1.25	1.77	0.33
ST 53		1.50	1.50	1.50	1.50	1.50	2.00	1.75	1.50	1.75	2.00	1.25	1.61	0.23
ST 54		1.50	2.00	1.75	1.75	1.75	1.75	2.00	2.00	2.00	2.00	1.50	1.82	0.20
ST 55	1.25		1.50	1.50	1.50	1.25	1.50	1.25	1.50	1.50	1.50	1.25	1.41	0.13
ST56	1.25		1.50	1.50	1.50	1.75	1.50	1.25	1.50	1.50	1.50	1.50	1.48	0.13
ST 57	1.25		1.50	1.50	1.50	1.25	1.50	1.25	1.50	1.50	1.50	1.25	1.41	0.13
ST 58	1.75	2.25	2.25	1.75	2.00	2.00				2.50	2.50	2.75	2.19	0.35
ST 59	1.75	2.00	2.25	1.75	2.00	2.00				2.50	2.50	2.75	2.17	0.35
ST 60	1.75	2.00	2.25	1.75	2.00	2.25				2.50	2.75	2.75	2.22	0.38
ST 61	1.25	1.00	1.50	2.00	2.50	1.50	2.00	2.25	2.00		1.50		1.75	0.47
ST 62	1.25	1.00	1.25	2.00	2.00	1.50	2.00	2.00	1.75		2.00		1.68	0.39
ST 63	1.25	1.00	1.50	2.25	2.00	1.50	2.00	2.00	1.75		2.00		1.73	0.40
St 64	2.50	2.00	2.50	2.40	2.50	2.75	3.00	3.00		2.80	3.50	3.40	2.76	0.45
ST 65	2.00	1.50	2.00	2.30	2.50	2.50	3.10	3.00		2.80	3.50	4.00	2.65	0.72
ST 66	3.00	1.80	2.10	2.00	2.30	2.50	3.00	2.50		2.80	4.00	3.80	2.71	0.71
ST 70	1.00	1.25	2.00	2.00	1.75	1.75	1.50	1.50	1.50	1.75	1.50	1.25	1.56	0.30
ST 71	1.00	1.25	2.00	1.75	1.50	1.75	1.50	1.50	1.50	1.50	1.50	1.25	1.50	0.26
ST 72	1.00	1.00	2.00	2.00	1.75	1.75	1.50	1.50	1.50	1.75	1.50	1.25	1.54	0.33
ST 73	1.25	1.00	1.50	2.00	2.50	1.50	2.00	2.25	2.00	1.75	1.50	1.75	1.75	0.43
ST 74	1.25	1.00	1.00	2.00	2.00	1.50	2.00	2.00	1.75	1.50	1.50	2.00	1.63	0.39
ST 75	1.25	1.00	1.50	2.25	2.00	1.50	2.00	2.00	1.75	1.75	1.25	2.00	1.69	0.39
ST 79	2.00	2.10	2.00	2.00	2.50	2.50	3.50	2.80	2.50		3.10	3.50	2.59	0.57
ST 80	2.10	2.00	2.00	2.50	3.00	3.25	3.00	3.00	2.60		3.20	3.50	2.74	0.53
ST 81	2.10	2.00	2.10	2.70	2.50	3.10	3.30	3.00	2.80		3.00	3.50	2.74	0.51
ST 82	1.00	1.50	2.00	2.00	2.00	2.00	2.00	2.00		2.00	2.00	2.25	1.89	0.34
ST 83	1.00	1.50	2.00	2.00	2.00	2.00	2.50	2.50		2.50	2.50	2.75	2.11	0.52
ST 84	1.50	2.00	2.00	2.00	2.50	2.00	2.50	2.50		2.50	3.00	3.00	2.32	0.46
ST 85	0.75		1.00	1.00	0.80	1.00		1.00		1.00		1.00	0.94	0.11
ST 86	0.75		1.00	1.00	0.80	1.00		1.00		1.00		1.00	0.94	0.11
ST 87	0.50		1.00	1.00	0.75	1.00		1.00		1.00		1.00	0.91	0.19
ST 91	0.50	1.00	1.75	1.50	1.25	1.50	1.75	1.50	1.25	1.25	1.50	1.75	1.38	0.36
ST 92	0.50	1.00	1.75	1.50	1.25	1.50	1.50	1.50	1.25	1.25	1.75	2.00	1.40	0.39
ST 93	0.75	1.25	1.50	1.25	1.50	2.00	1.75	2.00	2.00	2.00	2.00	2.25	1.69	0.44
ST 94	1.75	0.07	1.30	1.20	1.60	1.40	1.60	1.70	1.70	1.50	1.20		1.37	0.47
ST95	1.75	1.10	1.60	1.60	1.80	2.00	2.40	2.10	2.00	1.90	1.90		1.83	0.33
ST96	1.60	1.00	1.60	1.60	1.80	1.70	1.80	2.20	1.90	1.70	1.90		1.71	0.29
ST97	0.25	0.50		1.00	0.75	0.50	0.75	1.00		0.75	1.00	1.00	0.75	0.26
STY98	0.25	0.50		1.00	0.75	0.75	0.75	1.00		0.75	1.00	1.00	0.78	0.25
ST99	0.25	0.50		0.75	0.50	0.50	0.75	0.75		0.75	1.00	1.00	0.68	0.24
Per Avg	1.39	1.44	1.67	1.79	1.98	2.06	2.19	2.13	2.11	2.08	2.32	2.40	**Gr Avg**	**1.83**
Stdev	0.63	0.51	0.37	0.51	0.67	0.73	0.69	0.63	0.54	0.70	0.77	1.03	**Stdev**	**0.81**

Table A4. Water quality data for Leesville Lake.

