Leesville Lake
Water Quality Monitoring Program

Prepared by

Michael A. Lobue
Leesville Lake Association

Sponsored by
Leesville Lake Association

Funded by
Leesville Lake Association

Equipment Donated and Loaned by
Virginia Department of Environmental Quality

December 2007

CONTENTS

CONTENTS

FIGURES

TABLES

Leesville Lake Association
Altavista, VA

2007 OFFICERS

President	Mike Lobue
Vice President	Sherwood Zimmerman
Treasurer	Gerry Caprario
Secretary	Phyllis Garlick

2007 BOARD OF DIRECTORS

Richard Beaton
Sue Glasscock
Stan Goldsmith
Steve Johnston
Julie Moore
Pete Pettit
Sharon Reilly
Sam Skillman
Fred Tannehill

2007 VOLUNTEER MONITORS

Mike Lobue
Ron Long
Julie Moore
Don and Jan Parry
Steve and Barbara Richter
Bill Wallace

EXECUTIVE SUMMARY

The Virginia Department of Environmental Quality (DEQ) monitors Leesville Lake water quality. However, water quality monitoring by DEQ is currently on a six-year rotation. DEQ last collected water quality data in 2006 and will not monitor Leesville Lake water quality again until 2012. In addition, there are too few DEQ monitoring stations to get an adequate understanding of bacteria levels in the lake. Therefore, the Leesville Lake Association (LVLA) initiated a Citizen Water Quality Monitoring Program in 2007.

The goals of the program are to:

- Obtain a better understanding of Leesville Lake water quality.
- Supplement the DEQ water quality monitoring.
- Raise the awareness of the importance of water quality.
- Educate residents about the factors that cause water quality to deteriorate and age the lake more rapidly than necessary.

The 2007 monitoring season began in late April with volunteer training. Volunteers measured water clarity, pH, dissolved oxygen (DO), temperature and conductivity and collected water samples for bacteria testing from April 28th through September 28th on a biweekly basis. Water clarity data and water samples for bacteria testing were also collected after a significant rain event in early June. The Virginia Department of Environmental Quality loaned the Association a water quality monitoring probe that was used to measure DO, temperature, pH and conductivity.

The trophic status of Leesville Lake was monitored by measuring Secchi depth, which is an indicator of water clarity. Bacteria levels (E. coli) were monitored with the use of Coliscan Easygel® test kits. DEQ provided the Association with the Coliscan Easygel® test kits and the other equipment necessary to test for E. coli.

Conclusions – Trophic Status

Since this is the first year of the Association's monitoring program, the trophic status for 2007 was compared to the DEQ mean for the period from 1990 through 2006. Based on the mean Secchi depth for all of the monitoring stations, the trophic state index (TSI) for 2007 was 50.6. That number is lower than the mean for the period from 1990 through 2006, which was 57.7. The lower TSI for 2007 is likely a result of the below average rainfall in 2007. The reduced rainfall resulted in less runoff and less silt in the lake. Less silt results in clearer water, higher Secchi depth numbers and lower TSI. Silt, or sediment, carries nutrients into the lake, which speeds up the aging of the lake.

Since non-algal turbidity such as silt affects Secchi depth readings and therefore TSI, it would be better if chlorophyll *a* and total phosphorus data were also collected. If the Association could establish a partnership with a local college and find the necessary funding to pay for collecting and analyzing the samples, it could begin to collect chlorophyll *a* and total phosphorus data.

Conclusions – Bacteria (Escherichia coli)

Coliscan Easygel® test kits were used to measure E. coli in water samples. Of the 90 water samples tested during the season, only one sample exceeded the state standard (235 CFUs/100 ml) for E. coli. The sample that exceeded the standard was taken at Station 1 (Toler's Bridge) after a significant rain event in early June.

Conclusions – Dissolved Oxygen, Temperature, pH and Conductivity

As expected, most of the dissolved oxygen (DO) values moved toward lower values as the summer progressed. In addition, DO generally decreases with increasing depth. It is interesting to note, however, that the DO values are relatively constant from the surface to the bottom at Station 1, Toler's Bridge on any given day. This appears to be due to relatively high water flow rate either downstream or upstream (pump back operations) and good mixing in this area. Dissolved oxygen ranged from a high of 11.7 mg/l at Mile Marker 1 in late April to a low of 4.3 mg/l in the lower section of the lake in early July. None of the DO data exceeded the state standard (minimum 4 mg/l). However, data was only collected down to 6 meters depth. It is possible that DO concentrations could have been below the state standard in the lower section of the lake in late summer. In 2008, the Association plans to collect DO, pH, temperature and conductivity data for the entire water column at three locations.

The daily water temperature at Station 1 (Toler's Bridge) is nearly isothermal as a result of the high flow rates and mixing in that section of the lake. At the other six stations, the surface water temperature increased faster than the water temperatures at 3 and 6 meters of depth as the season progressed. The water temperature in the upper portion of the lake is influenced by the temperature of the water coming out of Smith Mountain Lake and is significantly lower than the water temperature in the lower portion of the lake. Water temperatures ranged from 13.1º C in late April at Toler's Bridge to a high of 28.2º C at Mile Marker 1 in mid-August. None of the temperature data collected exceeded the state standard (maximum 31 degrees Centigrade).

The pH values were generally higher at the surface and 3 meters depth than at 6 meters. The higher pH is a result of more algae growth nearer the surface of the water. The pH values ranged from a low of 6.5 at Toler's Bridge in early July to a high of 8.6 at Mile Marker 1 in early August. None of the pH values exceeded the state standard for pH (6.0 to 9.0).

Conductivity is a measure of the amount of dissolved salts in the water and is measured in microsiemens per centimeter (µs/cm). Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 µs/cm. The conductivity profiles for Leesville Lake show that conductivity is relatively constant in the water column. Conductivity values generally increased from April 28th through August 17th and then declined. On any given day, the conductivity was relatively constant at all of the monitoring stations. Conductivity values ranged from a low of 113 (µs/cm) in late April to a high of 185 (µs/cm) in mid-August.

INTRODUCTION

The Leesville Lake Association initiated a citizen water quality monitoring program in 2007. The goals of the program are to:

- Obtain a better understanding of Leesville Lake water quality.
- Supplement the DEQ water quality monitoring.
- Raise the awareness of the importance of water quality.
- Educate residents about the factors that cause water quality to deteriorate and age the lake more rapidly than necessary.

The Virginia Department of Environmental Quality (DEQ) monitors Leesville Lake water quality. However, water quality monitoring by DEQ is currently on a six-year rotation. DEQ last collected water quality data in 2006 and will not monitor Leesville Lake water quality again until 2012. In addition, there are too few DEQ monitoring stations to get an adequate understanding of bacteria levels in the lake..

The 2007 monitoring season began in late April with volunteer training. Volunteers measured water clarity, pH, dissolved oxygen (DO), temperature and conductivity and collected water samples for bacteria testing from April 28th through September 28th on a biweekly basis. Water clarity data and water samples for bacteria testing were also collected after a significant rain event in early June. The Virginia Department of Environmental Quality loaned the Association a water quality monitoring probe which was used to measure DO, temperature, pH and conductivity.

The trophic status of Leesville Lake is monitored by measuring Secchi depth, which is an indicator of water clarity. Bacteria levels (E. coli) are monitored with the use of Coliscan Easygel® test kits. DEQ provided the Association with the Coliscan Easygel® test kits and the other equipment necessary to test for E. coli.

Water quality data was collected at the following seven sites. A map of the lake that shows the monitoring stations is on page 31 (Figure 32).

LVLA Station Number	DEQ Station ID	Station Location Description	Latitude	Longitude
1	LVLAROA153.47	North (downstream) side of Toler's's Bridge	37.0109	-79.4753
2	LVLAROA149.94	Mile Marker 9	37.03993	-79.4823
3	LVLATER000.33	Tri-County Marina	37.05942	-79.4449
4	LVLAROA143.84	Mile Marker 3	37.06182	-79.4207
5	LVLAOWC000.58	Pit Stop Marina	37.05939	-79.3957
6	LVLAROA142.50	Mile Marker 2	37.06637	-79.4033
7	LVLAROA141.42	Mile Marker 1	37.08151	-79.4016

Trophic Status of Leesville Lake

The cloudiness of lake water and how far down you can see is often related to the amount of nutrients in the water. Nutrients promote growth of microscopic plant cells (phytoplankton) that are fed upon by microscopic animals (zooplankton). The more the nutrients, the more the plants and animals and the cloudier the water is. This is a common, but indirect, way to roughly estimate the condition of the lake. This condition, called eutrophication, is a natural aging process of lakes, but which is unnaturally accelerated by too many nutrients. Silt, or sediment, carries nutrients into the lake.

A Secchi disk is commonly used to measure the depth to which you can easily see through the water, also called its transparency. Secchi disk transparency, chlorophyll *a* (an indirect measure of phytoplankton), and total phosphorus (an important nutrient and potential pollutant) are often used to define the degree of eutrophication, or trophic status of a lake.

The concept of trophic status is based on the fact that changes in nutrient levels (measured by total phosphorus) causes changes in algal biomass (measured by chlorophyll *a*) which in turn causes changes in lake clarity (measured by Secchi disk transparency). A trophic state index is a convenient way to quantify this relationship. One popular index was developed by Dr. Robert Carlson of Kent State University. Carlson's index uses a logarithmic transformation of Secchi disk values as a measure of algal biomass on a scale from 0 - 110. Each increase of ten units on the scale represents a doubling of algal biomass. Because chlorophyll *a* and total phosphorus are usually closely correlated to Secchi disk measurements, these parameters can also be assigned trophic state index values. The Carlson trophic state index is useful for comparing lakes within a region and for assessing changes in trophic status over time. Ranges of trophic state index values are often grouped into trophic state classifications.

- Oligotrophic lakes are very low in nutrients, so few algae grow and the water is very clear. Oligotrophic lakes have the lowest level of biological productivity and support very few plants and fish. These lakes have a visible depth greater than 12 feet and a tropic state index (TSI) of less than 40.
- Mesotrophic lakes are moderately productive, with slightly green water. Mesotrophic lakes have a visible depth between 8 and 12 feet and a TSI between 40 and 50.
- Eutrophic lakes are productive lakes with murkier water, and/or lots of plants, a visible depth of 3 to 8 feet and a TSI greater than 50.

Over time, a lake's trophic state can change. A mesotrophic lake this year can, for many reasons, change into a eutrophic lake within a few years. That is why it is important to monitor lake clarity, chlorophyll *a* and phosphorus to determine trends.

As part of its relicensing process, Appalachian Power Company (Appalachian) conducted a water quality study on Leesville Lake. Part of the water quality study included a compilation of the water quality data collected by the Virginia Department of

Environmental Quality (DEQ) from 1990 through 2006. Based on DEQ data for chlorophyl *a*, total phosphorus and Secchi depth, Leesville Lake is considered mesotrophic.

The Association collected Secchi depth data from April 28 to September 28, 2007. Below are charts showing the data. The mean Secchi depth for 2007 was 1.92. DEQ collected Secchi depth data from 1993 through 2003. The mean Secchi depth from 1993 through 2003 was 1.42. The year 2003 was a wet year and Secchi depths were lower than typical. If the 2003 data is excluded, the mean Secchi depth would have been 1.56. Therefore, the mean Secchi depth for 2007 was substantially higher than the mean from 1993 through 2003 with or without the 2003 data. Although the Association collected data from more stations than DEQ, the mean Secchi depth for all of the Association stations was the same as the mean Secchi depth for the Association stations that are comparable to the DEQ stations (Stations 1, 3 and 7). Therefore, the Association data should be directly comparable to the DEQ data.

Based on the mean Secchi depth for all of the monitoring stations, the TSI for 2007 is 50.6. That number is lower than the mean for the DEQ data (1993 through 2003), which is 57.7. The lower TSI for 2007 is likely a result of the below average rainfall in 2007. The reduced rainfall resulted in less runoff and less silt in the lake. Less silt results in clearer water, higher Secchi depth numbers and lower TSI.

Since non-algal turbidity such as silt affects Secchi depth readings and, therefore. TSI, it would be better if chlorophyll *a* and total phosphorus data were also collected. If the Association could establish a partnership with a local college and find the necessary funding to pay for collecting and analyzing the samples, it could begin to collect chlorophyll *a* and total phosphorus data.

Note from Figure 1 that Secchi depth decreases as the distance from the dam increases. Also note that the Secchi depth is lower at Station 5, which is near the confluence of Old Woman's Creek and the lake. The murkier water from Old Woman's Creek reduces the Secchi depth at Station 5.

Figure 2 shows how Secchi depth changed over the season. There was a significant rain event on June 3rd that caused the Secchi depth to drop on June 4th and June 5th.

