

THE 1986 LAKE GEORGE LAY MONITORING PROGRAM

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INTRODUCTION

In 1986, the Lay Monitoring Program completed its seventh year of data collection. The goal of this program continues to be the collection of a large body of data on the lake using as a resource the residents of the Lake George basin. An important aspect of this data collection is the ability to familiarize lake residents with methods used in freshwater ecology and to encourage people to take an active role in maintenance of Lake George water quality.

The basic water quality parameters measured by the lay monitors include water temperature and transparency (Secchi depth). In addition, the lay monitors collect water samples from the epilimnion (the portion of the water column above the thermocline) for later analysis of chlorophyll a concentration by the Fresh Water Institute (FWI) staff. The data collected by the lay monitors continues to closely parallel information collected by FWI staff, while providing data of a more continuous (weekly) nature than would be possible otherwise.

SAMPLING SITES AND COLLECTION METHODS

Locations sampled by the lay monitors are found throughout the length of Lake George. The number of sites sampled has varied since the programs inception in 1980; from a low of 14 sites in 1985 to a high of 28 in 1986. A map of the lay monitoring sites for 1986 is shown in Figure 1, and a listing of the lay monitors is presented in Table 1.

Each lay monitor was equipped with a calibrated thermometer, a Secchi disk and a water column sampler. Observations and measurements of weather conditions (e.g. wind, lighting and temperature), surface water temperature and Secchi depth were made approximately weekly from June through September. These data were collected between 10 A.M. and 2 P.M. when the sun was as nearly directly overhead as possible. Measurements were also limited to days when the weather was calm and clear to reduce the influence of waves and wind on the Secchi disk determinations.

At least twice during the sampling season, the water column sampler was used to collect samples of the epilimnion. These water samples were returned to the FWI laboratory in Bolton Landing where they were prepared for chlorophyll a analysis. This procedure consisted of filtering the water, thereby concentrating the chlorophyll a-containing phytoplankton and then methyl alcohol was used to extract the chlorophyll a from within the cells of the phytoplankton. After at least three hours of treatment with the alcohol, the green extract was filtered and the concentration of chlorophyll a was measured by determining the optical density or "greenness" of the sample using a spectrophotometer.

RESULTS

The earliest surface water temperature and Secchi transparency data were reported on June 21 and data collection continued through September 27, 1986. In all, a total of 157 Secchi depths and corresponding surface water temperatures were reported.

Surface water temperatures varied from a early summer low of 16°C (61°F) on July 5th to a high of 27°C (81°F) on August 14th. A Fall low of 13°C (55°F) was reported on September 18th. Summer mean surface water temperature appears to increase on a transect from the south end of the lake to the north (Figure 2). The highly variable nature of surface water temperature however, makes any discussion of this trend highly speculative.

Secchi depths ranged from a low of 5.0 meters (16 feet) at Dunham Bay and East of Diamond Island on September 15th to a high of 11.5 meters (37 feet) at the Rogers Rock site on July 22nd. The lowest average Secchi depths 6.0 and 5.9 meters were also found at the Dunham Bay and East of Diamond Island sites. The highest average Secchi depth was reported from the site at the mouth of Hague Bay (10.1 meters).

A trend toward increasing Secchi depth (water transparency) continues to be apparent from the South to the North end of the lake (Figure 3). A discernable change in Secchi transparency occurs between sampling sites at a distance of 8 to 10 miles from the south end of the lake. This distance coincides roughly with the area around Dome Island. The average Secchi depth of all sites south of Dome Island was

6.8 meters, while the average for all sites north of Dome Island was 8.8 meters. The average for all Secchi depth measurements collected during 1986 was 8.0 meters, which is less than the average reported for 1985 (8.8 meters; Figure 4).

On August 16 and 30, 1986 each of the Lay Monitors collected a one gallon integrated water sample at the deepest of their sites. In all thirteen sites were sampled and ten of them were sampled on both days. Results of the chlorophyll a analyses were generally consistent with values obtained by FWI during the same time period in the same or similar parts of the lake. Results for all chlorophyll a analyses of samples collected by lay monitors are presented in Table 2. In this table, Miles refers to miles north of Lake George Village. All values are in micrograms per liter (ug/L), which is also parts per billion (ppb), in the original water sample. Table 3 shows the amount of chlorophyll a measured at some FWI sites during August.

The average amount of chlorophyll a measured in all the lay monitors' water samples decreased from 2.51 ppb on August 16th to 2.34 ppb on August 30th. In the ten sites that were sampled twice, the average amount of chlorophyll a decreased from 2.67 ppb to 2.28 ppb during the same time period.

A trend toward reduced concentrations of chlorophyll a in the north basin relative to the south basin was observed which translates to less phytoplankton present. This can be attributed to lower concentrations of nutrients present in the water column in the north basin (FWI, 1987).

CONCLUSIONS

The results of the 1986 Lake George Lay Monitoring Program indicate a number of trends present in the Secchi transparency and chlorophyll a concentrations of the various sites sampled.

