Water Quality Analysis of Eutrophication for Little Seneca Lake, Montgomery County, MD

FINAL

DEPARTMENT OF THE ENVIRONMENT
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Table of Contents

List of Figures

List of Tables

List of Abbreviations

BMP	Best Management Practice
cfs	Cubic Feet per Second
COMAR	Code of Maryland Regulation
CWA	Clean Water Act
DNR	Department of Natural Resources
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
m	Meters
MDE	Maryland Department of the Environment
mg/l	Milligrams Per Liter
mi^2	Square miles
MNCPPC	Maryland National Capital Parks and Planning Commission
NCHF	North Central Hardwood Forest
NGP	Northern Glaciated Plain
NLF	Northern Lakes and Forest
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSI	Trophic State Index
WCBP	Western Corn Belt Plains
WPP	Watershed Protection Plan
WQLS	Water Quality Limited Segment
WSSC	Washington Suburban Sanitary Commission
µg/l	Micrograms Per Liter

EXECUTIVE SUMMARY

Section 303(d) of the federal Clean Water Act (CWA) and the U.S Environmental Protection Agency's (EPA) implementing regulations direct states to identify and list waters, known as water quality limited segments (WQLSs), in which current required controls of a specified substance are inadequate to achieve water quality standards. For each WQLS, the State is to either establish a Total Maximum Daily Load (TMDL) of the specified substance that the waterbody can receive without violating water quality standards, or demonstrate that water quality standards are being met.

Little Seneca Lake in the Seneca Creek watershed basin (02140208) was identified on Maryland's 1998 list of WQLSs as being impaired by nutrients. An analysis of recent monitoring data (MDE, 2001) shows that the criteria associated with nutrients are being met, and the designated use in Little Seneca Lake is supported. This analysis supports the conclusion that a TMDL for nutrients is not necessary to achieve water quality in this case. Barring the receipt of any contradictory data, this report will be used to support the nutrient listing change for Little Seneca Lake from Category 5 ("waterbodies impaired by one or more pollutants and requiring a TMDL") to Category 2 ("surface waters that are meeting some standards and have insufficient information to determine attainment of other standards") when MDE proposes the revision of Maryland's 303(d) list for public review in the future. Urban development is occurring in portions of the Little Seneca Lake watershed, and is expected to increase in the future. It is expected that over time, the character of the watershed may change as a consequence of land conversion and development. Although the waters of Little Seneca Lake do not presently display signs of eutrophication, the State reserves the right to require future controls in the Little Seneca Lake watershed if evidence suggests nutrients from the basin are contributing to water quality problems.

1.0 INTRODUCTION

Section 303(d) of the federal Clean Water Act (CWA) and U.S. Environmental Protection Agency (EPA)'s implementing regulations direct each state to identify and list waters, known as water quality limited segments (WQLSs), in which current required controls of a specified substance are inadequate to achieve water quality standards. This list of impaired waters is commonly referred to as the "303(d) list." For each WQLS, the State is to either establish a Total Maximum Daily Load (TMDL) of the specified substance that the waterbody can receive without violating water quality standards, or demonstrate that water quality standards are being met.

A segment identified as a WQLS might not require the development and implementation of a TMDL if current information contradicts the previous finding of an impairment. Based on EPA's guidance for water quality-based decisions, four scenarios obviating the need for a TMDL are as follows: (1) recent data indicate that the impairment no longer exists (*i.e.*, water quality standards are being met); (2) more recent and updated water quality modeling demonstrates that the waterbody attains standards; (3) refinements to water quality standards, or the interpretation of those standards, result in the attainment of the standard; and (4) corrections are made to errors in the original listing.

Little Seneca Lake (in the Seneca Creek watershed, basin code 02140208) was first identified on the 1998 303(d) list, submitted to EPA by the Maryland Department of the Environment (MDE), as being impaired by nutrients. Little Seneca Lake was listed as impaired by nutrients on the basis of seasonally low oxygen levels in the lower portions of the lake (Maryland Department of Natural Resources, 2001). This report provides an analysis of more recent information that supports the removal of the nutrients listing for Little Seneca Lake when the 303(d) list is revised. Accordingly, the aforementioned first scenario most closely applies. Additionally, the initial listing was based on the occurrence of low hypolimnetic dissolved oxygen (DO); analyses demonstrate that this condition in Little Seneca Lake is due to thermal stratification, a natural process in lakes. Thus, the third scenario also applies.

The remainder of this report lays out the general setting of the waterbody within the Little Seneca Lake watershed, presents a discussion of the water quality characteristics in the basin, and provides conclusions with regard to the current water quality characteristics and the current standards. The analysis demonstrates that Little Seneca Lake is achieving water quality standards.

2.0 GENERAL SETTING

Little Seneca Lake is an impoundment located near Boyds in Montgomery County, Maryland (Figure 1). The impoundment, which is owned by the Washington Suburban Sanitary Commission (WSSC), lies on Little Seneca Creek, a tributary of the Great Seneca River. It was built in 1984 as a reserve water supply reservoir for the Potomac Water Filtration Plant (WSSC, 1998).

Little Seneca Lake lies in the Piedmont ecoregion, which occurs between the Appalachian Mountains and the Atlantic Coastal Plain on the East Coast. Topography is rolling to moderately hilly, soils are varied, the land use is a mixture of forest, agricultural and developed, and there are few natural lakes (none in Maryland). The soils immediately surrounding the lake are the Brinklow-Baile-Occoquan association (United States Department of Agriculture, Soil Conservation Service, 1995). These soils range from poorly drained to well drained, and moderately deep to deep.

Inflow to the lake is from three major river channels–Tenmile Creek, Cabin Branch Creek, and Little Seneca Creek. The lake discharges to Little Seneca Creek, which in turn discharges to the Great Seneca River. About half of the land in the watershed draining to Little Seneca Lake is forested, with the remainder a mix of developed and agricultural use (Figure 2). Land use distribution in the watershed is approximately 23% developed, 49% forested, 3% open water, and 25% agricultural (Figure 3) (Maryland Department of Planning, 2001).

Portions of the Little Seneca Lake watershed are designated by Montgomery County as a “Special Protection Area” (SPA) in recognition of the County’s master plan, whereby these areas contain existing and planned development in support of the County's housing and job needs. The SPA designation entails specific County regulatory requirements, including enhanced plan review, stream monitoring, and Best Management Practice (BMP) performance monitoring for new development. It is expected that over time, the character of the watershed may change as a consequence of land conversion and development.

There are no significant point source contributions within the watershed. Several relevant statistics for Little Seneca Lake are provided below in Table 1.

Table 1: Current Physical Characteristics of Little Seneca Lake

Location:	Montgomery County, MD Lat. $39^0$11'09.9" long. $77^0$18'10.0"
Surface Area:	505.0 acres = (12,763,080ft^2) = (1,185,729m^2)
Shoreline:	15.7 mi
Maximum Width:	1200 feet
Average Lake Depth:	24.7 feet
Maximum Depth:	68 feet
Purpose	Emergency Water Supply, Recreation and Flood Control
Basin Code	02140208
Volume of Lake:	12,473.5 acre-feet (9,557,017 m^3)
Drainage Area to Lake:	20.8 mi^2
Average Discharge:	22.8 cfs

Source: Montgomery County and WSSC.