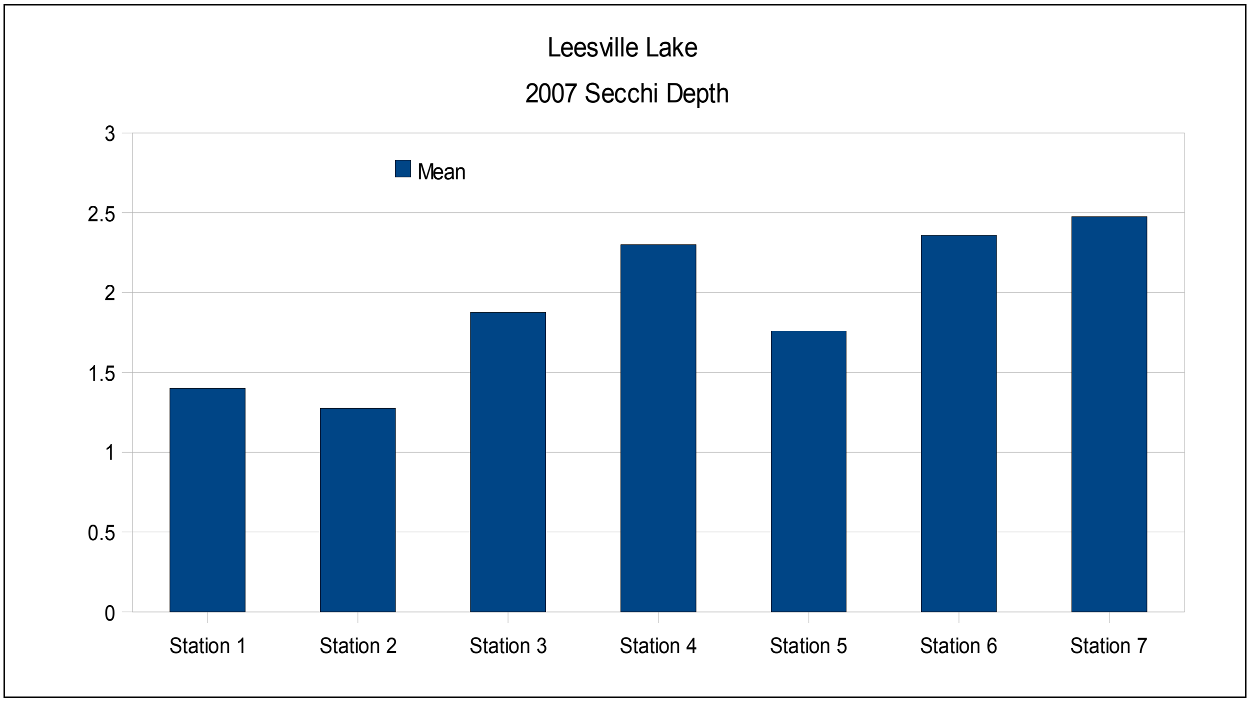

Figure 1: Mean Secchi Depth by Station

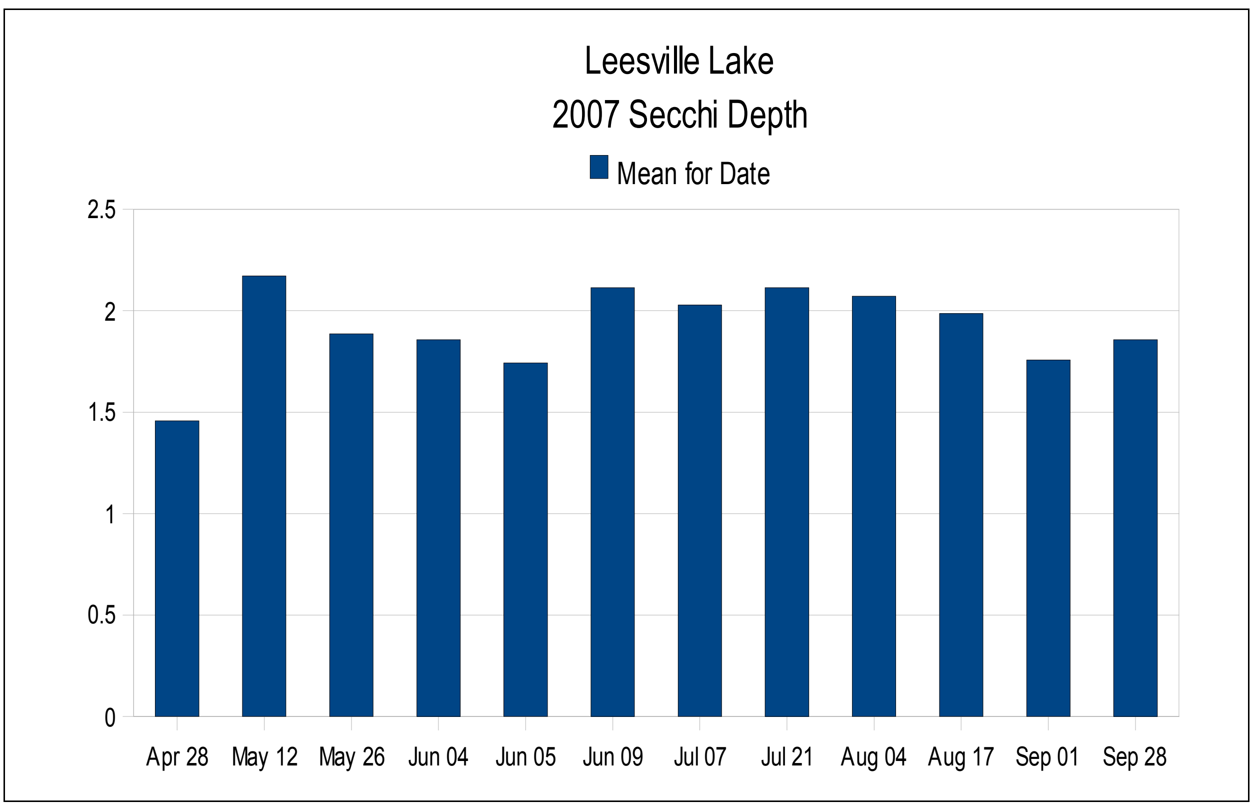

Figure 2: Mean Secchi Depth by Date

Bacteria (Escherichia coli) Profiles

Water samples collected from April 28th through September 28th were tested for E. coli using Coliscan Easygel® test kits. Samples were collected biweekly except for September. Samples were also collected on June 4th and 5th after a significant rain event (1.04” at the Roanoke Regional Airport).

Figure 3, below, is a chart with the results. Of the 90 lake water samples tested during the season, only one sample exceeded the state standard (235 CFUs/100 ml) for E. coli. The sample that exceeded the standard was taken on June 4th at station 1 (Toler's Bridge) after the significant rain event mentioned above. It is interesting to note that by the following day, the E. coli level had dropped back below the state standard. It is also interesting to note that while the E. coli level exceeded the standard on June 4th at Station 1 (Toler's Bridge), the tests showed no E. coli at the next monitoring station (Station 2, Mile Marker 9) or any of the other monitoring stations. By the following day, E. coli level had dropped back below the state standard at Station 1.

The primary source of E. coli in the lake is runoff from agricultural land along the Pigg River. Although it is not a normal sampling location, a water sample was taken from the Pigg River on June 5th. The sample had an E. coli count of 325 CFUs/100 ml. On that day, the Pigg River was very muddy (Secchi depth of 0.2 meters). While the Pigg River sample contained 325 CFUs/100 ml, the Station 1 (Toler's Bridge) sample contained 150 CFUs/100 ml. The significantly lower level at Station 1 was a result of dilution with lake water from Smith Mountain Lake and settling.

The 2007 mean E. coli level for the three LVLA monitoring stations that are comparable to the DEQ stations was 21 CFUs/100 ml. That is similar to the 2006 DEQ mean, which showed 25 CFUs/100 ml (lower detectable limit) and substantially lower than the 2003 DEQ mean, which was 190 CFUs/100 ml. The year 2003 was a wet year and the data from two dates skewed the results to the high mean.

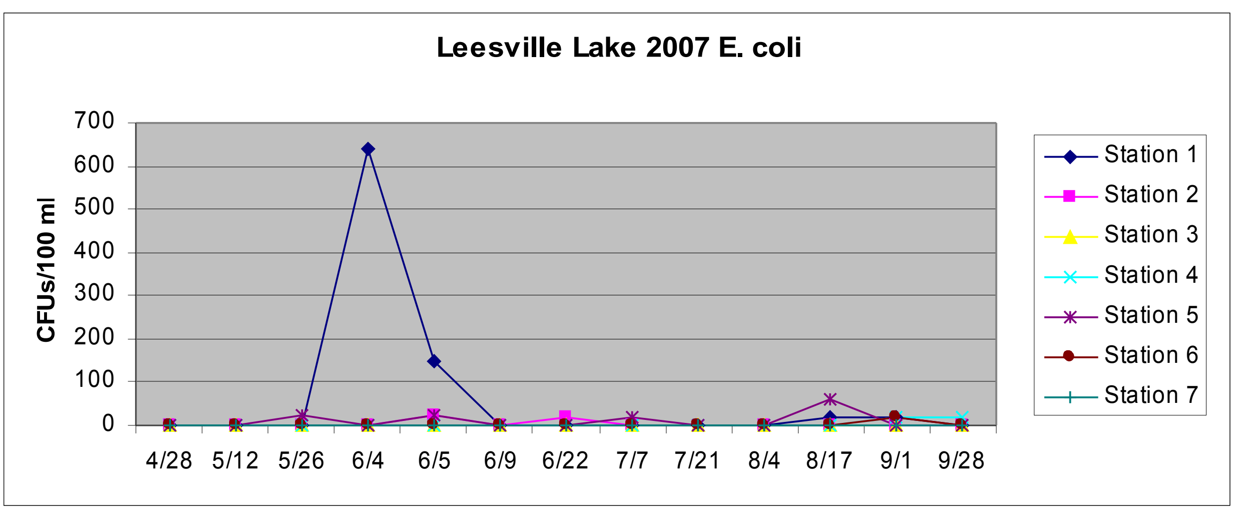

Figure 3: E. coli Profiles

Dissolved Oxygen (DO) Profiles

Figures 4 through 10 show the dissolved oxygen (DO) profiles for the seven monitoring stations. Table 1 contains the data that is plotted in the Figures. As expected, most of the DO values moved toward lower values as the summer progressed. In addition, DO generally decreases with increasing depth. It is interesting to note, however, that the DO values are relatively constant on many days at Station 1, Toler's Bridge. This appears to be due to relatively high water flow rate either downstream or upstream (pump back operations) and good mixing in this area.

It is interesting to note that the DO levels are sometimes higher at 3 meters deep than at the surface. This may be due to higher nutrient levels and increased algal production at 3 meters.

The state standard for DO in Leesville Lake is a minimum of 4 milligrams per liter (mg/l). None of the data collected in 2007 were below the state standard. However, data was only collected down to 6 meters. It is possible that DO below 6 meters in the latter part of the summer in the section of the lake downstream from Station 3 (Tri-County Marina) was below 4 mg/l. In 2008, data will be collected at one meter intervals to obtain a complete water column profile rather than stopping at 6 meters.