ST/WK	92/1	92/2	92/3	92/4	92/5	92/6	92/7	92/8	92/9	92/10	92/11	92/12	Sta Avg	Stdev
	Leesville Lake Total Phosphorus													
LS ST 100	63.9	54.5	48.1	25.8	35.8	42.6	52.4	64.3	51.6	72.6	112.6	78.4	58.6	22.6
LS ST 101	45.4	48.2	26.4	26.8	30.5	36.3	47.6	66.2	52.9	47.4	62.6	41.6	44.3	12.8
LS ST 102	46.4	45.0	18.9	8.0	67.4	43.7	50.0	39.5	46.5	42.1	43.7	51.6	41.9	15.2
LS ST 103	47.4	173.8	53.3	47.4	53.7	84.7	57.9	145.2	91.6	36.8	47.3	79.5	76.6	42.7
LS ST 104	834.0	86.9	227.4	266.2	37.9	81.6	73.8	277.6	111.0	82.6	88.7	55.3	185.3	220.4
LS ST 105	27.8	9.4	95.3	15.5	37.9	34.2	34.1	41.4	29.7	29.5	6.8		32.9	23.6
Per Avg	177.5	69.6	78.2	65.0	43.9	53.9	52.6	105.7	63.9	51.8	60.3	61.3	**Gr Avg**	**63.7**
Stdev	321.8	56.7	77.8	99.5	13.9	23.0	13.1	92.6	30.8	21.1	37.0	16.9	**Stdev**	**56.6**
	Leesville Lake Chlorophyll-*a*													
LS ST 100	2.4	7.5	3	3	4	7.4	2.4	5.8	7.4	3.6	5.6	6.7	4.9	2.0
LS ST 101	0.9	4.9	2.9	3.1	4.2	9.9	1.3	4.4	8.9	5.7	7.8	9.5	5.3	3.1
LS ST 102	8	11.8	5.7	2.7	1	4.8	9.2	4.8	9.7	5.1	7	7.1	6.4	3.0
LS ST 103	2.9	2.5	2.6	3.3	12.7	2	1.6	1.6	11.5	1.8	1.1	0.9	3.7	4.0
LS ST 104	1.2	0.3	0.7	0.8	12.8	2.5	0.4	2.3	1.4	3.9	1.3	1.4	2.4	3.4
LS ST 105	5.4	4.8	4.2	1.4	14.2	0.9	0.3	1.1	1.3	1.7	0.4	0.9	3.1	3.9
Per Avg	3.5	5.3	3.2	2.4	8.2	4.6	2.5	3.3	6.7	3.6	3.9	4.4	**Gr Avg**	**4.0**
Stdev	2.7	4.0	1.7	1.0	5.7	3.5	3.4	1.9	4.4	1.6	3.3	3.8	**Stdev**	**2.3**
	Leesville Lake Secchi Depth													
LS ST 100	1.50	0.05	0.05	1.75	2.00	1.50	2.00	2.00	2.00	1.50	1.50	1.50	1.45	0.69
LS ST 101	1.50	0.75	0.05	1.75	2.00	1.75	2.25	2.25	2.25	1.50	1.50	1.50	1.59	0.65
LS ST 102	1.20	0.75	0.05	1.75	2.00	1.75	2.00	2.25	2.25	1.50	1.75	1.75	1.58	0.64
LS ST 103	0.50	0.50	0.50	1.00	0.50	0.50	1.00	0.25	0.50	0.50	1.25	1.00	0.67	0.31
LS ST 104	0.50	0.75	0.50	0.75	0.50	0.50	0.75	0.25	0.25	0.50	0.50	0.50	0.52	0.17
LS ST 105	2.00		1.50		0.75		2.00	1.50	1.50			2.00	1.61	0.45
Per Avg	1.2	0.6	0.4	1.4	1.3	1.2	1.7	1.4	1.5	1.1	1.3	1.4	**Gr Avg**	**1.03**
Stdev	0.6	0.3	0.6	0.5	0.8	0.6	0.6	0.9	0.9	0.5	0.5	0.5	**Stdev**	**0.58**