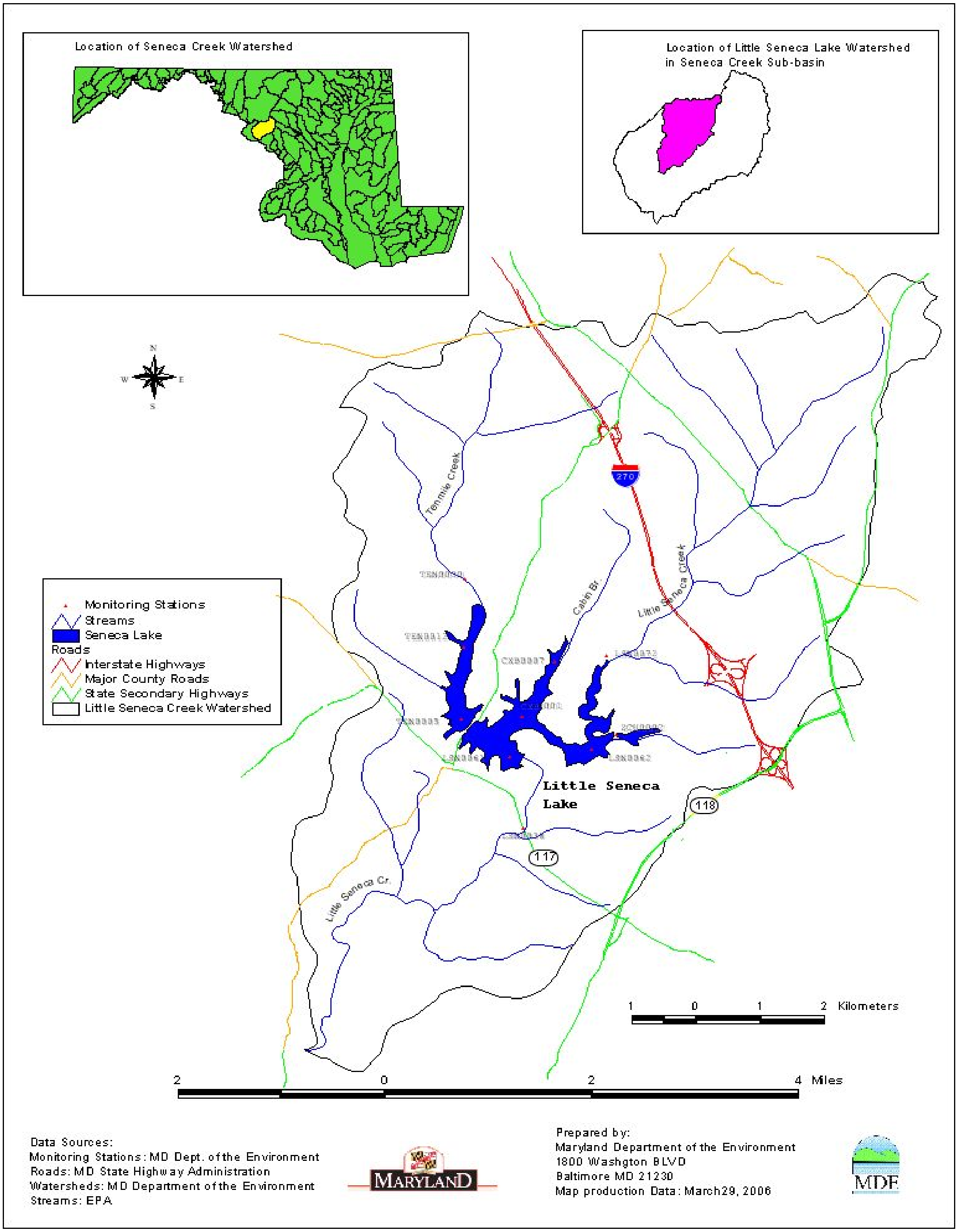

Figure 1. Location Map of Little Seneca Lake in Montgomery County, MD

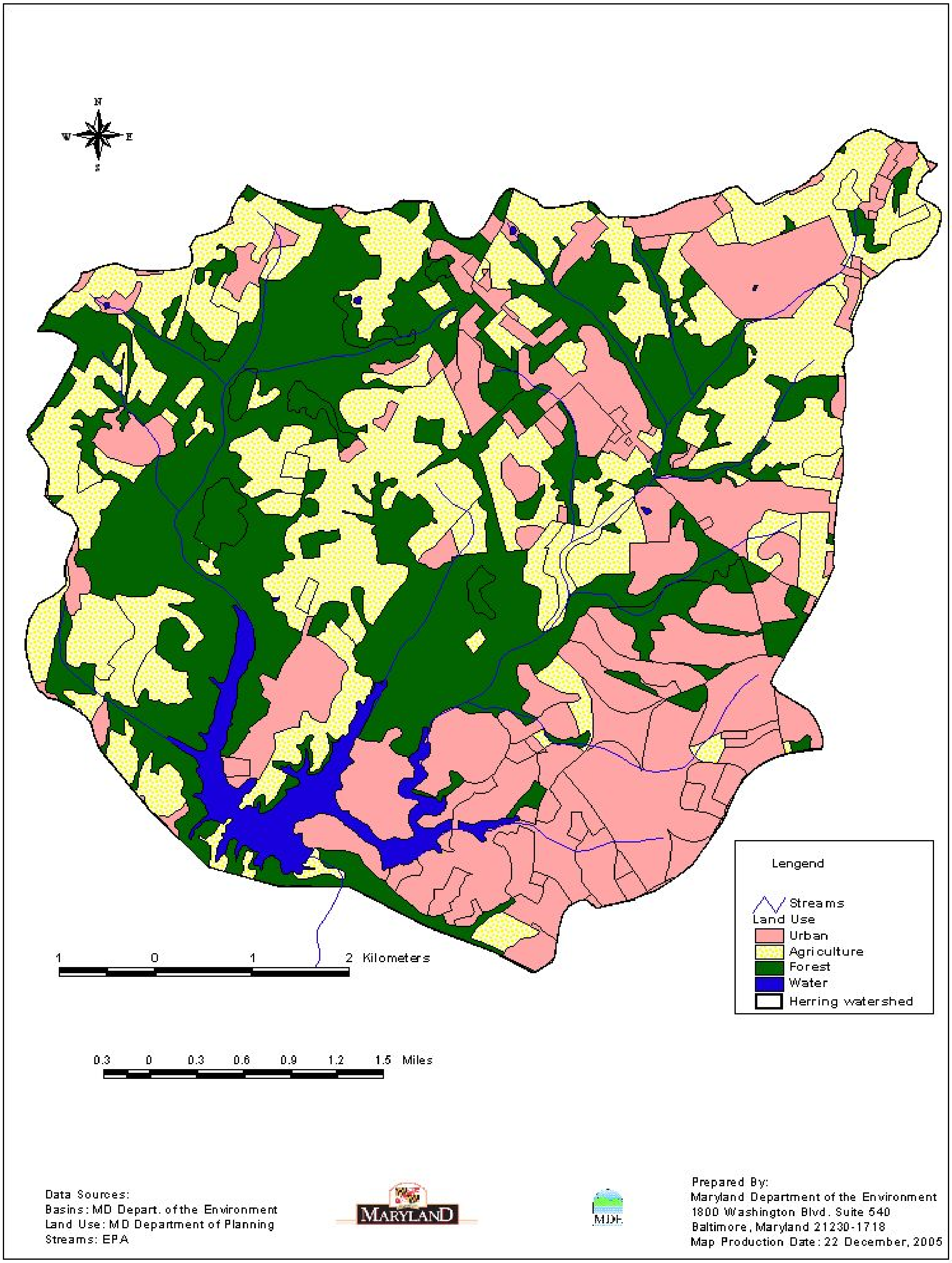

Figure 2. Predominant Land Use in the Little Seneca Lake Watershed

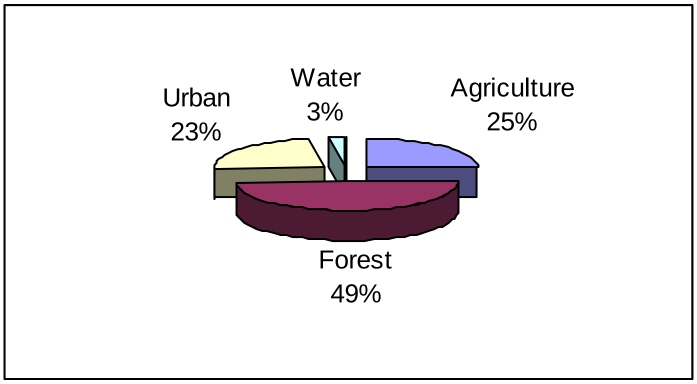

Figure 3. Land Use in Drainage Basin of Little Seneca Lake

3.0 WATER QUALITY CHARACTERIZATION

Little Seneca Lake was listed in 1998 as impaired by nutrients on the basis of seasonally low oxygen levels in the lower portions of the lake (the hypolimnion). Like many lakes, Little Seneca Lake naturally undergoes a period of thermal stratification from late spring into fall; at this time warmer surface waters do not readily mix with cooler, deeper waters. The DO concentration in the deeper portions of impoundments may fall below 5.0 mg/l in the summer months due to this natural thermal stratification. The water quality data presented in this section will show that the designated use of this water body is being met as it relates to nutrients.

All readily available water quality data for the last five years pertaining to Little Seneca Lake were considered for this analysis. Water quality data from MDE surveys conducted at multiple depths at seven stations within Little Seneca Lake during Summer 2001 were used to perform this analysis. This encompasses the period of thermal stratification, a critical condition for Little Seneca Lake. Station LSN0061 lies approximately in the deepest part of the lake and is representative of conditions at various depths throughout the lake. Physical water quality, nutrient and chlorophyll parameters were assessed at all seven stations. Detailed water quality data are presented in Appendix A. Washington Suburban Sanitary Commission (WSSC) water quality data (1998) and Maryland National Capital Parks and Planning Commission (MNCPPC) monitoring data (1999 to 2000) were also considered.

3.1 Water Quality Standards

A water quality standard is the combination of a designated use for a particular body of water, and the water quality criteria established to protect that use. Designated uses include activities such as swimming, drinking water supply, and trout propagation and harvest. Water quality criteria consist of narrative statements and numeric values designed to protect the designated uses. Criteria may differ among waters with different designated uses.

Maryland's General Water Quality Criteria prohibit pollution of waters of the State by any material in amounts sufficient to create a nuisance or interfere directly or indirectly with designated uses. See Code of Maryland Regulations (COMAR) 26.08.02.03B(2). Excessive eutrophication, indicated by elevated levels of chlorophyll *a*, can produce nuisance levels of algae that interfere with designated uses such as fishing and swimming. Maryland's water quality standards presently do not impose a limit on the concentration of nutrients in the water column.[1] Rather, Maryland manages nutrients indirectly by limiting their effects expressed in terms of excess algal growth and low DO. Little Seneca Lake, an impoundment on a tributary of the Little Seneca Creek near Boyds, has been designated a Use IV-P waterbody, pursuant to which it is protected for water contact recreation, recreational trout waters and public water supply. See COMAR 26.08.02.08(O). Use IV-P waters are subject to a DO criterion of not less than 5.0 mg/l at any time (COMAR 26.08.02.03-3G) unless natural conditions result in lower levels of DO (COMAR 26.08.02.03A). The DO concentration in the deeper portions of reservoirs occasionally falls below 5.0 mg/l, due to natural thermal stratification.

Maryland's policy is to address hypolimnetic hypoxia[2] in lakes on a case-by-case basis. In the event of observed hypoxia in the deeper portions of lakes during stratification, Maryland will conduct an analysis to determine if current loading conditions result in a degree of hypoxia that significantly exceeds (in terms of frequency, magnitude and duration) that associated with natural conditions in the lake and its watershed. This analysis may vary from one lake to another in terms of type, approach and scope. Examples may include a review of setting, source assessment and land use, so as to assess current loads; a comparison of estimated current loads exported from the watershed with analogous load estimates under 'natural' land cover; and model scenario runs simulating natural conditions. This list is not inclusive, and Maryland expressly reserves the right to determine and conduct the most appropriate type of analysis on a case-by-case basis.

The Use IV-P designation requires that the reservoir not become eutrophic. A chlorophyll *a* concentration of 10 µg/l corresponds approximately to a Carlson's Trophic State Index (TSI) of 53, which is at the boundary between mesotrophic and eutrophic conditions (Carlson, 1977). An endpoint, seeking to preserve and enhance the mesotrophic status of the reservoir and compatible with the Use IV-P designation, is a mean chlorophyll *a* level of 10 µg/l and maximum of 30 µg/l. This endpoint is not a numeric criterion, but rather a metric for the application of the State's general water quality criteria. Although designated as a drinking water supply, the reservoir is not currently used for that purpose.

[1] Maryland limits the ammonia form of nitrogen from wastewater treatment plants, due to its toxic effects on some aquatic organisms.
[2] During the summer lakes stratify with warm, less dense water at the surface and cold denser water at the bottom. This is called thermal stratification. The hypolimnion is the boundary between the warm and cold water.

4.0 ASSESSMENT OF EUTROPHICATION

4.1 Nutrients

Nitrogen and phosphorus are essential nutrients for algae growth. However, common types of algae require different amounts of these two nutrients. If one nutrient is available in great abundance relative to the other nutrient, then the nutrient that is less available restricts the amount of plant matter that can be produced, regardless of the amount of the other nutrient that is available. This latter nutrient is called the "limiting nutrient." In general, an N:P ratio in the range of 5:1 to 10:1 by mass is associated with plant growth being limited by neither phosphorus nor nitrogen. If the N:P ratio is greater than 10:1, phosphorus tends to be limiting, and if the N:P ratio is less than 5:1, nitrogen tends to be limiting (Chiandani and Vighi, 1974). An average TN: TP ratio value of 65.6 indicates that Little Seneca Lake is strongly phosphorus limited; thus, efforts to manage nutrients should be focused on phosphorus. As mentioned earlier, Maryland's water quality standards presently do not place a limit on the concentration of nutrients in the water column. Rather, Maryland manages nutrients indirectly by limiting their effects expressed in terms of excess algal growth and low DO.

During the sampling period, total phosphorus (TP) concentrations ranged from 0.008 mg/l to 0.038 mg/l, and total nitrogen (TN) concentrations ranged from 0.5 mg/l to 2.0 mg/l. The observed TP concentrations are associated with Carlson's TSI values in the range of 34 to 53, which is in the oligotrophic-mesotrophic region, and is below the eutrophic threshold at which the lake might be considered impaired. Tabular data are presented in Table A-2.

4.2 Dissolved Oxygen

Little Seneca Lake undergoes a period of distinct thermal stratification during summer months. This phenomenon is typical of lakes in the temperate region, where strong contrasts in seasonal conditions exist. During summer thermal stratification, the layers of the lake are highly resistant to mixing with each other (Wetzel, 2001).