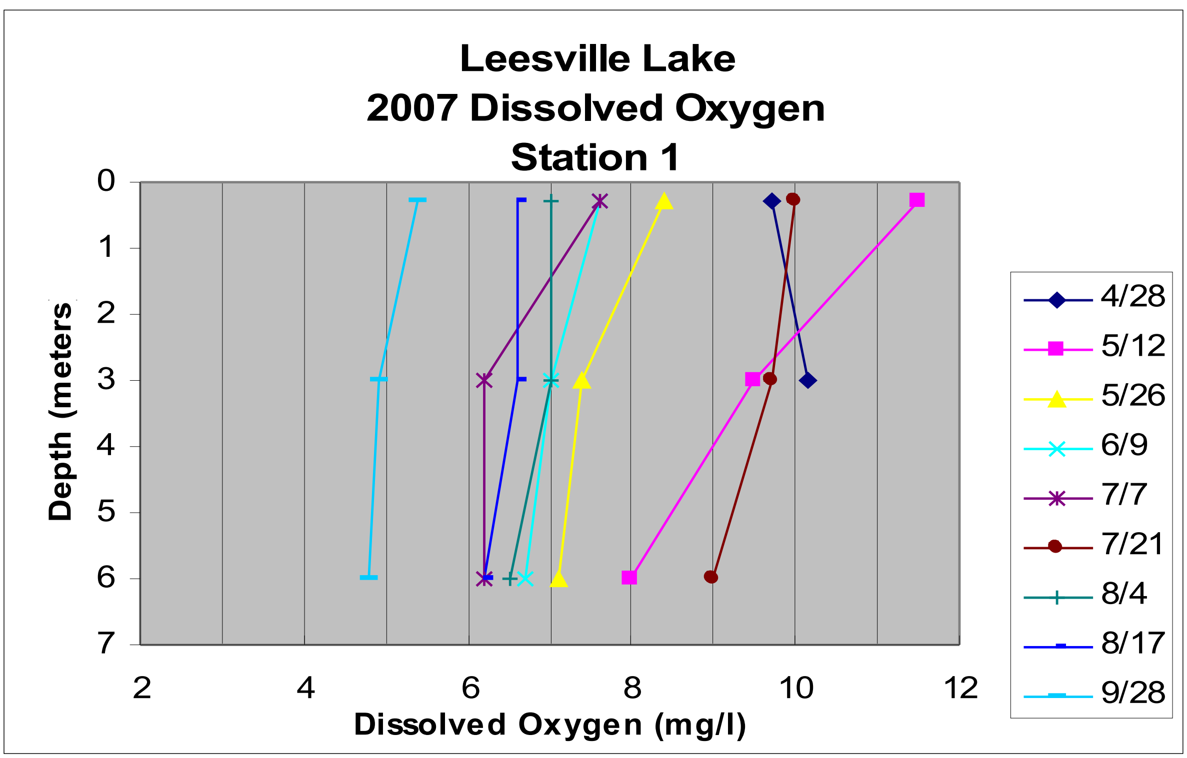

Figure 4: Dissolved Oxygen: Station 1, Toler's Bridge

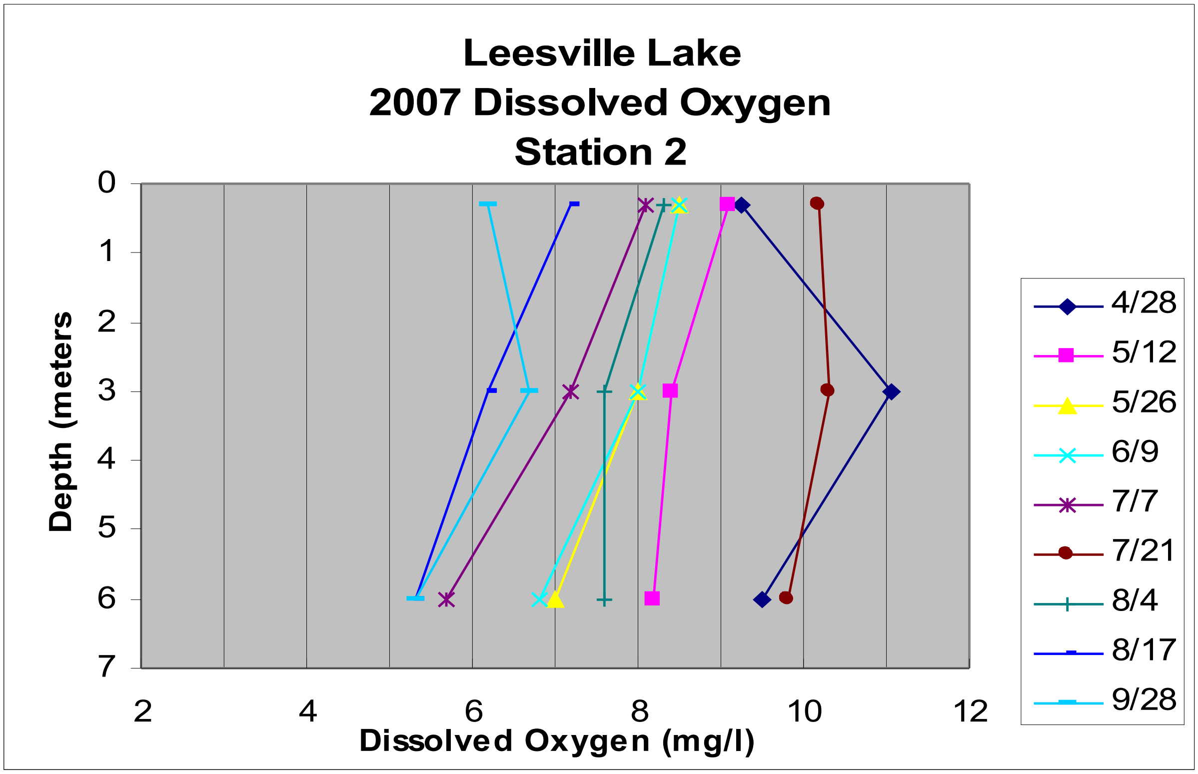

Figure 5: Dissolved Oxygen: Station 2, Mile Marker 9

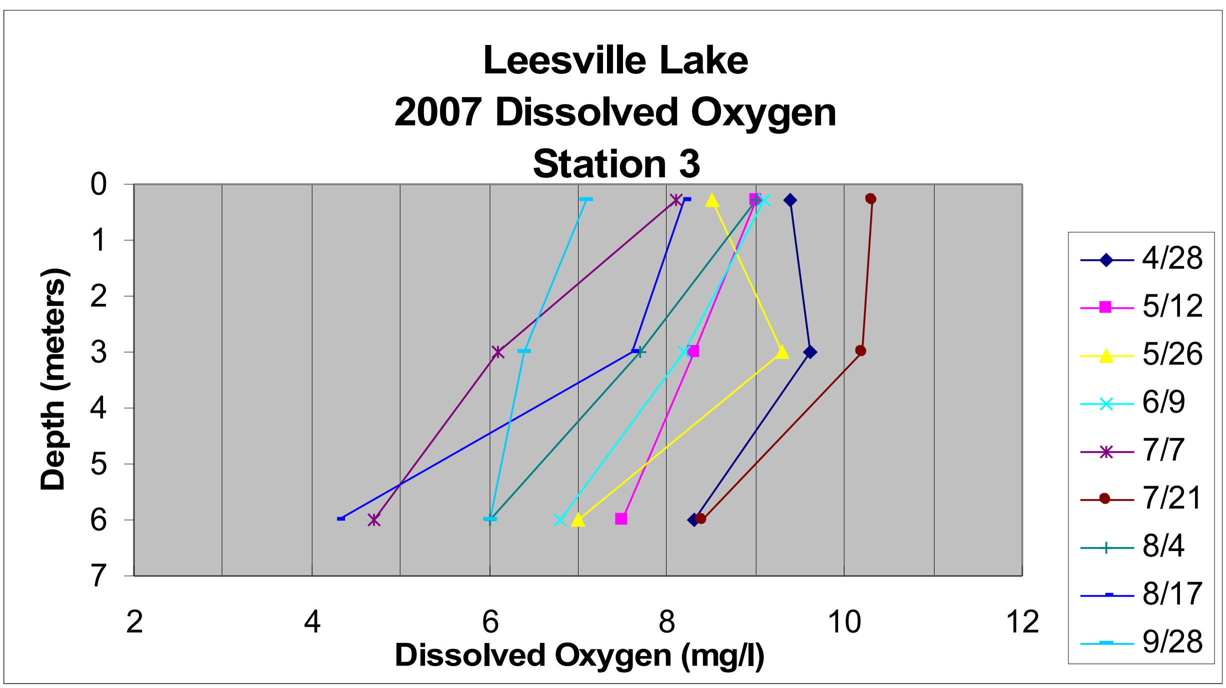

Figure 6: Dissolved Oxygen: Station 3, Tri-County Marina

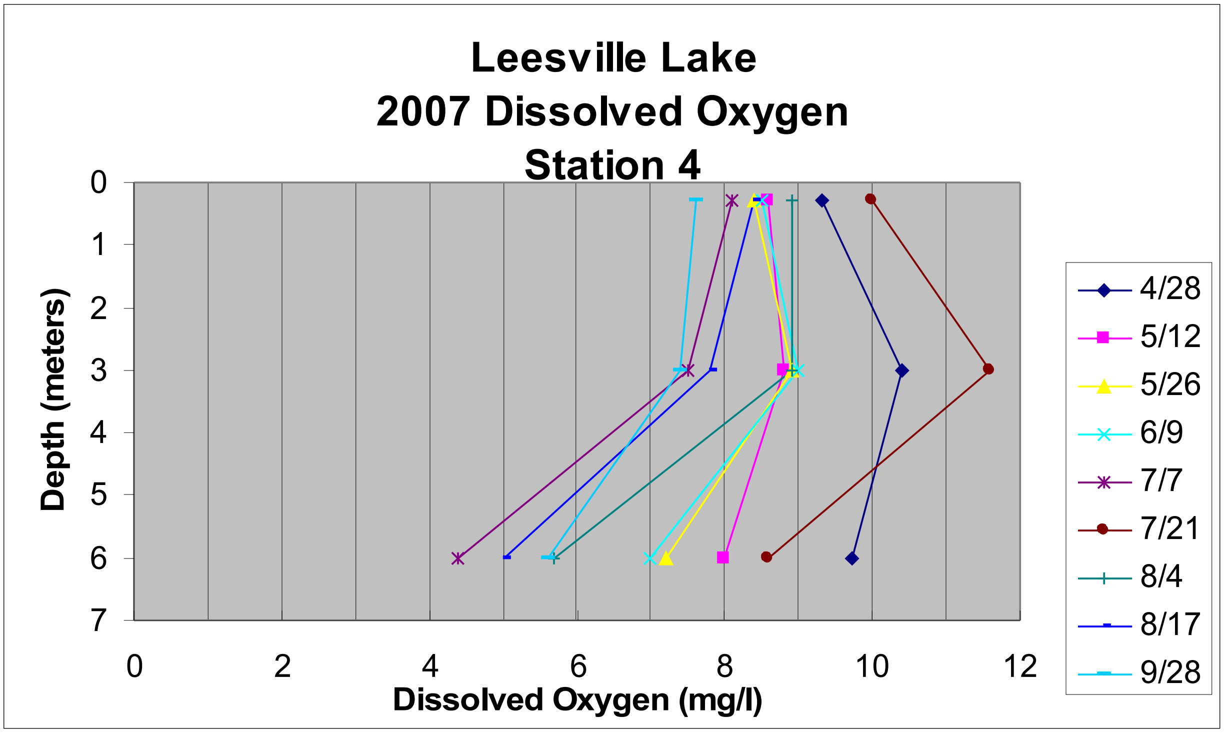

Figure 7: Dissolved Oxygen: Station 4, Mile Marker 3

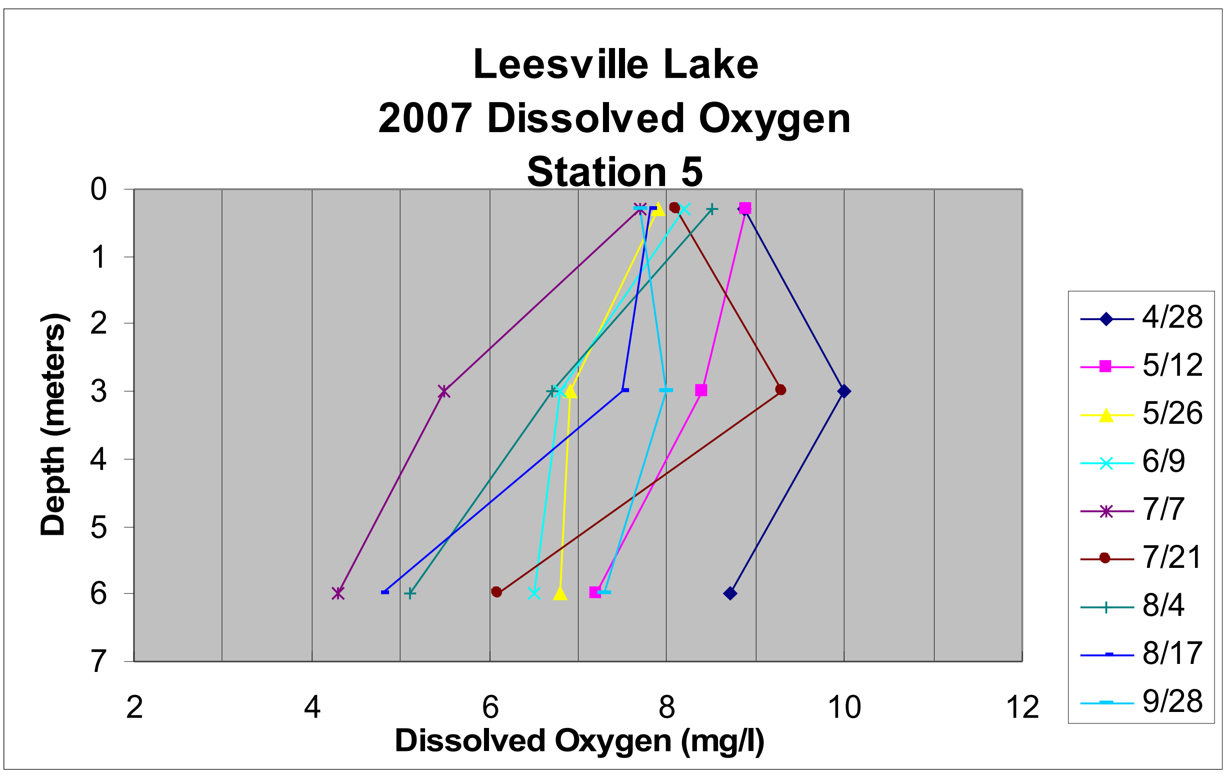

Figure 8: Dissolved Oxygen: Station 5, Pit Stop Marina

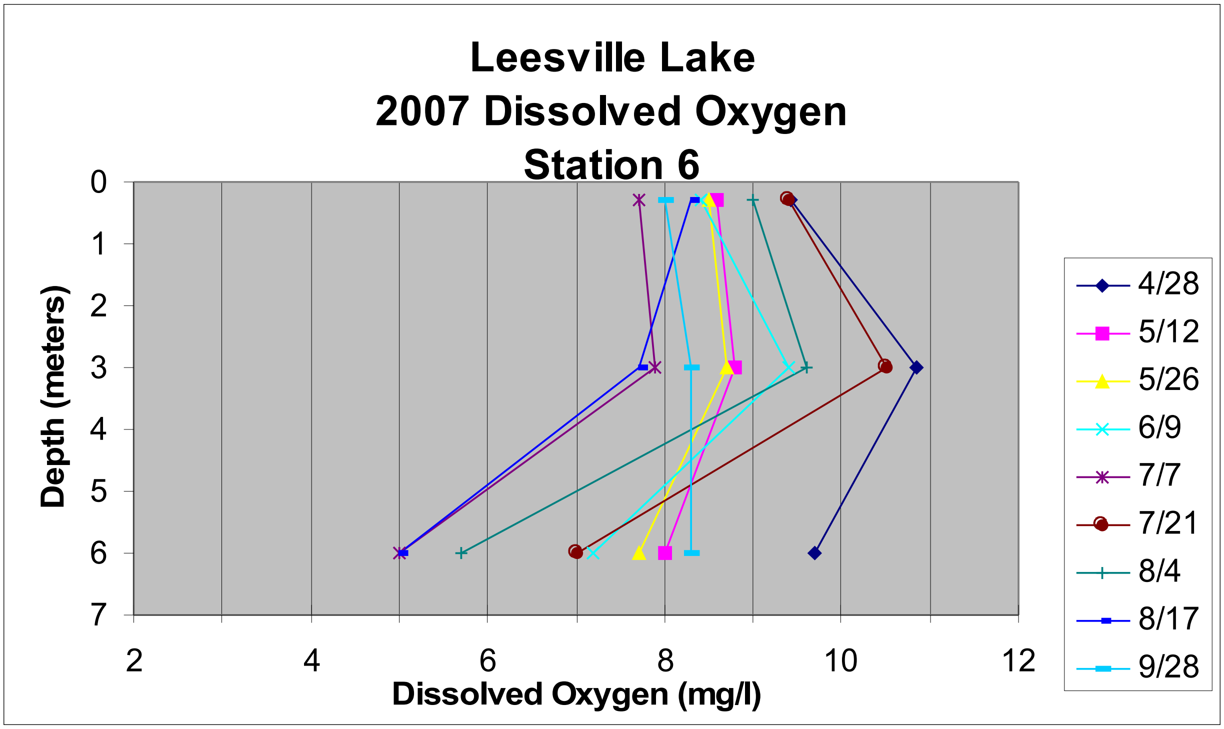

Figure 9: Dissolved Oxygen: Station 6, Mile Marker 2

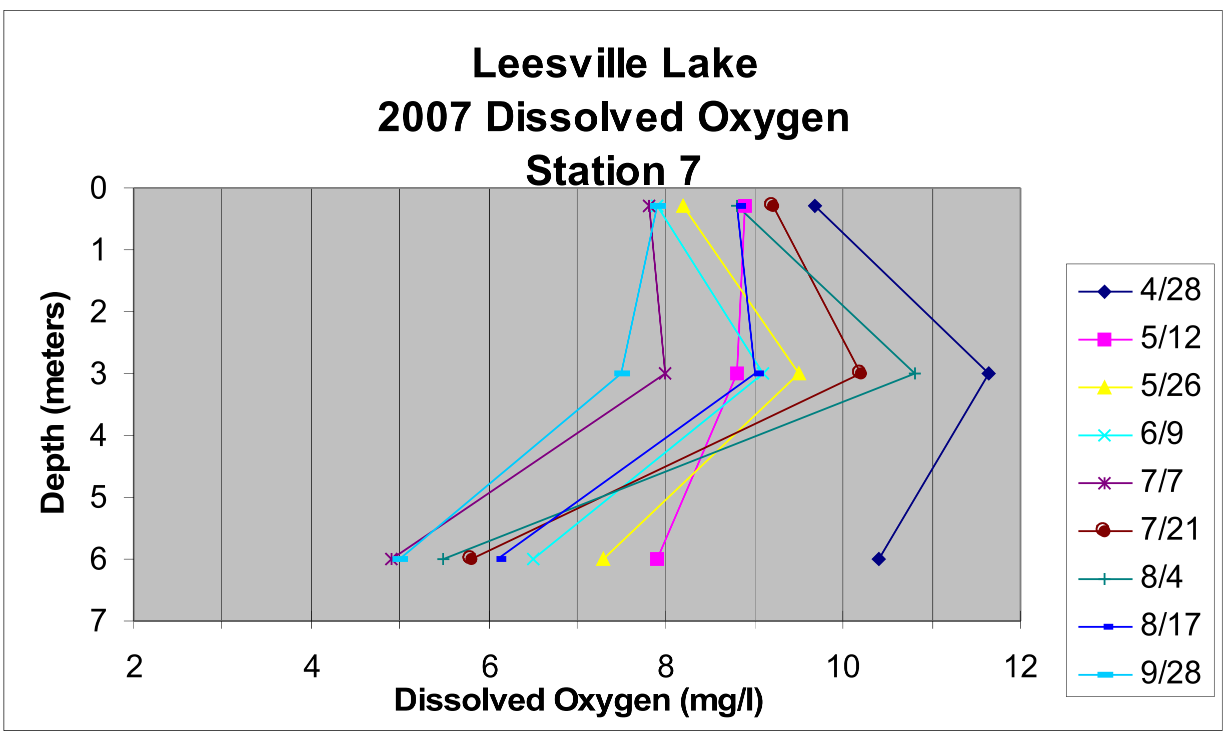

Figure 10: Dissolved Oxygen: Station 7, Mile Marker 1

Table 1: 2007 Dissolved Oxygen Data

Leesville Lake
2007 Dissolved Oxygen (DO) (mg/l)

Station	Depth (m)	28-Apr	12-May	26-May	9-Jun	7-Jul	21-Jul	4-Aug	17-Aug	28-Sep
1	0.3	9.7	11.5	8.4	7.6	7.6	10.0	7.0	6.6	5.4
1	3	10.2	9.5	7.4	7.0	6.2	9.7	7.0	6.6	4.9
1	6		8.0	7.1	6.7	6.2	9.0	6.5	6.2	4.8
2	0.3	9.3	9.1	8.5	8.5	8.1	10.2	8.3	7.2	6.2
2	3	11.1	8.4	8.0	8.0	7.2	10.3	7.6	6.2	6.7
2	6	9.5	8.2	7.0	6.8	5.7	9.8	7.6	5.3	5.3
3	0.3	9.4	9.0	8.5	9.1	8.1	10.3	9.0	8.2	7.1
3	3	9.6	8.3	9.3	8.2	6.1	10.2	7.7	7.6	6.4
3	6	8.3	7.5	7.0	6.8	4.7	8.4	6.0	4.3	6.0
4	0.3	9.3	8.6	8.4	8.5	8.1	10.0	8.9	8.4	7.6
4	3	10.4	8.8	8.9	9.0	7.5	11.6	8.9	7.8	7.4
4	6	9.7	8.0	7.2	7.0	4.4	8.6	5.7	5.0	5.6
5	0.3	8.9	8.9	7.9	8.2	7.7	8.1	8.5	7.8	7.7
5	3	10.0	8.4	6.9	6.8	5.5	9.3	6.7	7.5	8.0
5	6	8.7	7.2	6.8	6.5	4.3	6.1	5.1	4.8	7.3
6	0.3	9.4	8.6	8.5	8.4	7.7	9.4	9.0	8.3	8.0
6	3	10.8	8.8	8.7	9.4	7.9	10.5	9.6	7.7	8.3
6	6	9.7	8.0	7.7	7.2	5.0	7.0	5.7	5.0	8.3
7	0.3	9.7	8.9	8.2	7.9	7.8	9.2	8.8	8.8	7.9
7	3	11.7	8.8	9.5	9.1	8.0	10.2	10.8	9.0	7.5
7	6	10.4	7.9	7.3	6.5	4.9	5.8	5.5	6.1	5.0

Water Temperature Profiles

Figures 11 through 17 show the water temperature profiles for the seven monitoring stations. Note that on any given day, the water temperature at Station 1 (Toler's Bridge) is nearly isothermal. That is, the temperature from the surface down to 6 meters is nearly the same. This is a result of the high flow rates and mixing in that section of the lake.

As the season progressed, the surface water temperature increased faster than water temperatures at 3 and 6 meters of depth at the other six monitoring stations. The water temperature in the upper portion of the lake is influenced by the temperature of the water coming out of Smith Mountain Lake and is significantly lower than the water temperature in the lower portion of the lake.

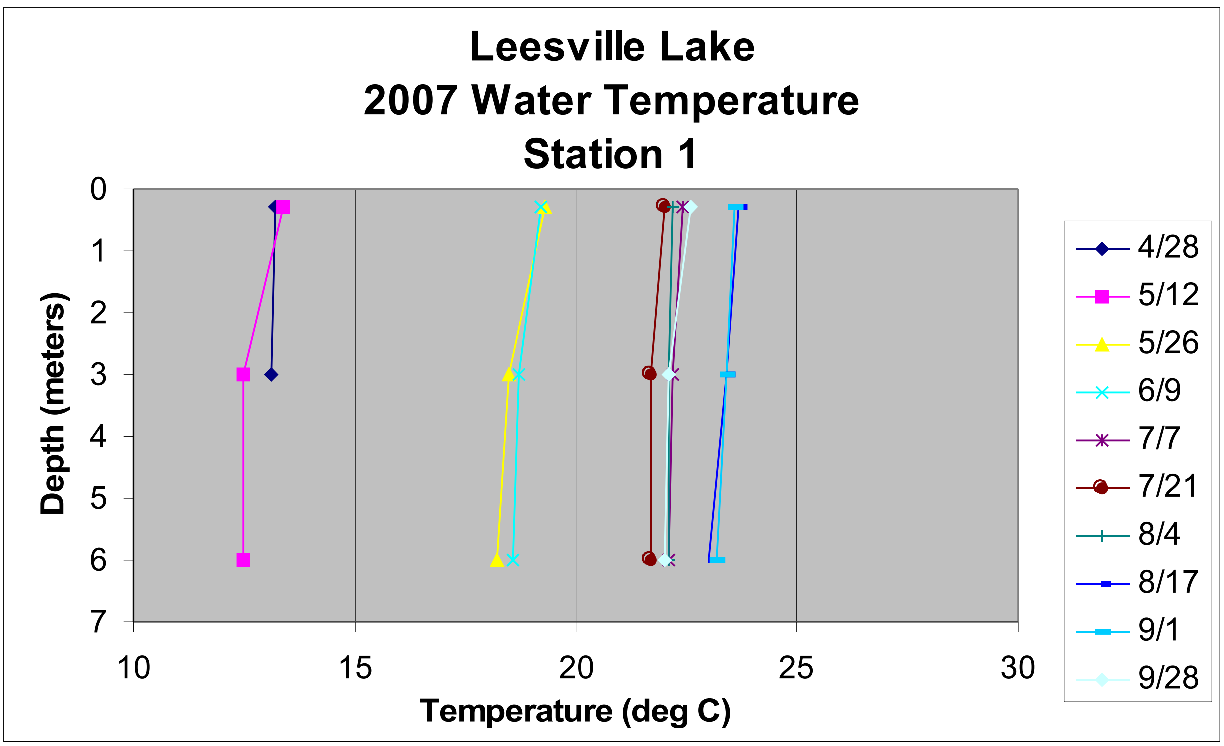

Figure 11: Water Temperature: Station 1, Toler's Bridge

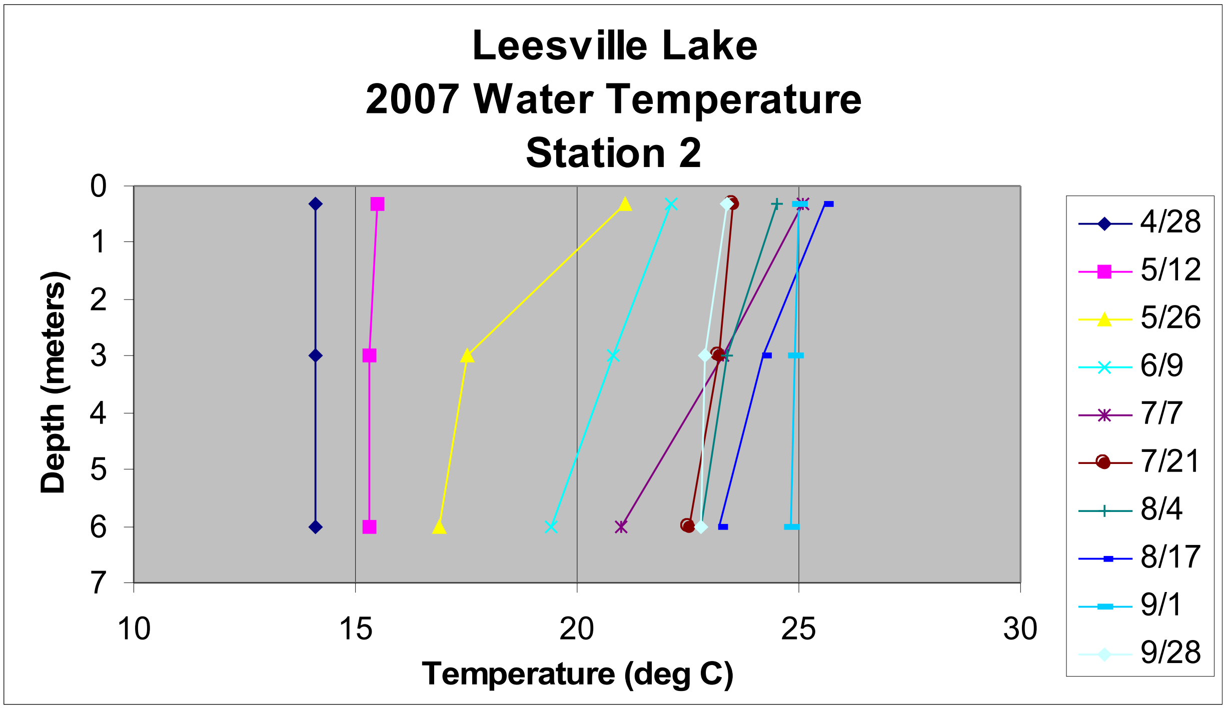

Figure 12: Water Temperature: Station 2, Mile Marker 9

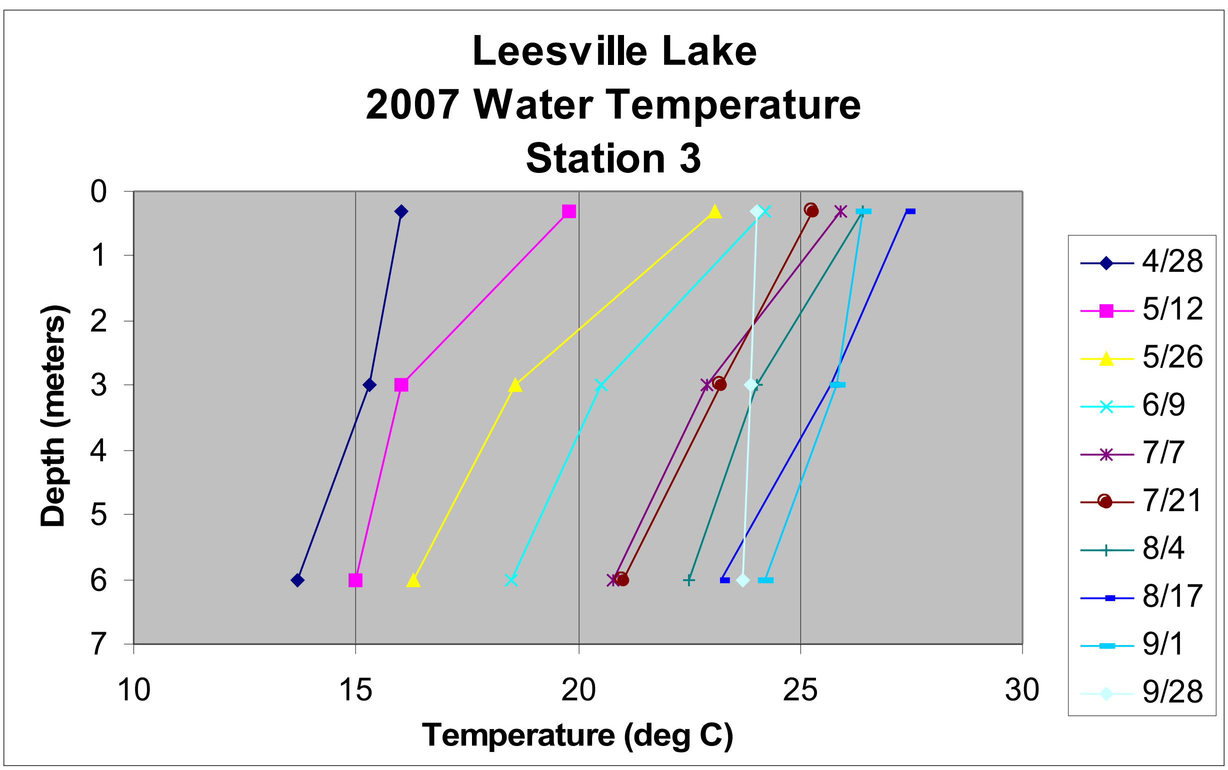

Figure 13: Water Temperature: Station 3, Tri-County Marina

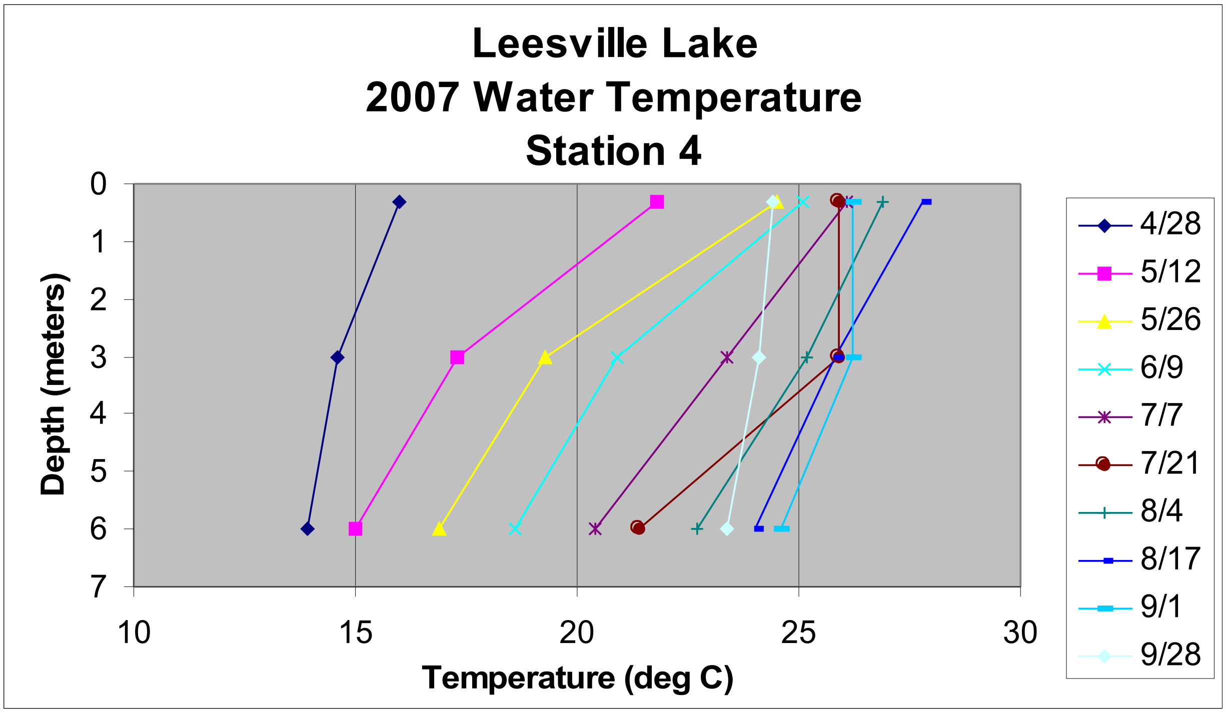

Figure 14: Water Temperature: Station 4, Mile Marker 3

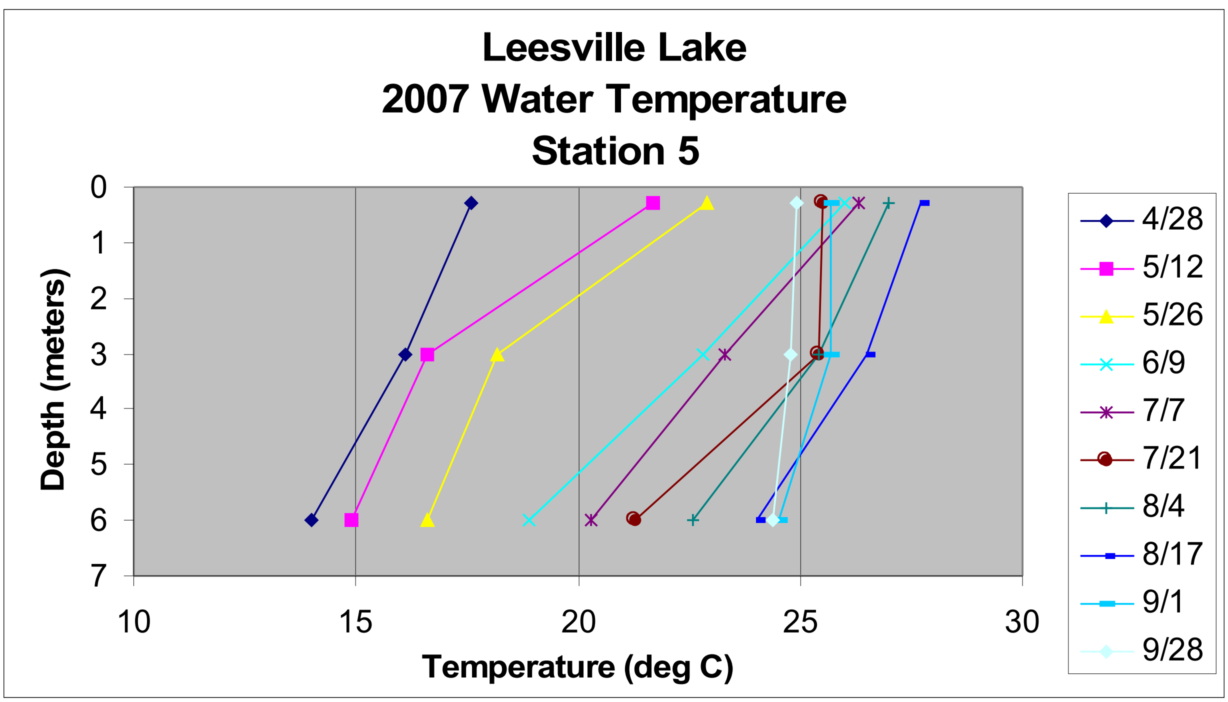

Figure 15: Water Temperature: Station 5, Pit Stop Marina

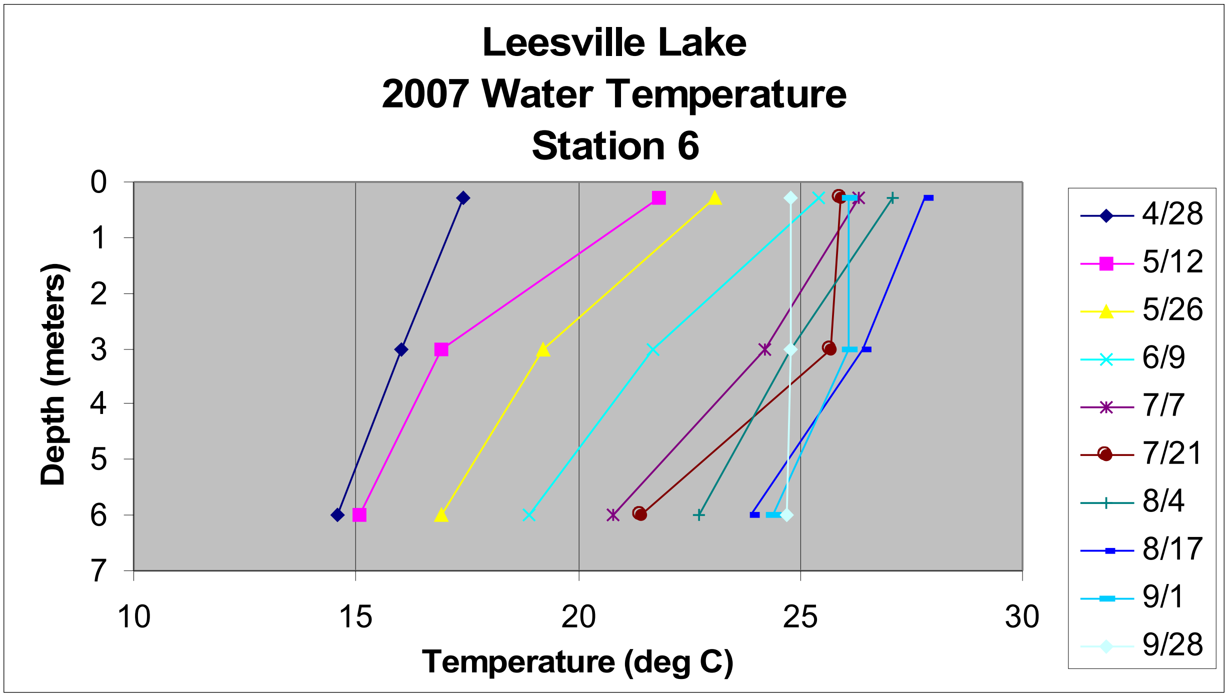

Figure 16: Water Temperature: Station 6, Mile Marker 2

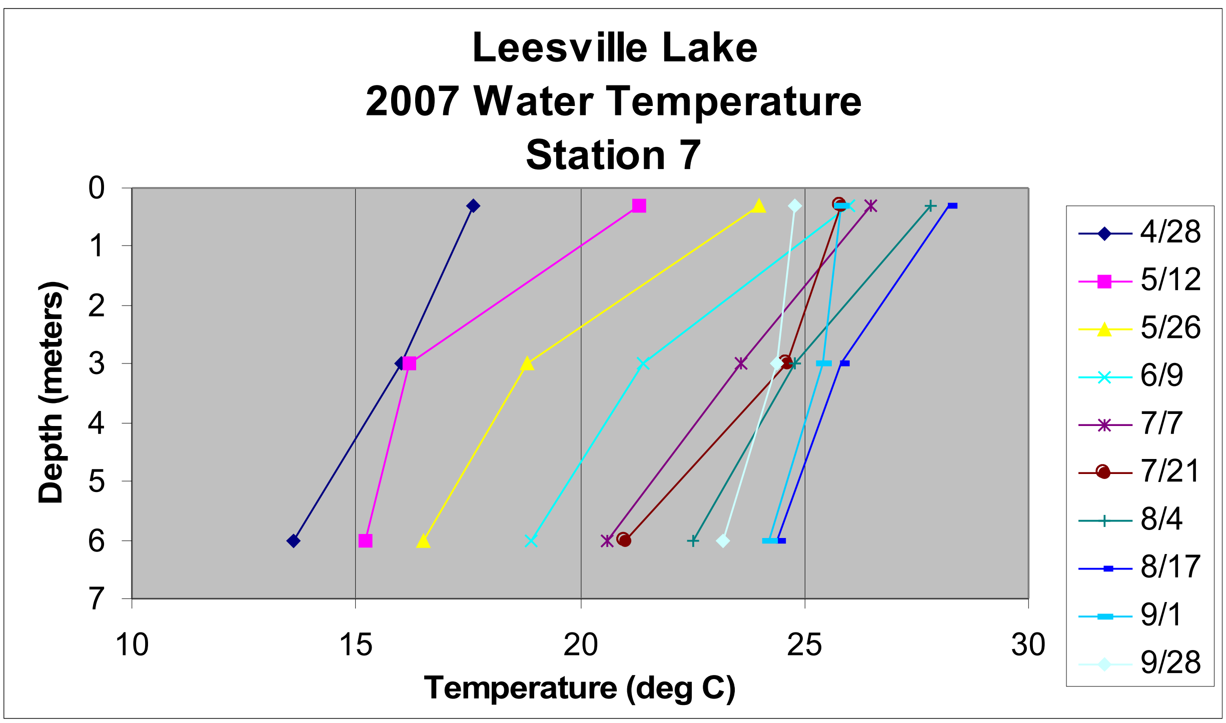

Figure 17: Water Temperature: Station 7, Mile Marker 1

Table 2: 2007 Water Temperature Data

Leesville Lake
2007 Water Temperature (deg C)

Station	Depth (m)	4/28	5/12	5/26	6/9	7/7	7/21	8/4	8/17	9/1	9/28
1	0.3	13.2	13.4	19.3	19.2	22.4	22.0	22.2	23.7	23.6	22.6
1	3	13.1	12.5	18.5	18.7	22.2	21.7	22.1	23.4	23.4	22.1
1	6		12.5	18.2	18.6	22.1	21.7	22.1	23.0	23.2	22.0
2	0.3	14.1	15.5	21.1	22.1	25.1	23.5	24.5	25.6	25.0	23.4
2	3	14.1	15.3	17.5	20.8	23.3	23.2	23.4	24.2	24.9	22.9
2	6	14.1	15.3	16.9	19.4	21.0	22.5	22.8	23.2	24.8	22.8