During the summer 2001 sampling period, DO concentrations measured at the surface ranged from 7.6 to 10.3 mg/l. DO concentrations in the deeper portions of the lake ranged as low as 0.1 mg/l. Figure 4 depicts a depth profile of temperature and DO at Station LSN0061 on August 9, 2001. These conditions are representative of maximum thermal stratification throughout the depth profile of the lake. Both temperature and DO decline discontinuously with depth, with an abrupt transition occurring between a depth of 3m and 9m. Above this region, both temperature and DO are relatively uniform (ranging respectively from 29.3 – 29.6 ^{o}C and 8.3 – 8.5 mg/l). Below 9m, these two parameters are similarly uniform, ranging from 6.8 – 12.5 ^{o}C and 0.7 – 1.1 mg/l, respectively. Within the 3 – 9m depth zone, temperature drops from 29.3 to 12.5^{o} C, and DO decreases from 8.3 to 0.7 mg/l. Tabular data are presented in Table A-1.

The observed temperature profile indicates strong thermal stratification, which occurs naturally in many lakes and is often associated with natural hypolimnetic DO depletion (Wetzel, 2001). As a component of the Little Seneca Lake Water Quality Analysis, MDE has examined three Maryland impoundments with similar temperature and DO profiles—Greenbrier Lake, Prettyboy Reservoir, and Loch Raven Reservoir—in an effort to assess the degree to which observed hypolimnetic hypoxia differs from that expected under "natural" conditions. The watershed surrounding Greenbrier Lake is over 90% forested, and the lake exhibits a DO profile during stratification very similar to that observed in Little Seneca Lake. In the case of the Prettyboy and Loch Raven Reservoirs, a linked watershed/water quality modeling system exists, allowing an "all forest" modeling scenario to be conducted. The simulated "all forest" DO profile under stratified conditions, approaching anoxia[3], was very similar to that observed in the two reservoirs, and similar as well to the profile observed in Little Seneca Lake. No such modeling system exists for Little Seneca Lake. However, the analyses conducted in the other impoundments support the conclusion that the hypoxia observed in Little Seneca Lake is due to the natural condition of thermal stratification. The reader is referred to MDE (2004) and MDE (2006, in press) for full details.

[3] The absence of oxygen

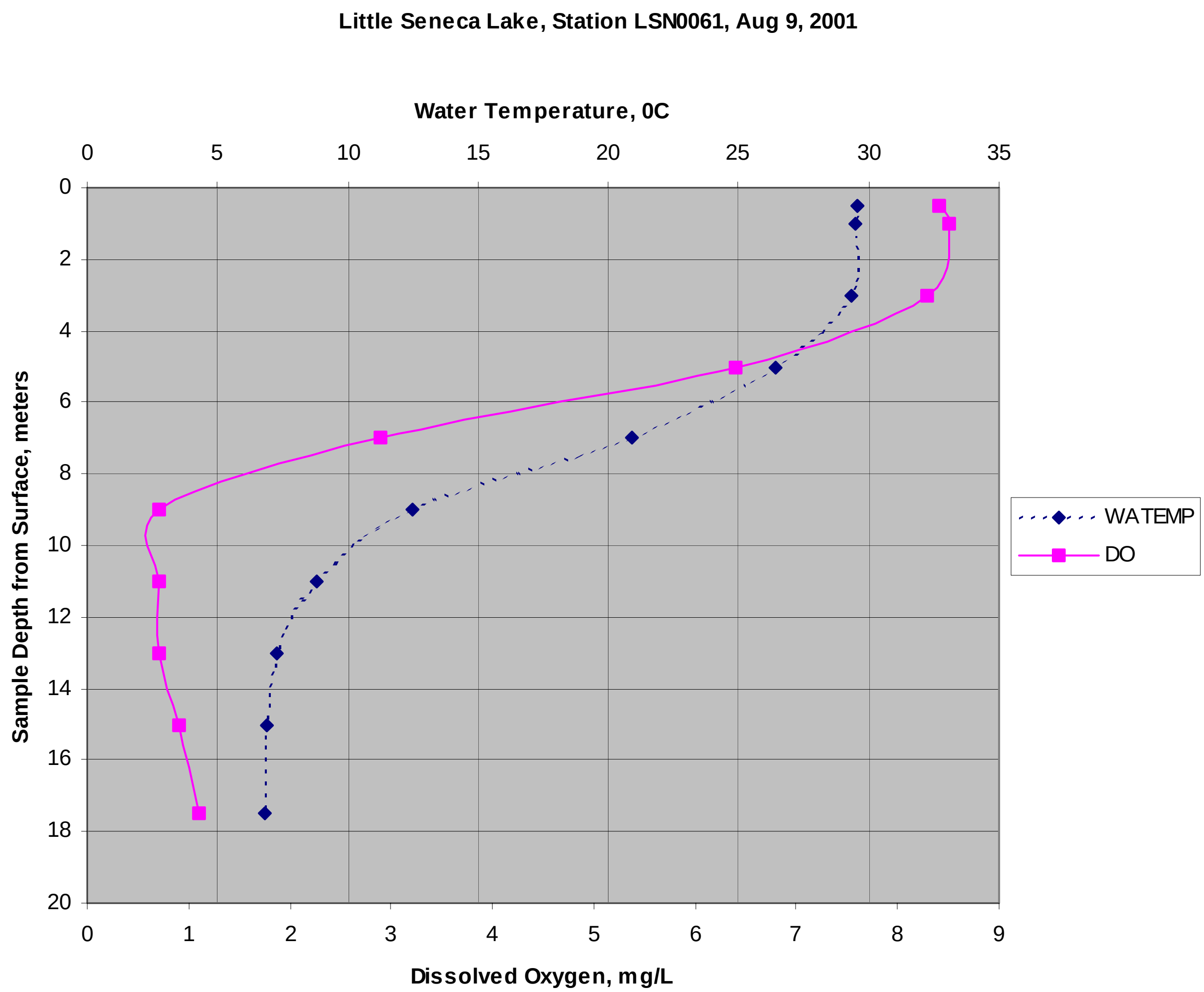

Figure 4: Depth Profile of Temperature and Dissolved Oxygen, Little Seneca Lake, August 9, 2001

4.3 Chlorophyll *a*

Chlorophyll *a* data were collected in Little Seneca Lake on July 18, July 25, July 31, August 9 and September 18, 2001. Chlorophyll *a* concentrations are typically at their peak in lakes during this time of the year. During this sampling period, instantaneous chlorophyll *a* concentrations ranged from 1.25 to 7.33 µg/l (Table A-2). The observed concentrations are low, well below the water quality threshold of 10 µg/l associated with eutrophic conditions (Chapra, 1997), and translate to Carlson's TSI values ranging from 32.76 to 50.14, which are consistent with an oligotrophic to mesotrophic state.

4.4 Biochemical Oxygen Demand (BOD)

Biochemical Oxygen Demand (BOD) is the amount of oxygen required by aerobic microorganisms to decompose the organic matter—natural or anthropogenic—in a sample of water. Because BOD also consumes DO, this potentially confounding factor must be considered in the analysis if low DO is observed. During the Summer 2001 sampling period, BOD concentrations were relatively low, ranging from 0.7 to 2.0 mg/l. Given that the lake's watershed is significantly forested, such values could derive from natural organic inputs such as leaves and other forest detritus. Data are presented in Table A-1.

4.5 Water Clarity

During the sampling period in Summer 2001, Secchi depths at Station LSN0061 ranged from 1.8 to 7.2 m. These values correspond to Carlson's TSI values of 31.5 to 51.5, which are in the oligotrophic – mesotrophic range. The data are presented in Table A-2.

5.0 CONCLUSION

The data presented above clearly demonstrate that excessive algal growth does not exist in Little Seneca Lake, as indicated by low chlorophyll *a* concentrations. Measurements of TP concentrations, chlorophyll *a* levels, and Secchi depth are consistent in providing a trophic state assessment in the oligotrophic to mesotrophic range, which is compatible with the lake's designated use.

Low hypolimnetic DO concentrations are demonstrably the result of natural conditions, as evidenced by the occurrence of thermal stratification. The observed BOD concentrations are relatively low, and could indicate sufficient oxygen demand to result in the depletion of DO from the deepest regions of the lake only because the bottom waters are nearly completely cut off from any source of reoxygenation other than diffusion. Hypoxia observed during the period of thermal stratification is thus not significantly different than what would occur under strictly natural conditions.

Urban development is occurring in portions of the Little Seneca Lake watershed, and is expected to increase in future. Portions of the Little Seneca Lake watershed are designated by Montgomery County as a "Special Protection Area" (SPA). The SPA designation entails specific County regulatory requirements, including enhanced plan review, stream monitoring, and BMP performance monitoring for new development.

It is expected that over time, the character of the watershed may change as a consequence of land conversion and development. MDE's watershed cycling strategy provides for monitoring at approximately five-year intervals. Other entities and jurisdictions (WSSC, Montgomery County) may wish to consider collecting appropriate in-lake monitoring data, in coordination with MDE, to provide for a comprehensive monitoring strategy.

Based on the surveys conducted during 2001 and data received from WSSC, Montgomery County and Maryland National Capital Parks and Planning Commission (MNCPPC), the water quality data indicate that Little Seneca Lake has no eutrophication-related water quality impairments. Barring the receipt of any contradictory data, this report provides sufficient justification to support the nutrient listing change for Little Seneca Lake from Category 5 ("waterbodies impaired by one or more pollutants and requiring a TMDL") to Category 2 ("surface waters that are meeting some standards and have insufficient information to determine attainment of other standards") when MDE proposes the revision of Maryland's 303(d) list for public review in the future.

REFERENCES

Carlson, R.E. A trophic state index for lakes. Limnology and Oceanography 22:361-369. 1977.

Chapra, Steven C. Surface Water Quality Modeling. McGraw – Hill. 1997.

Chiandani, G. and M. Vighi, "The N:P Ratio and Tests with Selanastrum to Predict Eutrophication in Lakes", Water Research, Vol. 8, pp 1063-1069. 1974.

COMAR 26.08.08.02.02B, 26.08.02.03-3G, 26.08.02.03A, 26.08.02.03.B(8), 26.08.02.08(O).

Heiskary, Steve. Minnesota Pollution Control Agency. Personal communication. 2000.

Http://www.montgomerycountymd.gov/deptmpl.asp?url=/content/dep/csps/watersheds/csps/html/lsen.asp

Maryland Department of the Environment, Water Quality Monitoring Data, 2001.

Maryland Department of the Environment. 2004. "Water Quality Analysis of Eutrophication for Greenbrier Lake, Washington County, Maryland"

Maryland Department of the Environment. 2006 (*in press*). "Total Maximum Daily Loads of Phosphorus and Sediments for Loch Raven Reservoir and Total Maximum Daily Loads of Phosphorus for Prettyboy Reservoir, Baltimore, Carroll and Harford Counties, MD and York County, PA"

Maryland Department of Planning, 2001.