3	0.3	16.0	19.8	23.1	24.2	25.9	25.3	26.4	27.4	26.4	24.0
3	3	15.3	16.0	18.6	20.5	22.9	23.2	24.0	25.7	25.8	23.9
3	6	13.7	15.0	16.3	18.5	20.8	21.0	22.5	23.2	24.2	23.7
4	0.3	16.0	21.8	24.5	25.1	26.1	25.9	26.9	27.8	26.2	24.4
4	3	14.6	17.3	19.3	20.9	23.4	25.9	25.2	25.8	26.2	24.1
4	6	13.9	15.0	16.9	18.6	20.4	21.4	22.7	24.0	24.6	23.4
5	0.3	17.6	21.7	22.9	26.0	26.3	25.5	27.0	27.7	25.7	24.9
5	3	16.1	16.6	18.2	22.8	23.3	25.4	25.4	26.5	25.7	24.8
5	6	14.0	14.9	16.6	18.9	20.3	21.3	22.6	24.0	24.5	24.4
6	0.3	17.4	21.8	23.1	25.4	26.3	25.9	27.1	27.8	26.1	24.8
6	3	16.0	16.9	19.2	21.7	24.2	25.7	24.8	26.4	26.1	24.8
6	6	14.6	15.1	16.9	18.9	20.8	21.4	22.7	23.9	24.4	24.7
7	0.3	17.6	21.3	24.0	26.0	26.5	25.8	27.8	28.2	25.8	24.8
7	3	16.0	16.2	18.8	21.4	23.6	24.6	24.8	25.8	25.4	24.4
7	6	13.6	15.2	16.5	18.9	20.6	21.0	22.5	24.4	24.2	23.2

pH Profiles

Algae growth consumes carbon dioxide, which is a weak acid. Therefore, when algae grows during the day, the water becomes more basic (pH increases). When the algae and other organisms respire at night and carbon dioxide levels increase, the pH goes down. The increase and decrease of pH from daytime to nighttime results in a diurnal pH cycle.

The figures below show that pH values were generally higher at the surface and 3 meters depth than at 6 meters. The higher pH is a result of more algae growth nearer the surface of the water. The water pH is generally lower at Station 1, Toler's Bridge. This is likely due to the lower temperatures and less algae growth. None of the pH values exceeded the state standard for pH (6.0 to 9.0).

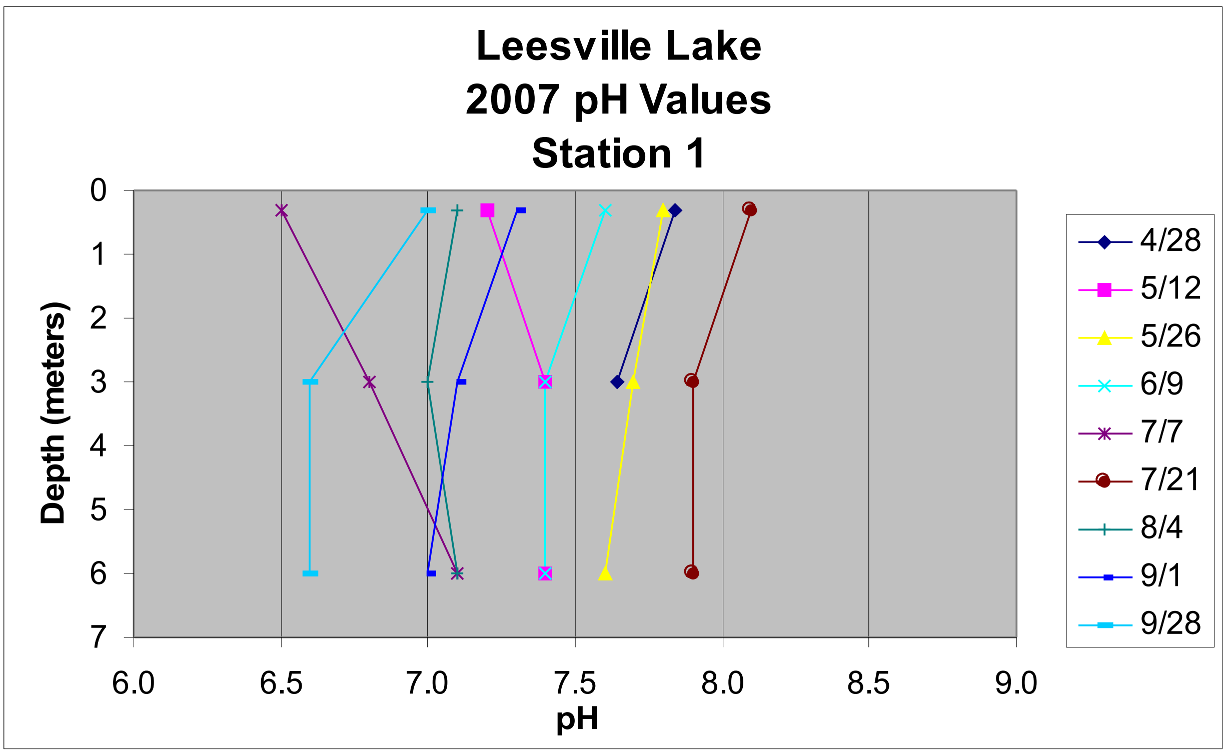

Figure 18: pH Values: Station 1, Toler's Bridge

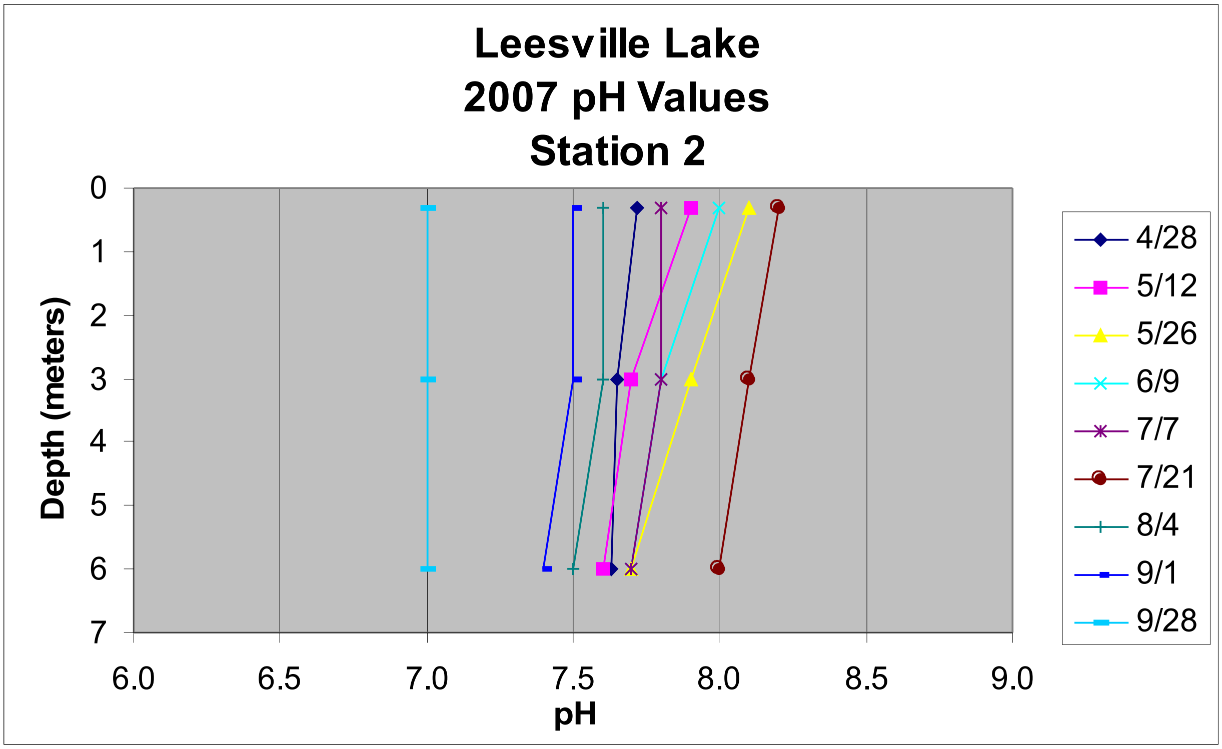

Figure 19: pH Values: Station 2, Mile Marker 9

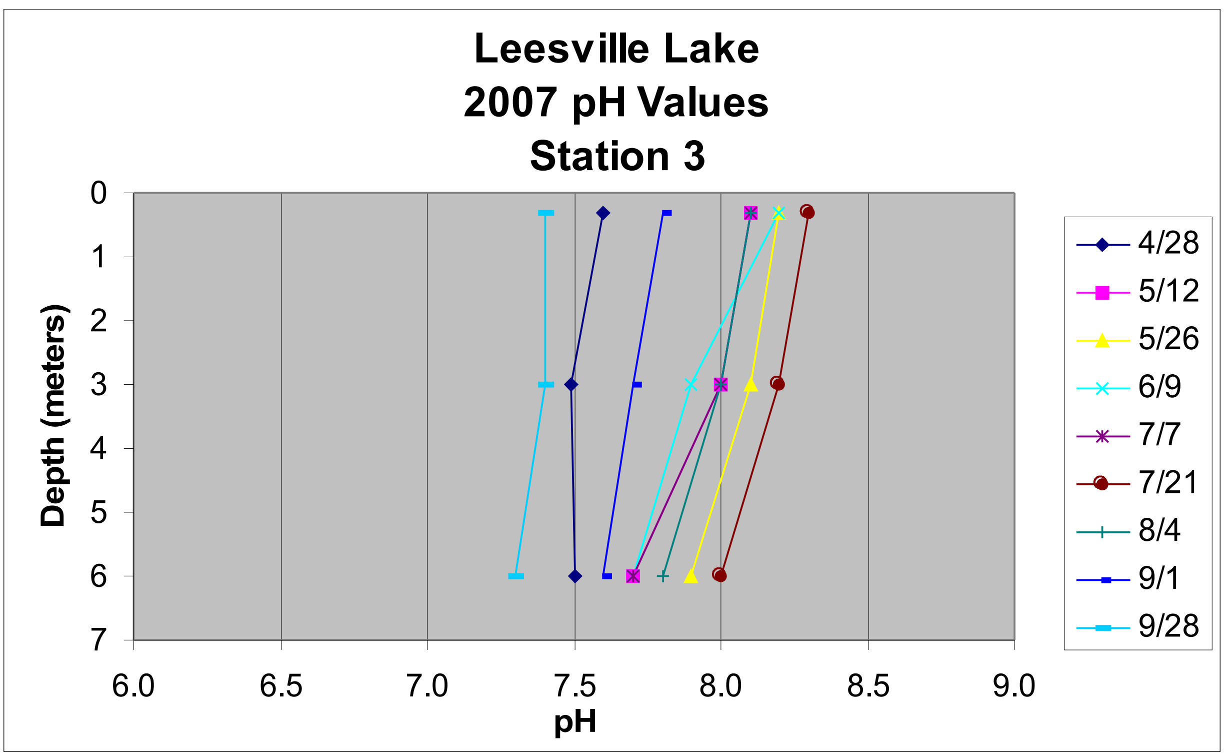

Figure 20: pH Values: Station 3, Pit Stop Marina

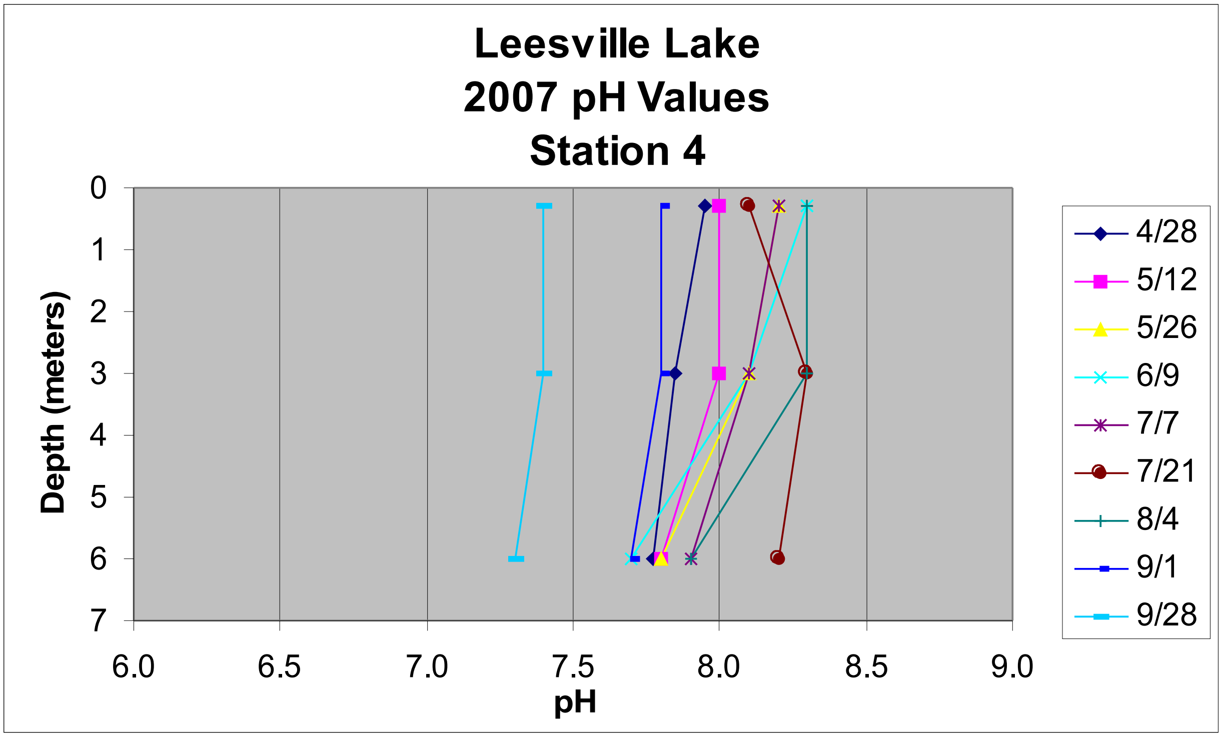

Figure 21: pH Values: Station 4, Mile Marker 3

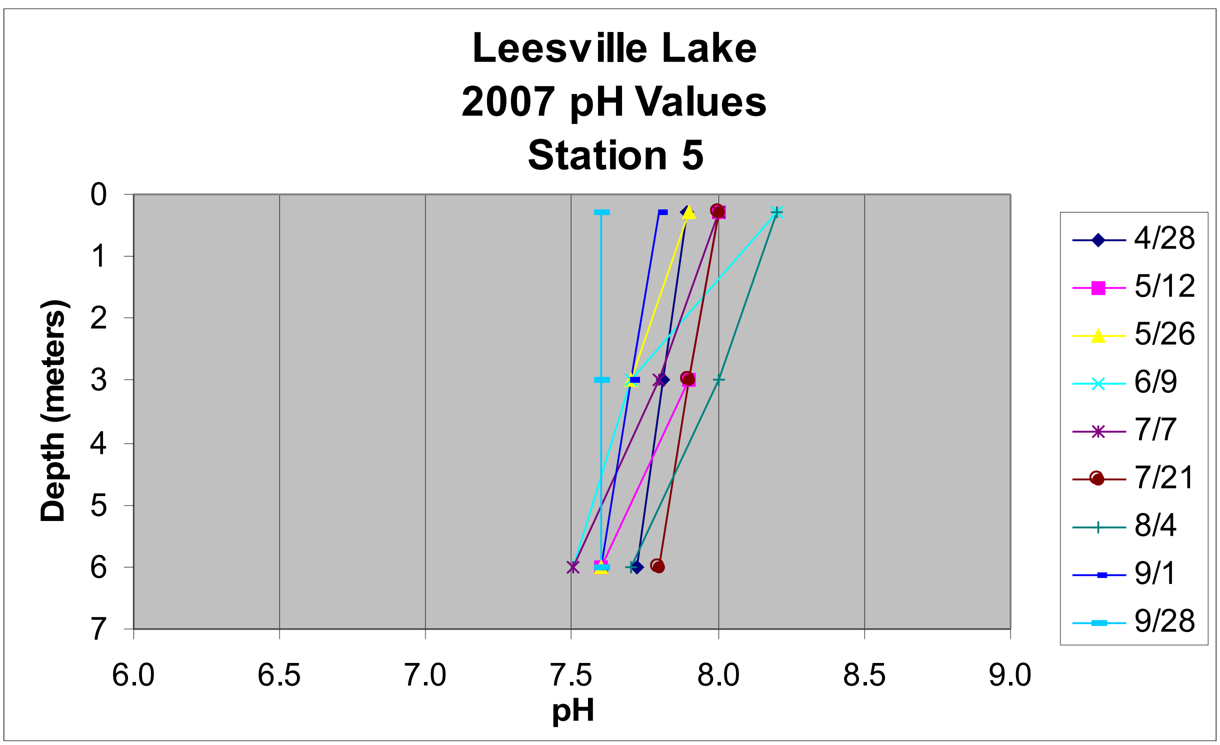

Figure 22: pH Values: Station 5, Pit Stop Marina

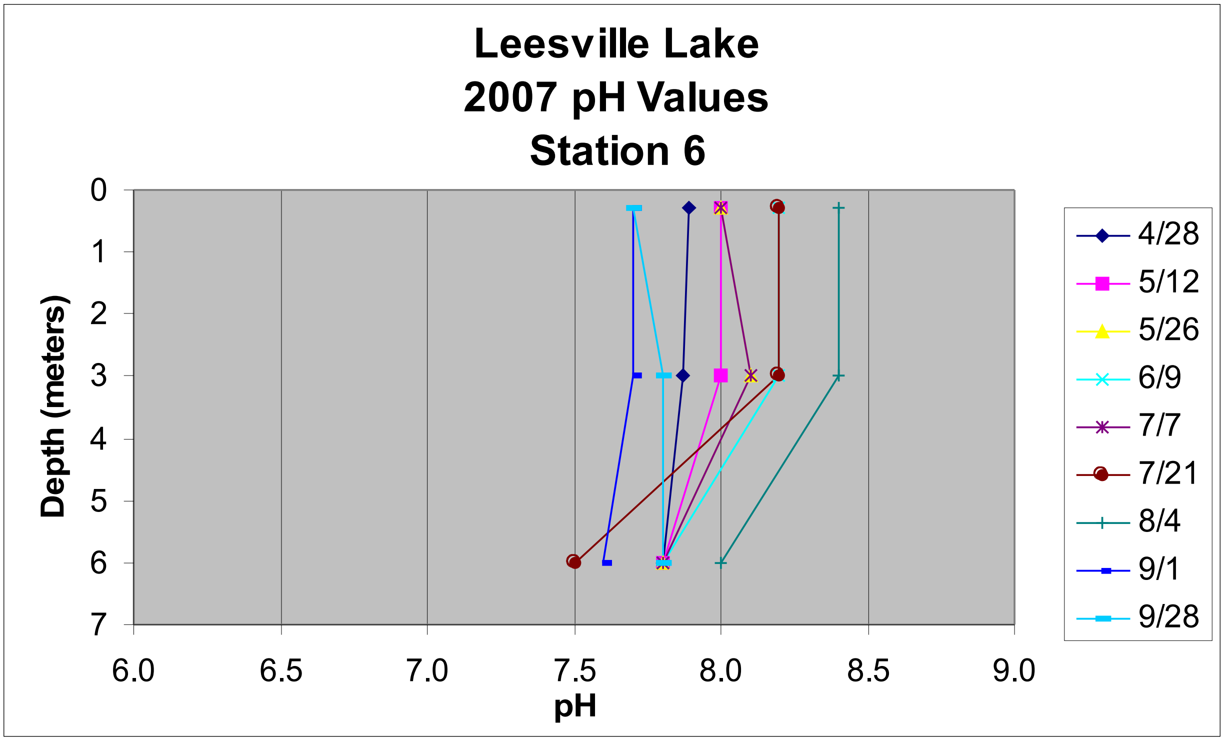

Figure 23: pH Values: Station 6, Mile Marker 2

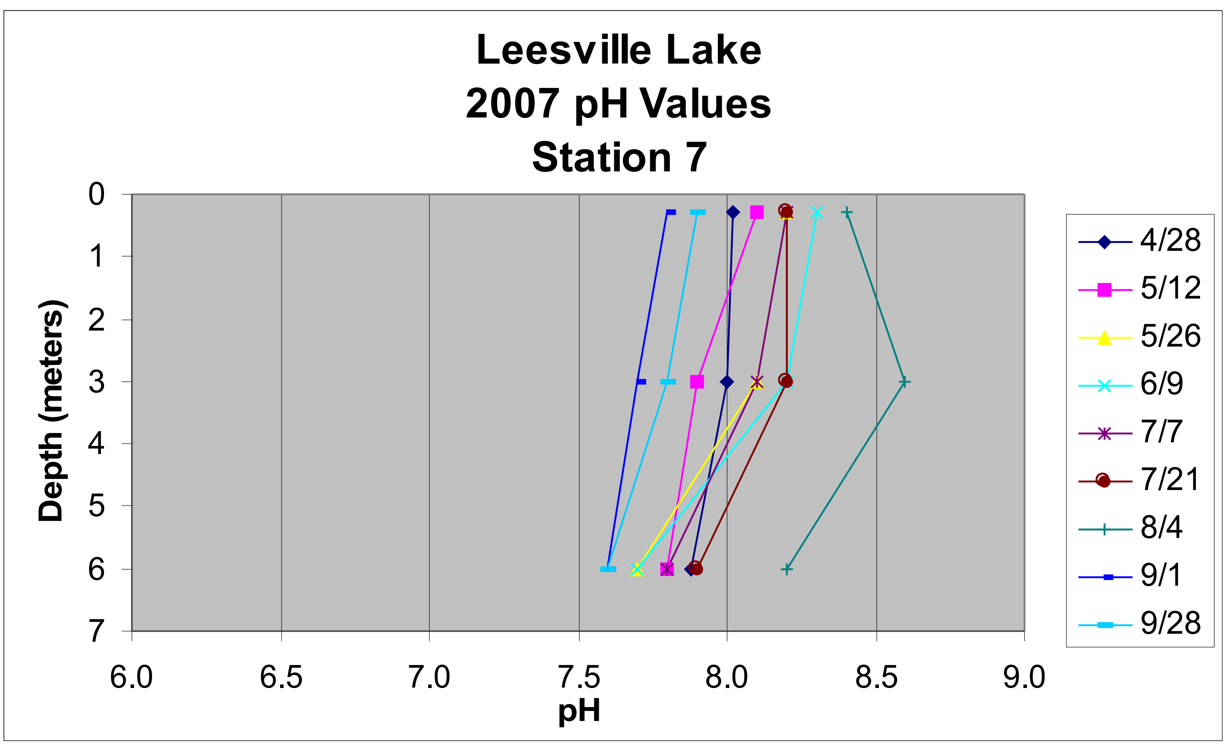

Figure 24: pH Values: Station 7 Mile Marker 1

Table 3: 2007 pH Values

Leesville Lake
2007 pH Values (Standard Units)