Maryland Department of the Natural Resources, 2001. Section 305 (b) report

Maryland Department of the Natural Resources. Maryland Lake Water Quality Assessment, 1991 Interim Report, 1993, 1997.

U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Montgomery County, Maryland, July 1995.

Washington Suburban Sanitary Commission, 1998.

Wetzel, R. G. 2001. <u>Limnology: Lake and River Ecosystems</u>. Academic Press, Inc., San Diego, U.S.A

Appendix A

Table A-1: Physical Water Quality Data— Little Seneca Lake (MDE, 2001)

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH FROM SURFACE METERS	DISSOLVED OXYGEN FIELD VALUE MG/L	WATER TEMP. °C	CONDUCTIVITY	PH	BOD
CXB0001	7/18/2001	0.5	9.6	27.5	216	9.5	.
CXB0001	7/18/2001	1	9.6	27.5	216	9.5	.
CXB0001	7/18/2001	2	9.7	27.4	216	9.5	.
CXB0001	7/18/2001	3	9.6	27.3	216	9.5	.
CXB0001	7/18/2001	4	9.3	26.5	214	9.4	.
CXB0001	7/18/2001	5	8.9	26.3	211	8.9	.
CXB0001	7/18/2001	6	8.7	21.8	201	6.9	.
CXB0001	7/18/2001	7	0.2	17.6	203	6.6	.
CXB0001	7/18/2001	8	0.2	13.4	228	6.6	.
CXB0001	7/18/2001	10	0.3	8.4	252	6.7	.
CXB0001	7/18/2001	12	0.3	7.6	253	6.7	.
CXB0001	7/18/2001	13.4	0.4	7.2	254	6.8	.
CXB0001	7/25/2001	0.5	9	28.7	222	9.5	.
CXB0001	7/25/2001	1	9	28.6	222	9.5	.
CXB0001	7/25/2001	3	9.2	28.1	222	9.5	.
CXB0001	7/25/2001	5	6.5	26	220	7.4	.
CXB0001	7/25/2001	7	0.9	20.1	207	6.8	.
CXB0001	7/25/2001	9	0.2	10.3	260	6.9	.
CXB0001	7/25/2001	11	0.3	7.8	263	6.9	.
CXB0001	7/25/2001	13.3	0.4	7.3	262	7	.
CXB0001	7/31/2001	0.5	8.3	26	220	9.2	.
CXB0001	7/31/2001	1	8.1	25.9	220	9.1	.
CXB0001	7/31/2001	3	7.8	25.8	219	9.1	.
CXB0001	7/31/2001	5	4.5	25.2	216	8.9	.
CXB0001	7/31/2001	7	0.6	20	210	6.6	.
CXB0001	7/31/2001	9	0.5	10	249	6.5	.
CXB0001	7/31/2001	11	0.9	8	261	6.6	.
CXB0001	7/31/2001	13.3	1.1	7.5	263	6.6	.
CXB0001	8/9/2001	0.5	8.5	29.8	221	8.7	.
CXB0001	8/9/2001	1	8.5	29.6	221	8.7	.
CXB0001	8/9/2001	3	8.8	28	220	8.6	.
CXB0001	8/9/2001	5	6.9	26.4	217	8	.
CXB0001	8/9/2001	7	3.9	21.4	203	6	.
CXB0001	8/9/2001	9	0.7	12.4	237	5.9	.
CXB0001	8/9/2001	11	0.8	8.5	244	6	.
CXB0001	8/9/2001	13.4	1.4	7.6	243	6.4	.
CXB0001	9/18/2001	0.5	7.6	23.4	211	8.8	.
CXB0001	9/18/2001	1	7.6	23.4	211	8.8	.
CXB0001	9/18/2001	3	7.6	23.4	211	8.8	.
CXB0001	9/18/2001	5	7.4	23.4	211	8.7	.
CXB0001	9/18/2001	7	6.4	23.2	210	8.2	.
CXB0001	9/18/2001	9	0.4	19.1	217	6.6	.

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH FROM SURFACE METERS	DISSOLVED OXYGEN FIELD VALUE MG/L	WATER TEMP. °C	CONDUCTIVITY	PH	BOD
CXB0001	9/18/2001	11	0.4	12.5	251	6.7	.
CXB0001	9/18/2001	13.5	0.4	8.4	267	6.8	.
CXB0007	7/18/2001	0.5	10.2	27.3	214	9.6	0.7
CXB0007	7/18/2001	0.5	10.2	27.3	214	9.6	.
CXB0007	7/18/2001	1	10.2	27.3	214	9.6	.
CXB0007	7/18/2001	2	9.7	27.2	215	9.4	.
CXB0007	7/18/2001	3	9.3	26.9	214	9.3	.
CXB0007	7/18/2001	3.7	9.3	26.8	214	9.3	.
CXB0007	7/25/2001	0.5	8.7	29.6	222	9.5	.
CXB0007	7/25/2001	0.5	8.7	29.6	222	9.5	.
CXB0007	7/25/2001	1	8.8	29.5	222	9.5	.
CXB0007	7/25/2001	2	8.8	29.3	222	9.5	.
CXB0007	7/25/2001	3	8.8	28.9	221	9.4	.
CXB0007	7/25/2001	4	8.8	27.3	220	9.2	.
CXB0007	7/31/2001	0.5	7.8	26	220	9.1	0.9
CXB0007	7/31/2001	0.5	7.8	26	220	9.1	.
CXB0007	7/31/2001	1	7.8	25.8	220	9.1	.
CXB0007	7/31/2001	2	7.7	25.8	220	9.1	.
CXB0007	7/31/2001	3	7.7	25.7	221	9.1	.
CXB0007	7/31/2001	4	7.7	25.7	220	9.1	.
CXB0007	8/9/2001	0.5	8.7	30.1	220	8.8	2
CXB0007	8/9/2001	0.5	8.7	30.1	220	8.8	.
CXB0007	8/9/2001	1	8.8	29.9	221	8.7	.
CXB0007	8/9/2001	2	9.1	29.5	220	8.7	.
CXB0007	8/9/2001	3	9.4	28.3	219	8.8	.
CXB0007	8/9/2001	3.6	8.8	27.7	217	8.6	.
CXB0007	9/18/2001	0.5	8.2	23.4	210	8.8	1.6
CXB0007	9/18/2001	1	8.2	23.4	210	8.8	.
CXB0007	9/18/2001	2	8.2	23.4	210	8.8	.
CXB0007	9/18/2001	3	8.1	23.4	210	8.8	.
CXB0007	9/18/2001	4.4	8.2	23.4	210	8.8	.
LSN0061	7/18/2001	0.5	9.7	27.3	216	9.5	0.9
LSN0061	7/18/2001	0.5	9.7	27.3	216	9.5	.
LSN0061	7/18/2001	1	9.6	27.3	215	9.5	.
LSN0061	7/18/2001	3	9.6	27.2	215	9.5	.
LSN0061	7/18/2001	5	8.8	25.3	208	8.2	.
LSN0061	7/18/2001	7	1.4	18.9	200	7.7	.
LSN0061	7/18/2001	9	1.7	10.4	240	6.7	.
LSN0061	7/18/2001	11	2.5	7.8	244	6.8	.
LSN0061	7/18/2001	13	2.4	7.2	245	7	.
LSN0061	7/18/2001	15	0.5	6.8	249	7.4	.
LSN0061	7/18/2001	17	0.5	6.6	362	7.6	.
LSN0061	7/18/2001	18.8	0.6	6.6	477	7.6	.
LSN0061	7/25/2001	0.5	9.1	28.5	222	9.5	.
LSN0061	7/25/2001	0.5	9.1	28.5	222	9.5	.
LSN0061	7/25/2001	1	9.2	28.3	222	9.5	.
LSN0061	7/25/2001	3	9	27.9	221	9.5	.

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH FROM SURFACE METERS	DISSOLVED OXYGEN FIELD VALUE MG/L	WATER TEMP. °C	CONDUCTIVITY	PH	BOD
LSN0061	7/25/2001	5	7.6	26.1	214	7.9	.
LSN0061	7/25/2001	7	3.8	19.3	206	6.8	.
LSN0061	7/25/2001	9	0.7	12.3	246	6.6	.
LSN0061	7/25/2001	11	1.5	8.3	252	6.7	.
LSN0061	7/25/2001	13	1.8	7.4	253	6.8	.
LSN0061	7/25/2001	15	0.2	6.9	259	7.1	.
LSN0061	7/25/2001	17.3	0.3	6.7	373	7.5	.
LSN0061	7/31/2001	0.5	8.2	26.1	220	9.1	1.3
LSN0061	7/31/2001	0.5	8.2	26.1	220	9.1	.
LSN0061	7/31/2001	1	8	26	220	9.2	.
LSN0061	7/31/2001	3	7.6	25.9	219	9.1	.
LSN0061	7/31/2001	5	6.6	25.7	218	8.9	.
LSN0061	7/31/2001	7	5.3	24.9	218	8.1	.
LSN0061	7/31/2001	9	0.6	13.4	224	6.5	.
LSN0061	7/31/2001	11	1.3	7.9	249	6.5	.
LSN0061	7/31/2001	13	0.7	7.1	253	6.6	.
LSN0061	7/31/2001	15	1.1	6.8	285	6.8	.
LSN0061	8/9/2001	0.5	8.4	29.6	222	8.7	1.9
LSN0061	8/9/2001	0.5	8.4	29.6	222	8.7	.
LSN0061	8/9/2001	1	8.5	29.5	225	8.6	.
LSN0061	8/9/2001	3	8.3	29.3	221	8.6	.
LSN0061	8/9/2001	5	6.4	26.4	217	7.8	.
LSN0061	8/9/2001	7	2.9	20.9	200	6.1	.
LSN0061	8/9/2001	9	0.7	12.5	232	6	.
LSN0061	8/9/2001	11	0.7	8.8	237	6.2	.
LSN0061	8/9/2001	13	0.7	7.3	235	6.5	.
LSN0061	8/9/2001	15	0.9	6.9	240	6.7	.
LSN0061	8/9/2001	17.5	1.1	6.8	328	6.6	.
LSN0061	9/18/2001	0.5	7.8	23.5	212	8.8	1.9
LSN0061	9/18/2001	1	7.8	23.4	212	8.8	.
LSN0061	9/18/2001	3	7.8	23.4	211	8.8	.
LSN0061	9/18/2001	5	7.7	23.4	212	8.8	.
LSN0061	9/18/2001	7	7.2	23.3	211	8.7	.
LSN0061	9/18/2001	9	0.1	18.5	212	6.5	.
LSN0061	9/18/2001	11	0.2	12.3	235	6.5	.
LSN0061	9/18/2001	13	0.2	8.4	245	6.7	.
LSN0061	9/18/2001	15	0.3	7.2	261	7	.
LSN0061	9/18/2001	17.7	0.4	6.9	444	7.3	.
LSN0062	7/18/2001	0.5	10.1	27.9	216	9.5	.
LSN0062	7/18/2001	1	10.1	27.8	216	9.5	.
LSN0062	7/18/2001	2	10	27.6	216	9.5	.
LSN0062	7/18/2001	3	9.8	27.1	216	9.4	.
LSN0062	7/18/2001	4	9	26.5	214	9	.
LSN0062	7/18/2001	5	6.3	25.6	212	7.1	.
LSN0062	7/18/2001	6	2.2	22.9	211	6.8	.
LSN0062	7/18/2001	7.2	0.3	17.7	205	6.7	.
LSN0062	7/25/2001	0.5	9.5	28.7	222	9.5	.