Station	Depth (m)	4/28	5/12	5/26	6/9	7/7	7/21	8/4	9/1	9/28
1	0.3	7.8	7.2	7.8	7.6	6.5	8.1	7.1	7.3	7.0
1	3	7.6	7.4	7.7	7.4	6.8	7.9	7.0	7.1	6.6
1	6		7.4	7.6	7.4	7.1	7.9	7.1	7.0	6.6
2	0.3	7.7	7.9	8.1	8.0	7.8	8.2	7.6	7.5	7.0
2	3	7.7	7.7	7.9	7.8	7.8	8.1	7.6	7.5	7.0
2	6	7.6	7.6	7.7	7.7	7.7	8.0	7.5	7.4	7.0
3	0.3	7.6	8.1	8.2	8.2	8.1	8.3	8.1	7.8	7.4
3	3	7.5	8.0	8.1	7.9	8.0	8.2	8.0	7.7	7.4
3	6	7.5	7.7	7.9	7.7	7.7	8.0	7.8	7.6	7.3
4	0.3	8.0	8.0	8.2	8.3	8.2	8.1	8.3	7.8	7.4
4	3	7.9	8.0	8.1	8.1	8.1	8.3	8.3	7.8	7.4
4	6	7.8	7.8	7.8	7.7	7.9	8.2	7.9	7.7	7.3
5	0.3	7.9	8.0	7.9	8.2	8.0	8.0	8.2	7.8	7.6
5	3	7.8	7.9	7.7	7.7	7.8	7.9	8.0	7.7	7.6
5	6	7.7	7.6	7.6	7.5	7.5	7.8	7.7	7.6	7.6
6	0.3	7.9	8.0	8.0	8.2	8.0	8.2	8.4	7.7	7.7
6	3	7.9	8.0	8.1	8.2	8.1	8.2	8.4	7.7	7.8
6	6	7.8	7.8	7.8	7.8	7.8	7.5	8.0	7.6	7.8
7	0.3	8.0	8.1	8.2	8.3	8.2	8.2	8.4	7.8	7.9
7	3	8.0	7.9	8.1	8.2	8.1	8.2	8.6	7.7	7.8
7	6	7.9	7.8	7.7	7.7	7.8	7.9	8.2	7.6	7.6

Conductivity Profiles

Conductivity is a measure of the amount of dissolved salts in the water, and therefore an indicator of salinity. The basic unit of measurement of conductivity is the mho or siemens. Conductivity is measured in micromhos per centimeter (μmhos/cm) or microsiemens per centimeter (μs/cm). Distilled water has a conductivity in the range of 0.5 to 3 μs/cm. The conductivity of rivers in the United States generally ranges from 50 to 1500 μs/cm. Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 μs/cm. Conductivity outside this range could indicate that the water is not suitable for certain species of fish or macroinvertebrates.

The conductivity profiles for Leesville Lake show that conductivity is relatively constant in the water column. Conductivity values generally increased from April 28th through August 17th and then declined. On any given day, the conductivity was relatively constant at all of the monitoring stations.

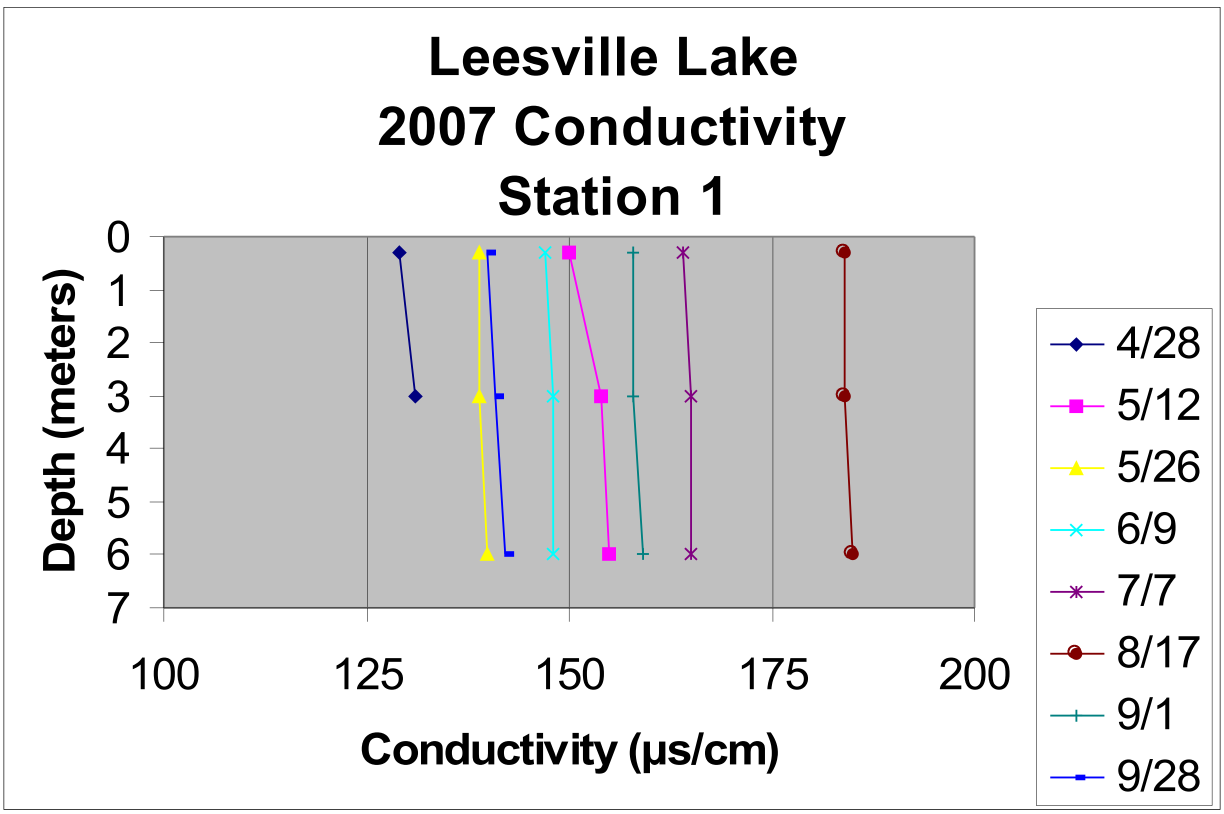

Figure 25: Conductivity profiles for Station 1 (Toler's Bridge)

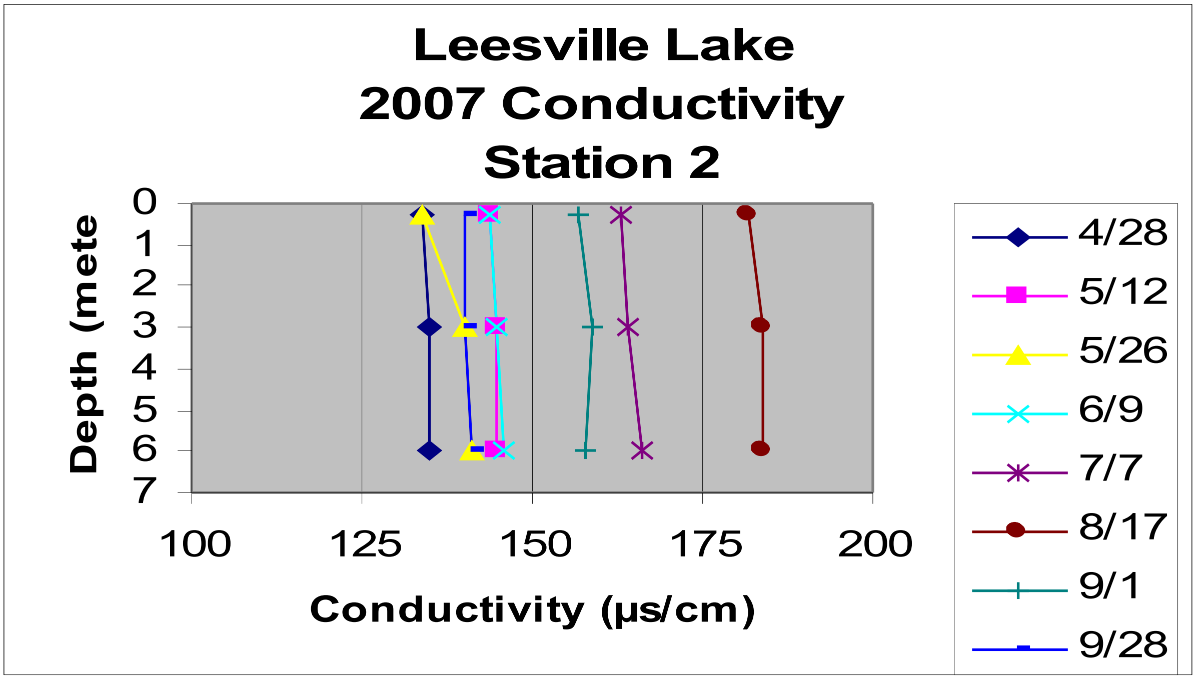

Figure 26: Conductivity profiles for Station 2 (Mile Marker 9)

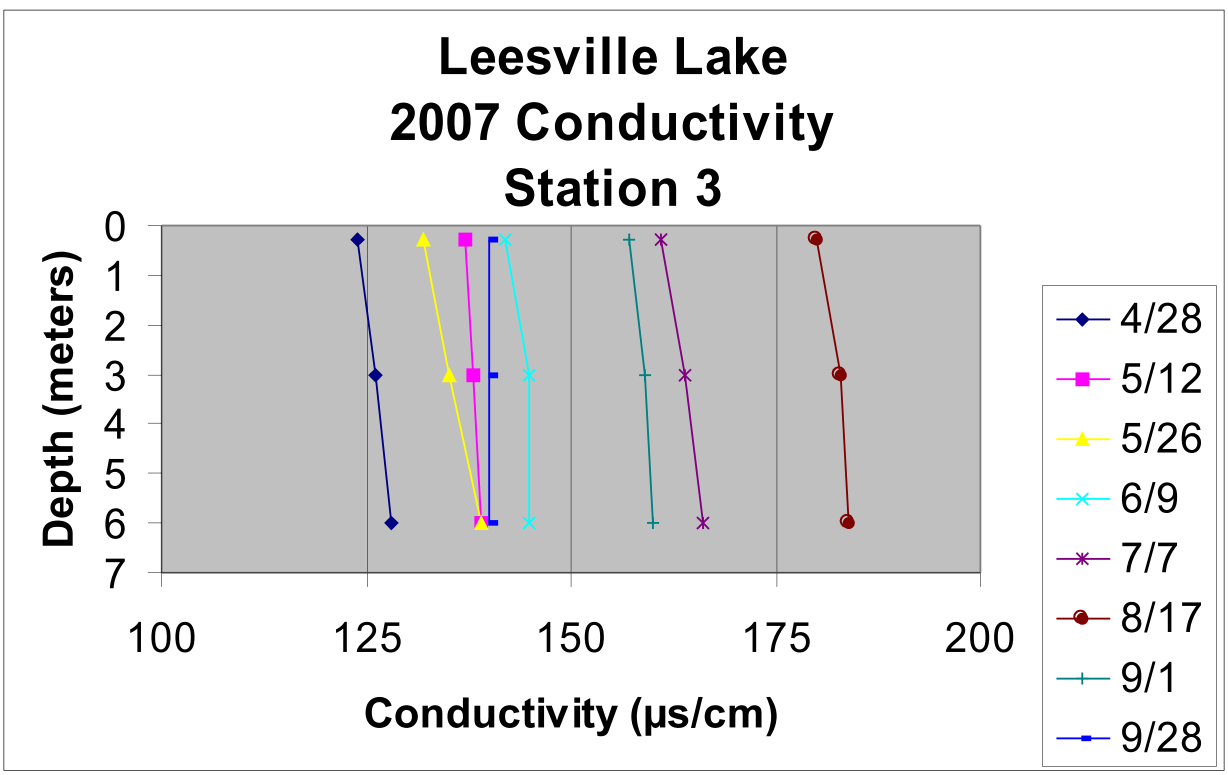

Figure 27: Conductivity profiles for Station 3 (Tri-County Marina)

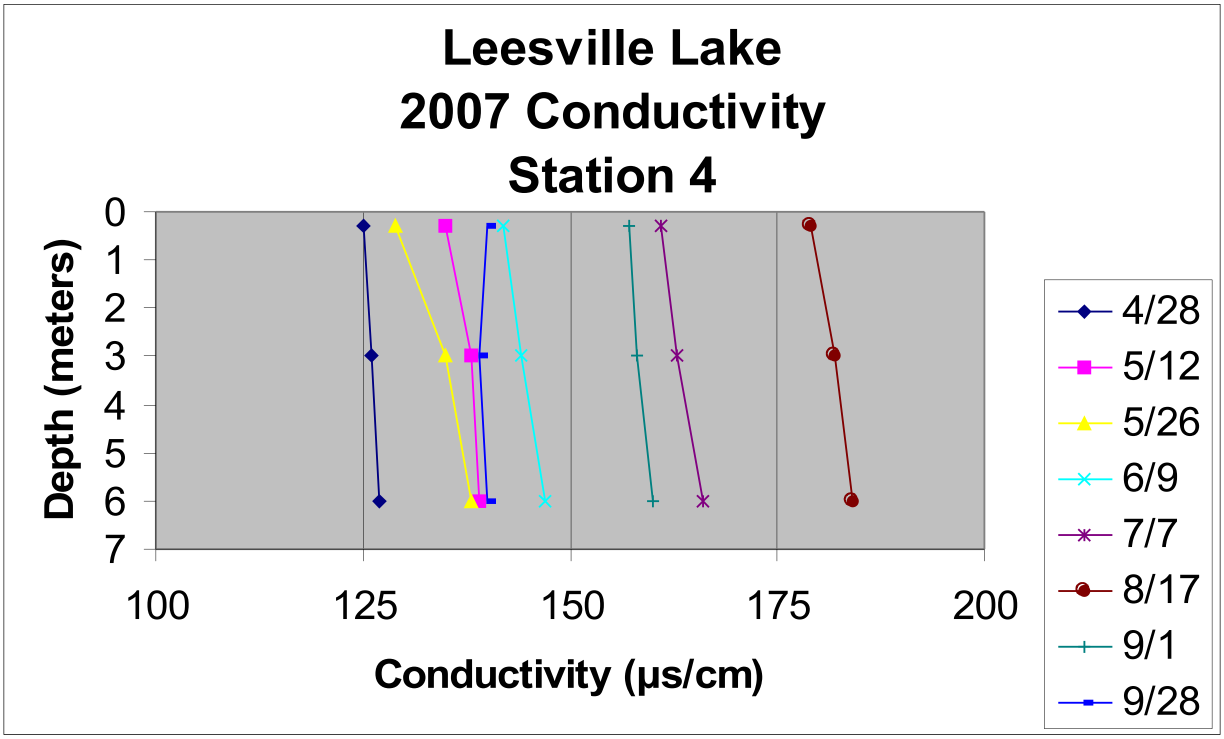

Figure 28: Conductivity profiles for Station 4 (Mile Marker 3)