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH FROM SURFACE METERS	DISSOLVED OXYGEN FIELD VALUE MG/L	WATER TEMP. °C	CONDUCTIVITY	PH	BOD
LSN0062	7/25/2001	1	9.6	28.5	222	9.5	.
LSN0062	7/25/2001	2	9.7	28.3	222	9.5	.
LSN0062	7/25/2001	3	9.9	27.9	222	9.5	.
LSN0062	7/25/2001	4	9.8	27.4	221	9.4	.
LSN0062	7/25/2001	5	6.1	26.7	221	7.7	.
LSN0062	7/25/2001	6	3.3	24.2	228	7	.
LSN0062	7/25/2001	7.3	0.4	17.9	214	6.9	.
LSN0062	7/31/2001	0.5	9.4	25.6	222	9	.
LSN0062	7/31/2001	1	9.4	25.8	222	9	.
LSN0062	7/31/2001	2	7.6	25.9	222	9	.
LSN0062	7/31/2001	3	6.9	25.8	222	8.9	.
LSN0062	7/31/2001	4	5.7	25.7	221	8.6	.
LSN0062	7/31/2001	5	4.1	25.6	224	7.8	.
LSN0062	7/31/2001	6	1.7	23.8	224	6.8	.
LSN0062	7/31/2001	7	0.9	18.3	214	6.7	.
LSN0062	8/9/2001	0.5	8.9	30.2	221	8.7	.
LSN0062	8/9/2001	1	8.8	30	221	8.7	.
LSN0062	8/9/2001	2	9	29.9	221	8.7	.
LSN0062	8/9/2001	3	9.3	28	220	8.7	.
LSN0062	8/9/2001	4	7.5	27	218	8.3	.
LSN0062	8/9/2001	5	5.5	26.3	219	6.7	.
LSN0062	8/9/2001	6	4.3	25.3	219	6.4	.
LSN0062	8/9/2001	7.1	0.9	21.8	215	6.2	.
LSN0062	9/18/2001	0.5	7.6	23.5	212	8.7	.
LSN0062	9/18/2001	1	7.6	23.5	212	8.7	.
LSN0062	9/18/2001	3	7.6	23.5	212	8.7	.
LSN0062	9/18/2001	5	7.6	23.5	212	8.7	.
LSN0062	9/18/2001	7.5	7.1	23	216	8.5	.
TEN0005	7/18/2001	0.5	9.8	27.2	217	9.5	.
TEN0005	7/18/2001	1	9.8	27.2	216	9.5	.
TEN0005	7/18/2001	2	9.8	27.2	216	9.5	.
TEN0005	7/18/2001	3	9.8	27.1	216	9.5	.
TEN0005	7/18/2001	4	9.6	26.8	216	9.5	.
TEN0005	7/18/2001	5	8.3	25.3	209	8	.
TEN0005	7/18/2001	6	9.3	23	206	7.1	.
TEN0005	7/18/2001	7	0.3	18.5	200	6.6	.
TEN0005	7/18/2001	8	0.6	14.1	230	6.7	.
TEN0005	7/18/2001	9	0.5	11.1	241	6.7	.
TEN0005	7/18/2001	10	0.4	8.8	250	6.8	.
TEN0005	7/18/2001	12.3	0.5	7.5	257	6.9	.
TEN0005	7/25/2001	0.5	9.4	28.9	223	9.6	.
TEN0005	7/25/2001	1	9.4	28.7	223	9.6	.
TEN0005	7/25/2001	3	9.7	27.7	222	9.6	.
TEN0005	7/25/2001	5	7.8	26	217	8	.
TEN0005	7/25/2001	7	1.3	19.5	207	6.8	.
TEN0005	7/25/2001	9	0.2	11	251	6.8	.
TEN0005	7/25/2001	11	0.3	7.8	263	6.9	.

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH FROM SURFACE METERS	DISSOLVED OXYGEN FIELD VALUE MG/L	WATER TEMP. °C	CONDUCTIVITY	PH	BOD
TEN0005	7/25/2001	12.3	0.7	7.6	266	7.1	.
TEN0005	7/31/2001	0.5	8.1	26.2	221	9.2	.
TEN0005	7/31/2001	1	8.1	26	220	9	.
TEN0005	7/31/2001	3	7.8	26	220	9.2	.
TEN0005	7/31/2001	5	5.7	24.9	216	8.9	.
TEN0005	7/31/2001	7	1.4	20	208	6.7	.
TEN0005	7/31/2001	9	0.4	13.7	236	6.6	.
TEN0005	7/31/2001	11	0.6	9.3	263	6.7	.
TEN0005	7/31/2001	12	0.9	8.4	267	6.7	.
TEN0005	8/9/2001	0.5	8.5	29.5	221	8.8	.
TEN0005	8/9/2001	1	8.4	29.5	221	8.8	.
TEN0005	8/9/2001	2	8.5	29.2	221	8.7	.
TEN0005	8/9/2001	3	8.5	28.6	220	8.7	.
TEN0005	8/9/2001	4	8.2	27.4	218	8.6	.
TEN0005	8/9/2001	5	6.8	26.3	217	8	.
TEN0005	8/9/2001	6	6.4	25.1	213	6.6	.
TEN0005	8/9/2001	7	5.1	21.6	201	6.1	.
TEN0005	8/9/2001	8	1.1	16.7	214	6.3	.
TEN0005	8/9/2001	9	0.5	13	239	5.8	.
TEN0005	8/9/2001	10	0.6	10.7	239	5.9	.
TEN0005	8/9/2001	10.7	0.7	9.1	247	5.9	.
TEN0005	9/18/2001	0.5	8	23.5	212	9	.
TEN0005	9/18/2001	1	8	23.4	212	9	.
TEN0005	9/18/2001	3	7.9	23.4	212	9	.
TEN0005	9/18/2001	5	7.6	23.4	212	8.9	.
TEN0005	9/18/2001	7	7.2	23.3	211	8.8	.
TEN0005	9/18/2001	9	0.2	18.7	216	6.6	.
TEN0005	9/18/2001	11	0.2	12.6	245	6.6	.
TEN0005	9/18/2001	12.6	0.2	9.4	264	6.8	.
TEN0012	7/18/2001	0.5	10.3	27.2	216	9.7	1.1
TEN0012	7/18/2001	0.5	10.3	27.2	216	9.7	.
TEN0012	7/18/2001	1	10.4	27.2	216	9.7	.
TEN0012	7/18/2001	2	10.5	27.1	217	9.7	.
TEN0012	7/18/2001	3	10.6	26.9	217	9.6	.
TEN0012	7/18/2001	4	10.2	26.7	217	9.6	.
TEN0012	7/18/2001	4.8	9.1	26.3	212	9.5	.
TEN0012	7/25/2001	0.5	9.7	29.2	223	9.7	.
TEN0012	7/25/2001	0.5	9.7	29.2	223	9.7	.
TEN0012	7/25/2001	1	9.7	29.2	223	9.7	.
TEN0012	7/25/2001	2	9.5	28.9	223	9.6	.
TEN0012	7/25/2001	3	10.1	27.7	223	9.6	.
TEN0012	7/25/2001	4	9.4	27.1	220	9.4	.
TEN0012	7/25/2001	5	6	26.4	215	8.6	.
TEN0012	7/25/2001	5.8	4.3	25.2	214	7.6	.
TEN0012	7/31/2001	0.5	8.2	26.1	221	9.3	1.1
TEN0012	7/31/2001	0.5	8.2	26.1	221	9.3	.
TEN0012	7/31/2001	1	8.3	25	220	9.3	.

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH FROM SURFACE METERS	DISSOLVED OXYGEN FIELD VALUE MG/L	WATER TEMP. °C	CONDUCTIVITY	PH	BOD
TEN0012	7/31/2001	2	8.2	25.9	221	9.3	.
TEN0012	7/31/2001	3	8	25.6	221	9.3	.
TEN0012	7/31/2001	4	8.1	25.6	221	9.3	.
TEN0012	7/31/2001	5	8.1	25.6	220	9.1	.
TEN0012	8/9/2001	0.5	9.1	29.4	222	8.9	1.9
TEN0012	8/9/2001	0.5	9.1	29.4	222	8.9	.
TEN0012	8/9/2001	1	9	29.3	222	8.9	.
TEN0012	8/9/2001	2	8.9	29.2	222	8.9	.
TEN0012	8/9/2001	3	9.4	28.4	221	8.8	.
TEN0012	8/9/2001	4	8.9	27.4	219	8.8	.
TEN0012	8/9/2001	5	4.5	26.4	215	7.5	.
TEN0012	8/9/2001	6.1	1.5	24.2	208	6.4	.
TEN0012	9/18/2001	0.5	7.9	23.5	212	8.9	1.6
TEN0012	9/18/2001	1	7.9	23.5	212	8.9	.
TEN0012	9/18/2001	3	8	23.4	212	8.9	.
TEN0012	9/18/2001	5.2	7.7	23.4	212	8.9	.
ZCU0002	10/18/2000	0	8.2	16.2	270	7.2	.
ZCU0002	11/16/2000	0	5.2	9.6	411	7	.
ZCU0002	12/6/2000	0	8.9	3.6	399	7.2	.
ZCU0002	1/10/2001	0	13.8	2	440	7.7	.
ZCU0002	2/7/2001	0	16	4.4	451	7.6	.
ZCU0002	3/21/2001	0	10.2	7.9	748	7.5	.
ZCU0002	4/18/2001	0	10.1	12.1	500	7.6	.
ZCU0002	5/16/2001	0	9.9	20.3	468	8.4	.
ZCU0002	6/20/2001	.	.	.	.	.	.
ZCU0002	7/25/2001	0	8.1	28.8	236	8.1	1
ZCU0002	8/8/2001	0	8.6	29.1	266	8.6	.
ZCU0002	9/18/2001	0	5.7	23	254	7.3	.