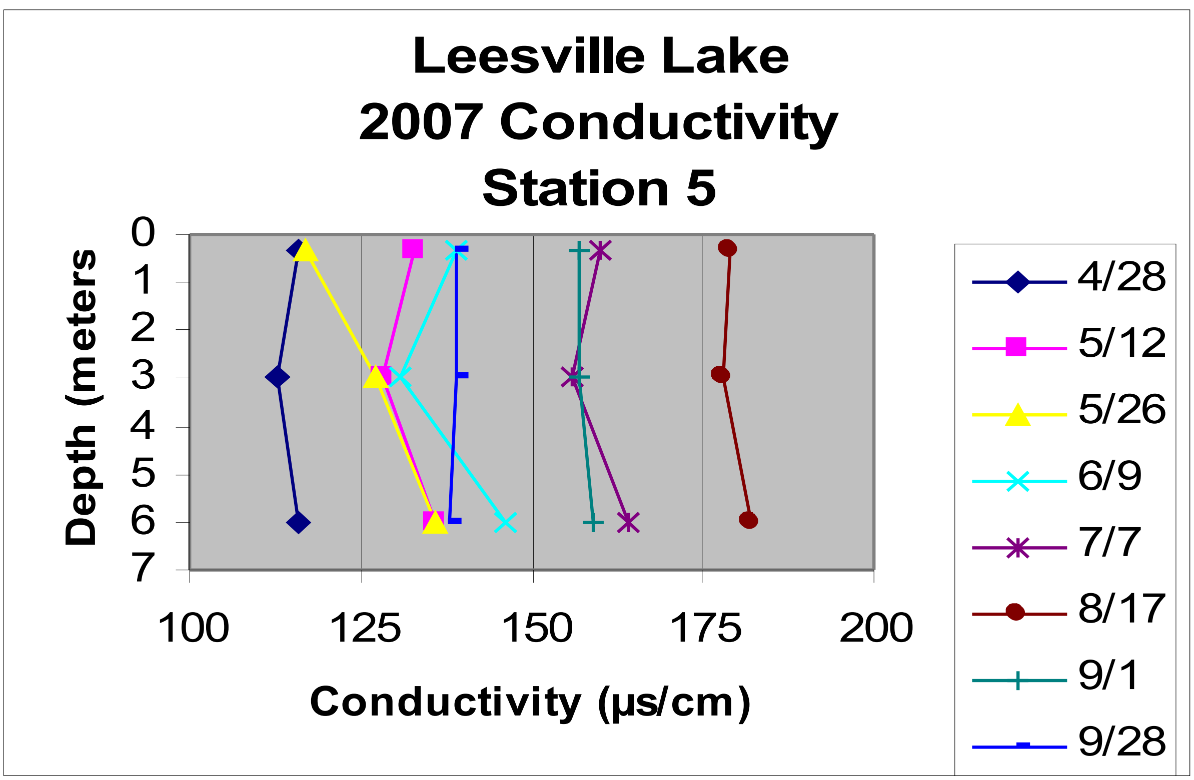

Figure 29: Conductivity profiles for Station 5 (Pit Stop Marina)

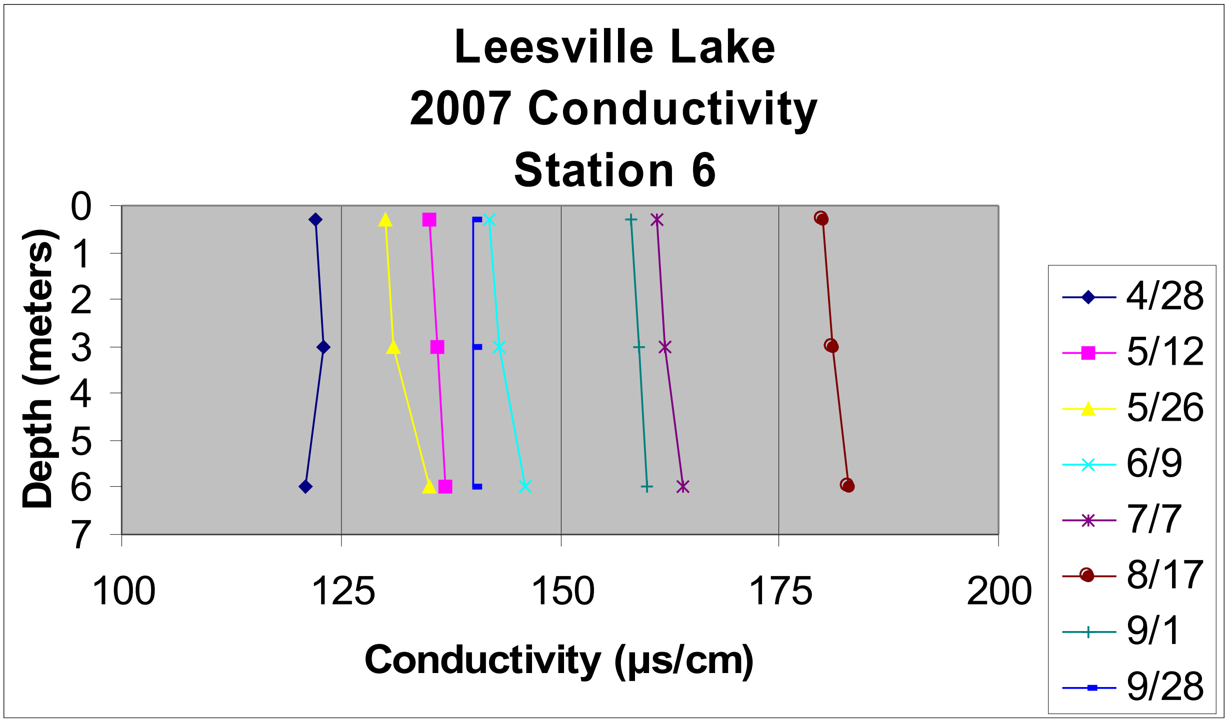

Figure 30: Conductivity profiles for Station 6 (Mile Marker 2)

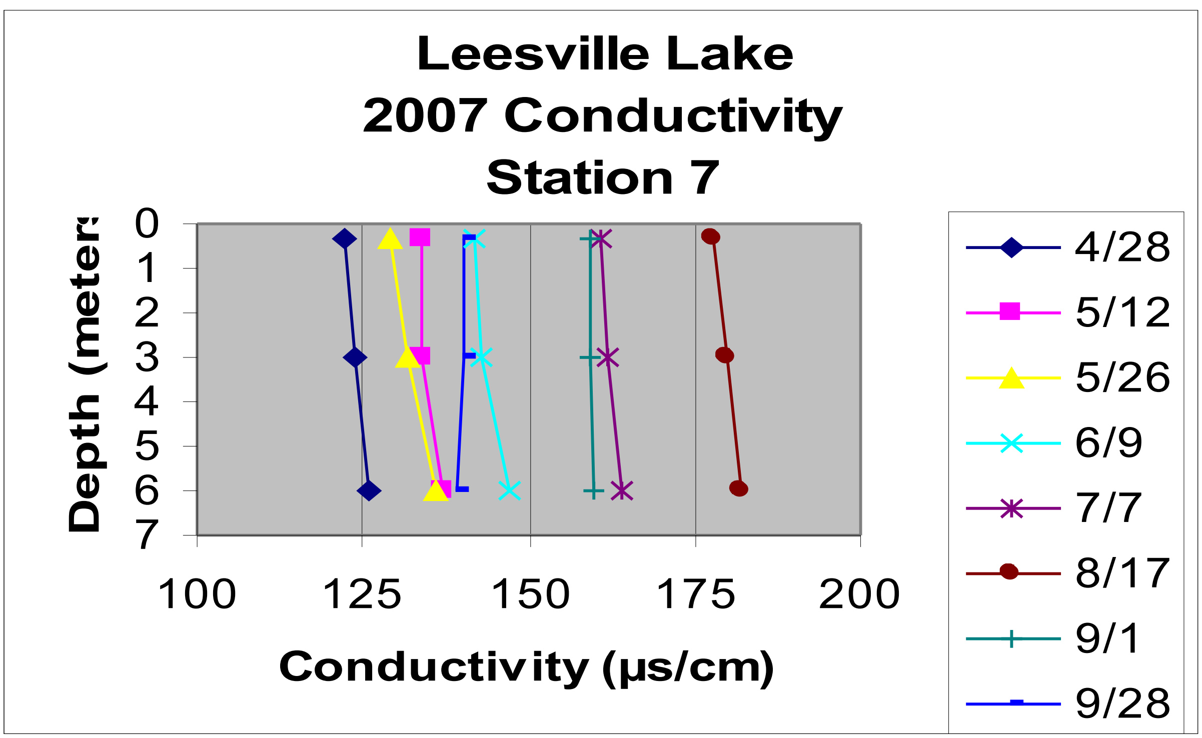

Figure 31: Conductivity profiles for Station 7 (Mile Marker 1)

Table 4: 2007 Conductivity Data

Leesville Lake
2007 Conductivity (µs/cm)

Station	Depth (m)	4/28	5/12	5/26	6/9	7/7	8/17	9/1	9/28
1	0.3	129	150	139	147	164	184	158	140
1	3	131	154	139	148	165	184	158	141
1	6		155	140	148	165	185	159	142
2	0.3	134	144	134	144	163	182	157	140
2	3	135	145	140	145	164	184	159	140
2	6	135	145	141	146	166	184	158	141
3	0.3	124	137	132	142	161	180	157	140
3	3	126	138	135	145	164	183	159	140
3	6	128	139	139	145	166	184	160	140
4	0.3	125	135	129	142	161	179	157	140
4	3	126	138	135	144	163	182	158	139
4	6	127	139	138	147	166	184	160	140
5	0.3	116	133	117	139	160	179	157	139
5	3	113	128	127	131	156	178	157	139
5	6	116	136	136	146	164	182	159	138
6	0.3	122	135	130	142	161	180	158	140
6	3	123	136	131	143	162	181	159	140
6	6	121	137	135	146	164	183	160	140
7	0.3	122	134	129	142	161	178	159	140
7	3	124	134	132	143	162	180	159	140
7	6	126	137	136	147	164	182	160	139

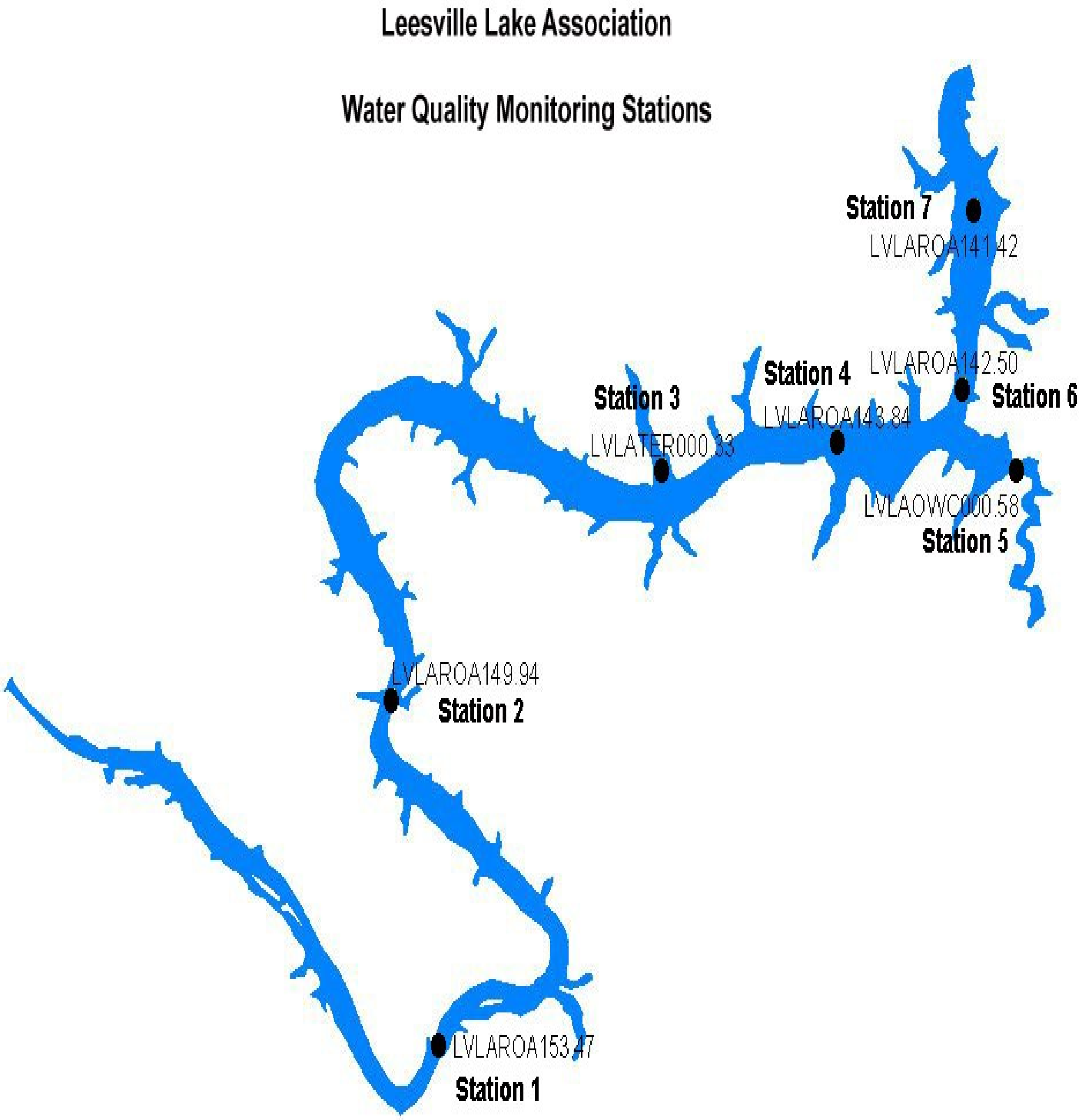

Figure 32: Leesville Lake Monitoring Stations