Table A-2: Physical Water Quality Data— Little Seneca Lake (MNCPPC-MC, 2001)

Station	Depth (Meters)	Sampling Date	Temp (°C)	pH	DO (Mg/L)	DO (% sat.)	Conductivity
LS1	7	8/12/1999	17.24	7.81	2.16	25	0.242
LS1	6	8/12/1999	24.04	7.66	6.97	83	0.248
LS1	5	8/12/1999	26.43	9.17	9.91	122.1	0.263
LS1	4	8/12/1999	26.55	9.36	10.65	136.6	0.264
LS1	3	8/12/1999	26.62	9.41	10.78	134.8	0.265
LS1	2	8/12/1999	26.68	9.44	10.81	135	0.266
LS1	1	8/12/1999	26.83	9.41	10.5	131.5	0.266
LS1	0	8/12/1999	26.97	9.41	10.48	132.1	0.267
LS2	7	8/12/1999	16.85	9.08	18.59	191	0.207
LS2	6	8/12/1999	21.7	8.15	16.92	190.9	0.231
LS2	5	8/12/1999	26.21	9.06	10.91	135.1	0.26
LS2	4	8/12/1999	27.02	9.37	10.61	133.3	0.267
LS2	3	8/12/1999	27.33	9.43	10.72	135.5	0.269
LS2	2	8/12/1999	27.5	9.45	10.82	137.9	0.27
LS2	1	8/12/1999	27.6	9.46	10.68	135.8	0.271
LS2	0	8/12/1999	27.78	9.44	10.45	133.2	0.272
LS3	7	8/12/1999	18.48	8.28	8.97	95.4	0.215
LS3	6	8/12/1999	22.03	8.09	11.62	139.4	0.231
LS3	5	8/12/1999	25.45	8.15	10.17	124.2	0.252
LS3	4	8/12/1999	26.91	8.95	9.81	123.6	0.264
LS3	3	8/12/1999	27.58	9.4	10.62	134.4	0.27
LS3	2	8/12/1999	27.78	9.45	10.9	138.9	0.272
LS3	1	8/12/1999	27.94	9.47	10.82	138.3	0.272
LS3	0	8/12/1999	28.15	9.45	10.58	135.7	0.274
LS4	7	8/12/1999	18.65	8.16	9.56	97.9	0.221
LS4	6	8/12/1999	24.09	7.92	10.25	125.2	0.243
LS4	5	8/12/1999	25.9	8.4	9.01	100.1	0.258
LS4	4	8/12/1999	27	9.25	10.69	134.1	0.265
LS4	3	8/12/1999	27.18	9.38	11.15	140.3	0.268
LS4	2	8/12/1999	27.24	9.11	11.33	140.67	0.269
LS4	1	8/12/1999	27.41	9.44	11.46	142.4	0.269
LS4	0	8/12/1999	24.44	9.41	10.87	137.7	0.27
LS5	7	8/12/1999	17.09	8.44	14.54	151.3	0.207

Station	Depth (Meters)	Sampling Date	Temp (°C)	pH	DO (Mg/L)	DO (% sat.)	Conductivity
LS5	6	8/12/1999	21.89	8.4	15.01	173.9	0.23
LS5	5	8/12/1999	26.43	9.05	9.82	121.2	0.261
LS5	4	8/12/1999	26.96	9.4	10.3	129.1	0.267
LS5	3	8/12/1999	27.14	9.46	10.66	134.2	0.268
LS5	2	8/12/1999	27.23	9.45	10.66	134.3	0.269
LS5	1	8/12/1999	27.42	9.45	10.67	135.1	0.27
LS5	0	8/12/1999	27.59	9.44	10.5	133.2	0.271
LS1	7	10/12/1999	18.24	7.66	8.5	94.9	0.189
LS1	6	10/12/1999	18.3	7.79	8.68	93.3	0.19
LS1	5	10/12/1999	18.3	7.82	8.68	94.4	0.19
LS1	4	10/12/1999	18.3	7.84	8.75	93.3	0.19
LS1	3	10/12/1999	18.9	7.84	8.6	92.1	0.19
LS1	2	10/12/1999	18.41	7.85	8.6	91.7	0.191
LS1	1	10/12/1999	18.46	7.85	8.66	92.8	0.191
LS1	0	10/12/1999	18.53	7.85	8.61	92.1	0.191
LS2	7	10/12/1999	18.51	7.78	8.29	89.8	0.192
LS2	6	10/12/1999	18.51	7.79	7.9	84.5	0.192
LS2	5	10/12/1999	18.74	7.83	8.63	92.6	0.192
LS2	4	10/12/1999	18.77	7.91	8.82	94.7	0.192
LS2	3	10/12/1999	18.79	7.98	8.84	94.9	0.193
LS2	2	10/12/1999	18.83	8.04	8.72	93.7	0.193
LS2	1	10/12/1999	18.95	8.09	8.98	96.7	0.193
LS2	0	10/12/1999	19.26	8	8.88	96.2	0.195
LS3	7	10/12/1999	18.27	7.26	10.21	108.5	0.19
LS3	6	10/12/1999	18.43	7.45	9.23	98.5	0.199
LS3	5	10/12/1999	18.53	7.52	9.4	100.9	0.191
LS3	4	10/12/1999	18.57	7.59	9.24	98.8	0.191
LS3	3	10/12/1999	18.6	7.64	9.31	99.7	1.91
LS3	2	10/12/1999	18.62	7.7	9.17	98.1	0.191
LS3	1	10/12/1999	18.74	7.74	9.15	98.3	0.192
LS3	0	10/12/1999	18.79	7.77	8.79	94.4	0.192
LS4	7	10/12/1999	18.49	7.85	7.91	85.6	0.192
LS4	6	10/12/1999	18.62	7.8	7.51	80.4	0.193
LS4	5	10/12/1999	18.83	7.87	84.8	91.1	0.194
LS4	4	10/12/1999	18.85	7.94	8.65	95.1	0.194

Station	Depth (Meters)	Sampling Date	Temp (°C)	pH	DO (Mg/L)	DO (% sat.)	Conductivity
LS4	3	10/12/1999	18.88	8.05	9.04	97.2	0.194
LS4	2	10/12/1999	18.92	8.13	9	98	0.194
LS4	1	10/12/1999	19.1	8.16	9.05	97.8	0.195
LS4	0	10/12/1999	19.26	8.14	9.08	99	0.196
LS5	7	10/12/1999	18.53	7.77	8.11	87.2	0.191
LS5	6	10/12/1999	18.56	7.71	8	85.5	0.191
LS5	5	10/12/1999	18.68	7.74	8.52	91.2	0.192
LS5	4	10/12/1999	18.72	7.83	8.79	94.3	0.192
LS5	3	10/12/1999	18.71	7.9	8.99	96.5	0.192
LS5	2	10/12/1999	18.77	7.99	8.8	94.5	0.193
LS5	1	10/12/1999	18.93	8.04	9.02	97.2	0.193
LS5	0	10/12/1999	19.05	8.07	8.99	97.1	0.194
LS1	7	3/8/2000	6.13	7.49	8.16	65.8	0.228
LS1	6	3/8/2000	6.08	7.5	7.99	64.4	0.227
LS1	5	3/8/2000	6.2	7.5	8.07	65.2	0.227
LS1	4	3/8/2000	6.51	7.48	8.32	67.7	0.226
LS1	3	3/8/2000	6.57	7.46	8.56	69.7	0.225
LS1	2	3/8/2000	6.94	7.44	8.97	73.8	0.225
LS1	1	3/8/2000	7.42	7.51	9.71	80.8	0.224
LS1	0	3/8/2000	7.68	7.52	10.3	86.2	0.223
LS2	7	3/8/2000	7.32	7.44	9.27	77.1	0.226
LS2	6	3/8/2000	7.33	7.43	9.22	76.7	0.227
LS2	5	3/8/2000	7.38	7.42	9.38	78.1	0.226
LS2	4	3/8/2000	7.39	7.42	9.39	78.3	0.226
LS2	3	3/8/2000	7.39	7.4	9.72	81.4	0.226
LS2	2	3/8/2000	7.41	7.43	10.11	84.6	0.226
LS2	1	3/8/2000	7.46	7.47	11.64	97.1	0.226
LS2	0	3/8/2000	7.52	7.45	17.85	153.7	0.226
LS3	5	3/8/2000	6.26	7.74	7.71	62.4	0.227
LS3	4	3/8/2000	6.68	7.71	7.93	64.9	0.227
LS3	3	3/8/2000	6.95	7.68	8.28	68.2	0.229
LS3	2	3/8/2000	7.63	7.67	8.4	70.7	0.227
LS3	1	3/8/2000	8.59	7.64	9.08	77.8	0.226
LS3	0	3/8/2000	8.67	7.64	9.42	80.9	0.226
LS4	7	3/8/2000	6.48	7.32	8.08	66	0.229

Station	Depth (Meters)	Sampling Date	Temp (°C)	pH	DO (Mg/L)	DO (% sat.)	Conductivity
LS4	6	3/8/2000	6.58	7.33	7.86	64.2	0.232
LS4	5	3/8/2000	6.67	7.33	7.99	65.3	0.231
LS4	4	3/8/2000	6.89	7.34	8.2	67.4	0.23
LS4	3	3/8/2000	7.32	7.39	8.55	70.9	0.229
LS4	2	3/8/2000	7.64	7.4	9.12	76.4	0.23
LS4	1	3/8/2000	7.94	7.45	10.32	87.1	0.23
LS4	0	3/8/2000	8	7.46	15.85	133.9	0.23
LS5	7	3/8/2000	6.14	7.47	8.81	71.2	0.226
LS5	6	3/8/2000	6.17	7.46	8.94	72.2	0.227
LS5	5	3/8/2000	6.64	7.45	9.03	73.8	0.226
LS5	4	3/8/2000	6.85	7.43	9.32	76.6	0.226
LS5	3	3/8/2000	7.06	7.42	9.61	79.4	0.226
LS5	2	3/8/2000	7.11	7.43	10.02	82.9	0.226
LS5	1	3/8/2000	7.22	7.47	10.71	88.8	0.226
LS5	0	3/8/2000	7.33	7.48	13.11	109.2	0.226
LS1	7	8/9/2000	23.46	7.96	4.15	49.1	0.18
LS1	6	8/9/2000	24.97	7.94	5.93	71.8	0.204
LS1	5	8/9/2000	25.89	9.56	9.33	114.3	0.205
LS1	4	8/9/2000	26.39	9.84	10.29	127.8	0.207
LS1	3	8/9/2000	26.75	9.75	9.83	122.8	0.206
LS1	2	8/9/2000	27.06	9.69	9.61	120.9	0.206
LS1	1	8/9/2000	27.55	9.79	9.92	125.7	0.207
LS1	0	8/9/2000	28.17	9.73	9.74	124.8	0.207
LS2	7	8/9/2000	23.64	8.3	8.36	98.4	0.209
LS2	6	8/9/2000	24.96	8.34	8.43	102	0.204
LS2	5	8/9/2000	25.7	8.68	8.19	100.7	0.204
LS2	4	8/9/2000	26.18	9.12	8.46	104.7	0.206
LS2	3	8/9/2000	26.75	9.5	9.12	113.9	0.205
LS2	2	8/9/2000	27.77	9.58	9.14	116.4	0.205
LS2	1	8/9/2000	27.87	9.6	9.16	116.9	0.206
LS2	0	8/9/2000	28.77	9.59	8.94	115.9	0.206
LS3	7	8/9/2000	24.15	7.63	3.27	38.9	0.182
LS3	6	8/9/2000	25.44	7.7	6.41	77.6	0.2
LS3	5	8/9/2000	25.86	8.24	7.53	92.8	0.202
LS3	4	8/9/2000	26.65	9.26	9.21	114.4	0.202

Station	Depth (Meters)	Sampling Date	Temp (°C)	pH	DO (Mg/L)	DO (% sat.)	Conductivity
LS3	3	8/9/2000	27.17	9.43	9.17	115.5	0.203
LS3	2	8/9/2000	27.8	9.56	9.55	121.7	0.204
LS3	1	8/9/2000	28.35	9.53	9.08	116.8	0.204
LS3	0	8/9/2000	28.42	9.54	9.08	117	0.205
LS4	7	8/9/2000	24.32	7.96	4.56	54.6	0.178
LS4	6	8/9/2000	25.2	7.79	4.71	57.3	0.186
LS4	5	8/9/2000	25.96	8.15	7.3	89.2	0.198
LS4	4	8/9/2000	26.52	9.26	8.85	109.6	0.202
LS4	3	8/9/2000	27.02	9.59	9.86	123.7	0.199
LS4	2	8/9/2000	27.77	9.58	9.6	122.2	0.202
LS4	1	8/9/2000	28.11	9.53	9.22	118.1	0.203
LS4	0	8/9/2000	28.64	9.57	9.23	119.4	0.203
LS5	7	8/9/2000	23.63	8.04	5.1	60.3	0.198
LS5	6	8/9/2000	25.06	8.16	7.76	93.3	0.204
LS5	5	8/9/2000	25.88	8.86	8.01	98.5	0.206
LS5	4	8/9/2000	26.34	9.48	8.9	110.2	0.205
LS5	3	8/9/2000	26.58	9.53	9.19	114.5	0.204
LS5	2	8/9/2000	26.99	9.63	9.53	119.7	0.205
LS5	1	8/9/2000	27.75	9.62	9.22	117.4	0.206
LS5	0	8/9/2000	28.15	9.67	9.34	119.7	0.207

Table A-3: Water Quality (Nutrient) Data, Little Seneca Lake (MDE, 2001)

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
ZCU0002	10/18/2000	0	0.025	50.68	9.42	52.60	.	.	
ZCU0002	11/16/2000	0	0.037	56.34	17.01	58.40	.	.	
ZCU0002	12/6/2000	0	0.038	56.57	13.64	56.24	.	.	
ZCU0002	1/10/2001	0	0.018	45.59	1.79	36.33	.	.	
ZCU0002	2/7/2001	0	0.017	44.92	4.34	44.99	.	.	
ZCU0002	3/21/2001	0	0.023	49.49	3.74	43.53	.	.	
ZCU0002	4/18/2001	0	0.026	51.02	6.73	49.30	.	.	
ZCU0002	5/16/2001	0	0.033	54.70	8.52	51.62	.	.	
ZCU0002	6/20/2001	.	.	.	.	.	.	.	
CXB0001	7/18/2001	0.5	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	1	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	2	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	3	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	4	.	.	.	.	4.00	40.02	

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
CXB0001	7/18/2001	5	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	6	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	7	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	8	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	10	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	12	.	.	.	.	4.00	40.02	
CXB0001	7/18/2001	13.4	.	.	.	.	4.00	40.02	
CXB0007	7/18/2001	0.5	0.008	34.49	4.24	44.76	4.00	40.02	
CXB0007	7/18/2001	0.5	.		4.49	45.32	4.00	40.02	
CXB0007	7/18/2001	1	.	.	.	.	4.00	40.02	
CXB0007	7/18/2001	2	.	.	.	.	4.00	40.02	
CXB0007	7/18/2001	3	.	.	.	.	4.00	40.02	
CXB0007	7/18/2001	3.7	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	0.5	0.008	34.31	3.99	44.17	4.00	40.02	
LSN0061	7/18/2001	0.5	.	.	3.74	43.53	4.00	40.02	
LSN0061	7/18/2001	1	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	3	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	5	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	7	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	9	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	11	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	13	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	15	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	17	.	.	.	.	4.00	40.02	
LSN0061	7/18/2001	18.8	.	.	.	.	4.00	40.02	
LSN0062	7/18/2001	0.5	.	.	.	.	3.80	40.76	
LSN0062	7/18/2001	1	.	.	.	.	3.80	40.76	
LSN0062	7/18/2001	2	.	.	.	.	3.80	40.76	
LSN0062	7/18/2001	3	.	.	.	.	3.80	40.76	
LSN0062	7/18/2001	4	.	.	.	.	3.80	40.76	
LSN0062	7/18/2001	5	.	.	.	.	3.80	40.76	110.71
LSN0062	7/18/2001	6	.	.	.	.	3.80	40.76	
LSN0062	7/18/2001	7.2	.	.	.	.	3.80	40.76	
TEN0005	7/18/2001	0.5	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	1	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	2	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	3	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	4	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	5	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	6	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	7	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	8	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	9	.	.	.	.	4.00	40.02	41.60
TEN0005	7/18/2001	10	.	.	.	.	4.00	40.02	
TEN0005	7/18/2001	12.3	.	.	.	.	4.00	40.02	
TEN0012	7/18/2001	0.5	0.008	34.67	5.23	46.84	4.00	40.02	
TEN0012	7/18/2001	0.5	.	.	5.48	47.29	4.00	40.02	
TEN0012	7/18/2001	1	.	.	.	.	4.00	40.02	
TEN0012	7/18/2001	2	.	.	.	.	4.00	40.02	74.54

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
TEN0012	7/18/2001	3	.	.	.	.	4.00	40.02	
TEN0012	7/18/2001	4	.	.	.	.	4.00	40.02	
TEN0012	7/18/2001	4.8	.	.	.	.	4.00	40.02	
CXB0001	7/25/2001	0.5	.	.	.	.	5.20	36.24	
CXB0001	7/25/2001	1	.	.	.	.	5.20	36.24	
CXB0001	7/25/2001	3	.	.	.	.	5.20	36.24	50.68
CXB0001	7/25/2001	5	.	.	.	.	5.20	36.24	
CXB0001	7/25/2001	7	.	.	.	.	5.20	36.24	
CXB0001	7/25/2001	9	.	.	.	.	5.20	36.24	
CXB0001	7/25/2001	11	.	.	.	.	5.20	36.24	
CXB0001	7/25/2001	13.3	.	.	.	.	5.20	36.24	113.15
CXB0007	7/25/2001	0.5	.	.	4.34	44.99	ON BOTTOM		
CXB0007	7/25/2001	0.5	.	.	3.74	43.53	ON BOTTOM		
CXB0007	7/25/2001	1	.	.	.	.	ON BOTTOM		
CXB0007	7/25/2001	2	.	.	.	.	ON BOTTOM		
CXB0007	7/25/2001	3	.	.	.	.	ON BOTTOM		
CXB0007	7/25/2001	4	.	.	.	.	ON BOTTOM		
LSN0061	7/25/2001	0.5	.		2.54	39.75	7.20	31.55	
LSN0061	7/25/2001	0.5	.	.	2.54	39.75	7.20	31.55	
LSN0061	7/25/2001	1	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	3	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	5	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	7	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	9	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	11	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	13	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	15	.	.	.	.	7.20	31.55	
LSN0061	7/25/2001	17.3	.	.	.	.	7.20	31.55	
LSN0062	7/25/2001	0.5	.	.	.	.	4.20	39.32	
LSN0062	7/25/2001	1	.	.	.	.	4.20	39.32	
LSN0062	7/25/2001	2	.	.	.	.	4.20	39.32	
LSN0062	7/25/2001	3	.	.	.	.	4.20	39.32	
LSN0062	7/25/2001	4	.	.	.	.	4.20	39.32	
LSN0062	7/25/2001	5	.	.	.	.	4.20	39.32	66.67
LSN0062	7/25/2001	6	.	.	.	.	4.20	39.32	
LSN0062	7/25/2001	7.3	.	.	.	.	4.20	39.32	
TEN0005	7/25/2001	0.5	.	.	.	.	6.00	34.18	
TEN0005	7/25/2001	1	.	.	.	.	6.00	34.18	
TEN0005	7/25/2001	3	.	.	.	.	6.00	34.18	
TEN0005	7/25/2001	5	.	.	.	.	6.00	34.18	
TEN0005	7/25/2001	7	.	.	.	.	6.00	34.18	
TEN0005	7/25/2001	9	.	.	.	.	6.00	34.18	
TEN0005	7/25/2001	11	.	.	.	.	6.00	34.18	

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
TEN0005	7/25/2001	12.3	.	.	.	.	6.00	34.18	85.71
TEN0012	7/25/2001	0.5	.		3.29	42.28	5.50	35.43	
TEN0012	7/25/2001	0.5	.		3.30	42.32	5.50	35.43	
TEN0012	7/25/2001	1	.	.	.	.	5.50	35.43	
TEN0012	7/25/2001	2	.	.	.	.	5.50	35.43	
TEN0012	7/25/2001	3	.	.	.	.	5.50	35.43	
TEN0012	7/25/2001	4	.	.	.	.	5.50	35.43	
TEN0012	7/25/2001	5	.	.	.	.	5.50	35.43	
TEN0012	7/25/2001	5.8	.	.	.	.	5.50	35.43	
ZCU0002	7/25/2001	0	0.017	45.09	3.59	43.13	.		
CXB0001	7/31/2001	0.5	.	.	.	.	2.80	45.16	
CXB0001	7/31/2001	1	.	.	.	.	2.80	45.16	52.16
CXB0001	7/31/2001	3	.	.	.	.	2.80	45.16	
CXB0001	7/31/2001	5	.	.	.	.	2.80	45.16	
CXB0001	7/31/2001	7	.	.	.	.	2.80	45.16	
CXB0001	7/31/2001	9	.	.	.	.	2.80	45.16	
CXB0001	7/31/2001	11	.	.	.	.	2.80	45.16	
CXB0001	7/31/2001	13.3	.	.	.	.	2.80	45.16	
CXB0007	7/31/2001	0.5	0.021	47.77	3.99	44.17	3.60	41.54	
CXB0007	7/31/2001	0.5	.		3.74	43.53	3.60	41.54	
CXB0007	7/31/2001	1	.	.	.	.	3.60	41.54	
CXB0007	7/31/2001	2	.	.	.	.	3.60	41.54	
CXB0007	7/31/2001	3	.	.	.	.	3.60	41.54	
CXB0007	7/31/2001	4	.	.	.	.	3.60	41.54	
LSN0061	7/31/2001	0.5	0.012	40.34	5.23	46.84	1.80	51.53	
LSN0061	7/31/2001	0.5	.		5.23	46.84	1.80	51.53	
LSN0061	7/31/2001	1	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	3	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	5	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	7	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	9	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	11	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	13	.	.	.	.	1.80	51.53	
LSN0061	7/31/2001	15	.	.	.	.	1.80	51.53	
LSN0062	7/31/2001	0.5	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	1	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	2	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	3	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	4	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	5	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	6	.	.	.	.	2.70	45.69	
LSN0062	7/31/2001	7	.	.	.	.	2.70	45.69	
TEN0005	7/31/2001	0.5	.	.	.	.	3.00	44.17	
TEN0005	7/31/2001	1	.	.	.	.	3.00	44.17	
TEN0005	7/31/2001	3	.	.	.	.	3.00	44.17	
TEN0005	7/31/2001	5	.	.	.	.	3.00	44.17	
TEN0005	7/31/2001	7	.	.	.	.	3.00	44.17	
TEN0005	7/31/2001	9	.	.	.	.	3.00	44.17	
TEN0005	7/31/2001	11	.	.	.	.	3.00	44.17	

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
TEN0005	7/31/2001	12	.	.	.	.	3.00	44.17	
TEN0012	7/31/2001	0.5	0.015	43.10	3.99	44.17	3.00	44.17	
TEN0012	7/31/2001	0.5	.		3.74	43.53	3.00	44.17	
TEN0012	7/31/2001	1	.	.	.	.	3.00	44.17	
TEN0012	7/31/2001	2	.	.	.	.	3.00	44.17	
TEN0012	7/31/2001	3	.	.	.	.	3.00	44.17	
TEN0012	7/31/2001	4	.	.	.	.	3.00	44.17	
TEN0012	7/31/2001	5	.	.	.	.	3.00	44.17	
ZCU0002	8/8/2001	0	0.015	43.58	3.59	43.13	.		
CXB0001	8/9/2001	0.5	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	1	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	3	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	5	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	7	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	9	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	11	.	.	.	.	3.90	40.39	
CXB0001	8/9/2001	13.4	.	.	.	.	3.90	40.39	
CXB0007	8/9/2001	0.5	0.009	36.31	NOT DETECTED		ON BOTTOM		
CXB0007	8/9/2001	0.5	.		NOT DETECTED		ON BOTTOM		
CXB0007	8/9/2001	1	.	.	.	.	ON BOTTOM		
CXB0007	8/9/2001	2	.	.	.	.	ON BOTTOM		
CXB0007	8/9/2001	3	.	.	.	.	ON BOTTOM		
CXB0007	8/9/2001	3.6	.	.	.	.	ON BOTTOM		
LSN0061	8/9/2001	0.5	0.008	34.14	NOT DETECTED		4.50	38.33	
LSN0061	8/9/2001	0.5	.		NOT DETECTED		4.50	38.33	
LSN0061	8/9/2001	1	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	3	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	5	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	7	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	9	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	11	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	13	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	15	.	.	.	.	4.50	38.33	
LSN0061	8/9/2001	17.5	.	.	.	.	4.50	38.33	
LSN0062	8/9/2001	0.5	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	1	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	2	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	3	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	4	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	5	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	6	.	.	.	.	3.00	44.17	
LSN0062	8/9/2001	7.1	.	.	.	.	3.00	44.17	
TEN0005	8/9/2001	0.5	.	.	.	.	3.80	40.76	

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
TEN0005	8/9/2001	1	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	2	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	3	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	4	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	5	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	6	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	7	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	8	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	9	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	10	.	.	.	.	3.80	40.76	
TEN0005	8/9/2001	10.7	.	.	.	.	3.80	40.76	
TEN0012	8/9/2001	0.5	0.009	35.99	1.50	34.55	4.80	37.40	
TEN0012	8/9/2001	0.5	.		1.25	32.76	4.80	37.40	
TEN0012	8/9/2001	1	.	.	.	.	4.80	37.40	
TEN0012	8/9/2001	2	.	.	.	.	4.80	37.40	111.13
TEN0012	8/9/2001	3	.	.	.	.	4.80	37.40	
TEN0012	8/9/2001	4	.	.	.	.	4.80	37.40	
TEN0012	8/9/2001	5	.	.	.	.	4.80	37.40	
TEN0012	8/9/2001	6.1	.	.	.	.	4.80	37.40	
CXB0001	9/18/2001	0.5	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	1	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	3	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	5	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	7	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	9	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	11	.	.	.	.	3.60	41.54	
CXB0001	9/18/2001	13.5	.	.	.	.	3.60	41.54	
CXB0007	9/18/2001	0.5	0.011	38.46	7.33	50.14	3.00	44.17	
CXB0007	9/18/2001	1	.	.	.	.	3.00	44.17	
CXB0007	9/18/2001	2	.	.	.	.	3.00	44.17	50.90
CXB0007	9/18/2001	3	.	.	.	.	3.00	44.17	
CXB0007	9/18/2001	4.4	.	.	.	.	3.00	44.17	
LSN0061	9/18/2001	0.5	0.010	36.76	4.34	44.99	3.60	41.54	
LSN0061	9/18/2001	1	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	3	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	5	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	7	.	.	.	.	3.60	41.54	73.66
LSN0061	9/18/2001	9	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	11	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	13	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	15	.	.	.	.	3.60	41.54	
LSN0061	9/18/2001	17.7	.	.	.	.	3.60	41.54	
LSN0062	9/18/2001	0.5	.	.	.	.	3.00	44.17	
LSN0062	9/18/2001	1	.	.	.	.	3.00	44.17	
LSN0062	9/18/2001	3	.	.	.	.	3.00	44.17	46.17
LSN0062	9/18/2001	5	.	.	.	.	3.00	44.17	
LSN0062	9/18/2001	7.5	.	.	.	.	3.00	44.17	
TEN0005	9/18/2001	0.5	.	.	.	.	3.60	41.54	
TEN0005	9/18/2001	1	.	.	.	.	3.60	41.54	56.87

SAMPLING STATION IDENTIFIER	DATE START SAMPLING	SAMPLE DEPTH METERS	TOTAL PHOSPHORUS MG/L	*TSI TP*	ACTIVE CHLOROPHYLL A µG/L	*TSI Chl A*	SECCHI DEPTH METERS	*TSI SECCHI*	TN:TP
TEN0005	9/18/2001	3	.	.	.	.	3.60	41.54	53.05
TEN0005	9/18/2001	5	.	.	.	.	3.60	41.54	53.83
TEN0005	9/18/2001	7	.	.	.	.	3.60	41.54	85.28
TEN0005	9/18/2001	9	.	.	.	.	3.60	41.54	91.15
TEN0005	9/18/2001	11	.	.	.	.	3.60	41.54	79.91
TEN0005	9/18/2001	12.6	.	.	.	.	3.60	41.54	63.55
TEN0012	9/18/2001	0.5	0.011	38.46	5.23	46.84	3.00	44.17	40.92
TEN0012	9/18/2001	1	.	.	.	.	3.00	44.17	
TEN0012	9/18/2001	3	.	.	.	.	3.00	44.17	42.68
TEN0012	9/18/2001	5.2	.	.	.	.	3.00	44.17	38.45
ZCU0002	9/18/2001	0	0.035	55.46	2.09	37.85	.		25.28

Table A-4: Trophic State Indexes (TSI) for Little Seneca Lake (WSSC, 1998)

	Cabin Branch Creek	Little Seneca Creek	Seneca Dam	Ten Mile Creek
TSI-Chlorophyll-a (October)	49.0	51.3	49.5	49.8
TSI-Total Phosphorus (October)	56.9	56.9	56.9	56.9
TSI-Secchi Disk (June)	40.2	39.2	39.3	39.4
TSI-Secchi Disk (July)	38.1	39.4	37.9	37.6
TSI-Secchi Disk (August)	42.5	39.1	39.1	37.6
TSI-Secchi Disk (September)	41.3	34.7	33.9	34.1
TSI-Secchi Disk (October)	40.4	42.5	39.8	41.5

Table A-5: Cabin Branch Creek Chemical and Biological Data (WSSC, 1998)

	Cabin Branch Creek Surface	Cabin Branch Creek Bottom	Cabin Branch Creek Composite	Units	Detection Limits
Alkalinity	38.0	38.0		mg/l	
Iron	0.0500	0.112		mg/l	0.0030
Manganese	0.0180	0.0330		mg/l	0.0020
Ammonia	0.00	0.00		mg/l as N	0.10
Nitrate-Nitrite	0.305	0.301		mg/l as N	0.020
Ortho-phosphate	0.0390	0.0270		mg/l	0.0200
Total Kjeldahl Nitrogen	0.289	.0300		mg/l	0.10
Total Phosphorus	0.0386	0.0386		mg/l	
Turbidity	1.3	1.4		NTU	
Chlorophyll a	6.58			mg/m^3	
Fecal Coliforms MPN			4.00	MPN/100ml	
Total Organic Carbon			2.2	mg/l	0.060

Table A-6: Little Seneca Creek Chemical and Biological Data (WSSC, 1998)

	Little Seneca Creek Surface	Little Seneca Creek Bottom	Little Seneca Creek Composite	Units	Detection Limits
Alkalinity	38.0	38.0		mg/l	
Iron	0.167	0.167		mg/l	0.0030
Manganese	0.0450	0.0450		mg/l	0.0020
Ammonia	0.0366	0.0366		mg/l as N	0.10
Nitrate-Nitrite	0.407	0.407		mg/l as N	0.020
Ortho-phosphate	0.0290	0.0290		mg/l	0.0200
Total Kjeldahl Nitrogen	0.323	0.323		mg/l	0.10
Total Phosphorus	0.0386	0.0386		mg/l	
Turbidity	2.3	2.3		NTU	
Chlorophyll a	8.32			mg/m^3	
Fecal Coliforms MPN			2.00	MPN/100ml	
Total Organic Carbon			2.2	mg/l	0.060

Table A-7: Seneca Dam Chemical and Biological Data (WSSC, 1989)

	Seneca Dam Surface	Seneca Dam Bottom	Seneca Dam Composite	Units	Detection Limits
Alkalinity	60.0	38.0		mg/l	
Iron	0.0270	2.86		mg/l	0.0030
Manganese	0.0120	3.87		mg/l	0.0020
Ammonia	0.00	1.51		mg/l as N	0.10
Nitrate-Nitrite	0.304	0.0086		mg/l as N	0.020
Ortho-phosphate	0.0310	0.0640		mg/l	0.0200
Total Kjeldahl Nitrogen	0.272	1.99		mg/l	0.10
Total Phosphorus	0.0386	0.0627		mg/l	
Turbidity	13.7	1.10		NTU	
Chlorophyll a	6.92			mg/m^3	
Fecal Coliforms MPN			8.00	MPN/100ml	
Total Organic Carbon			2.6	mg/l	0.060

Table A-8: Ten Mile Creek Chemical and Biological Data (WSSC, 1989)

	Ten Mile Creek Surface	Ten Mile Creek Bottom	Ten Mile Creek Composite	Units	Detection Limits
Alkalinity	38.0	65.0		mg/l	
Iron	0.0380	2.95		mg/l	0.0030
Manganese	0.0190	3.63		mg/l	0.0020
Ammonia	0.00	2.20		mg/l as N	0.10
Nitrate-Nitrite	0.300	0.0082		mg/l as N	0.020
Ortho-phosphate	0.0280	0.0240		mg/l	0.0200
Total Kjeldahl Nitrogen	0.318	2.95		mg/l	0.10
Total Phosphorus	0.0386	0.0810		mg/l	
Turbidity	1.30	18.0		NTU	
Chlorophyll a	7.12			mg/m^3	
Fecal Coliforms MPN			30.0	MPN/100ml	
Total Organic Carbon			2.6	mg/l	0.060