These trends include:

- Greater Secchi transparency in the North basin than the South basin.
- Lower concentrations of chlorophyll a and thus a smaller amount of phytoplankton present in samples from the north basin relative to the south basin.
- A decrease in overall Secchi transparency in Lake George relative to results from the 1985 Lay Monitoring Program.
- The transparency results for 1986 however, were higher than 1983 but lower than 1984.

These trends support conclusions reached in the 1986 Lake George Chemical Monitoring Program (FWI, 1987) which were that greater concentrations of nutrients (nitrogen and phosphorus) and greater overall productivity were found in the south basin when compared to the north basin. Higher concentrations of nutrients generally result in more phytoplankton and thus reduced transparency.

The source of the elevated levels of nutrients in the south basin has been the subject of a number of studies (Gibble, 1974; Ferris and Clesceri, 1975; Aulenbach, 1979; Wood and Fuhs, 1979; Sutherland et al., 1983; and Dillon, 1983). Although estimates vary on the precise amounts of nutrient loading from a variety of sources, all investigators agree that atmospheric deposition (rain, snow, and dryfall) and surface runoff are the major sources of nitrogen and

phosphorus to the lake. Inputs from atmospheric sources are very difficult if not impossible to control on a local or regional basis. Surface runoff of nutrients however, may be mediated in a variety of ways including sediment traps, management of vegetation in shoreline zones, replacement of impermeable with permeable surfaces, and a host of other methods dependent on the type and quantity of surface runoff. It should be the responsibility of all persons interested in the water quality of Lake George to press for more effective runoff controls.

ACKNOWLEDGMENTS

The staff of the Fresh Water Institute would like to thank all of this years Lay Monitors for a job well done. The Lay Monitoring Program continues to provide a large amount of valuable data in a very cost effective manner. Results of this program support conclusions generated through this and other research activities whose overall goal is protection of the water quality of Lake George. You should be justifiably proud of your efforts.

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Table 1. Volunteer Lay Monitors and the sites where they obtained Secchi depth and surface temperature measurements.

Monitor	Site No.	Site	Mile
Blake	1	Midlake at Plum Point	1.75
	2	Woods Point	2.50
	3	The Mouth of Dunhams Bay	2.75
	4	East of Diamond Island	3.00
Krebs	5	Middle Bay	4.00
	6	Warner Bay	4.10
Sebold	8	Kattskill Bay	4.50
	9	Midlake between Long Is. and Cotton Point	5.50
Dickenson	10	Echo Bay	5.70
Kennedy	7	Van Warner Bay	4.40
	11	Basin Bay	7.50
Elsworth	12	Phelps Bay	8.00
Summerhayes	15	Midlake between Crown Is. and Shelving Rock	10.50
	17	Midlake between Montcalm Pt. and West Shore	10.80
	18	Juanita Island	11.50
Whalen	14	Knapps Bay	10.00
	16	Fourteen Mile Island	10.60
White	13	Huddle Bay	8.50
	19	Northwest Bay	12.50
Brondel	29	Red Rock Bay	12.40
	30	South of French Point	13.20
Robinson	20	Silver Bay	18.00
	21	Lamb Shanty Bay	19.00
	23	Smith Bay	20.50
Bryant	22	Jenkins Point	20.00
	24	Gull Bay	21.00
	25	Hague Bay	21.50
Martin	26	Blairs Bay	24.00
	27	Rogers Rock	27.50
	28	Hearts Bay	28.00

Table 2. Chlorophyll a determination for Lay Monitors collection on August 16 and 30, 1986.

Site	Collector	8/16 Chlorophyll <u>a</u> (ppb)	8/30 Chlorophyll <u>a</u> (ppb)
Plum Point	Blake	3.26	2.84
French Point	Brondel	2.69	2.69
Jenkins Point	Bryant	1.58	1.74
Echo Bay	Dickenson	2.74	2.37
Phelps Bay	Elsworth	2.69	2.53
Van Warner Bay	Kennedy	4.00	3.05
Middle Bay	Krebs	3.26	1.81
Tioga Point	Martin	1.84	1.47
Silver Bay	Robinson	1.90	1.74
Kattskill Bay	Sebold	nc	3.37
Long Is-Cotton Pt	Sebold	nc	1.90
Fourteen Mile Is.	Whalen	2.74	2.58
Northwest Bay	White	0.88	nc

nc=not collected

Table 3. Chlorophyll a results from Fresh Water Institute sampling stations.

Site	8/20 Chlorophyll <u>a</u> (ppb)	8/27-8/28 Chlorophyll <u>a</u> (ppb)
Lake George Village	2.22	2.86
Tea Island		2.27
Harris Bay	3.47	3.57
Warner Bay	2.25	2.50
Sandy Bay	2.76	
Dome Island		0.59
South Green Island		3.20
Bolton Landing	1.47	1.25
Sagamore		2.57
Northwest Bay		3.33
French Point		2.42
Huletts Landing		1.94
Smith Bay		0.95
Hague		1.13
Rogers Rock		1.86
Hearts Bay		1.49

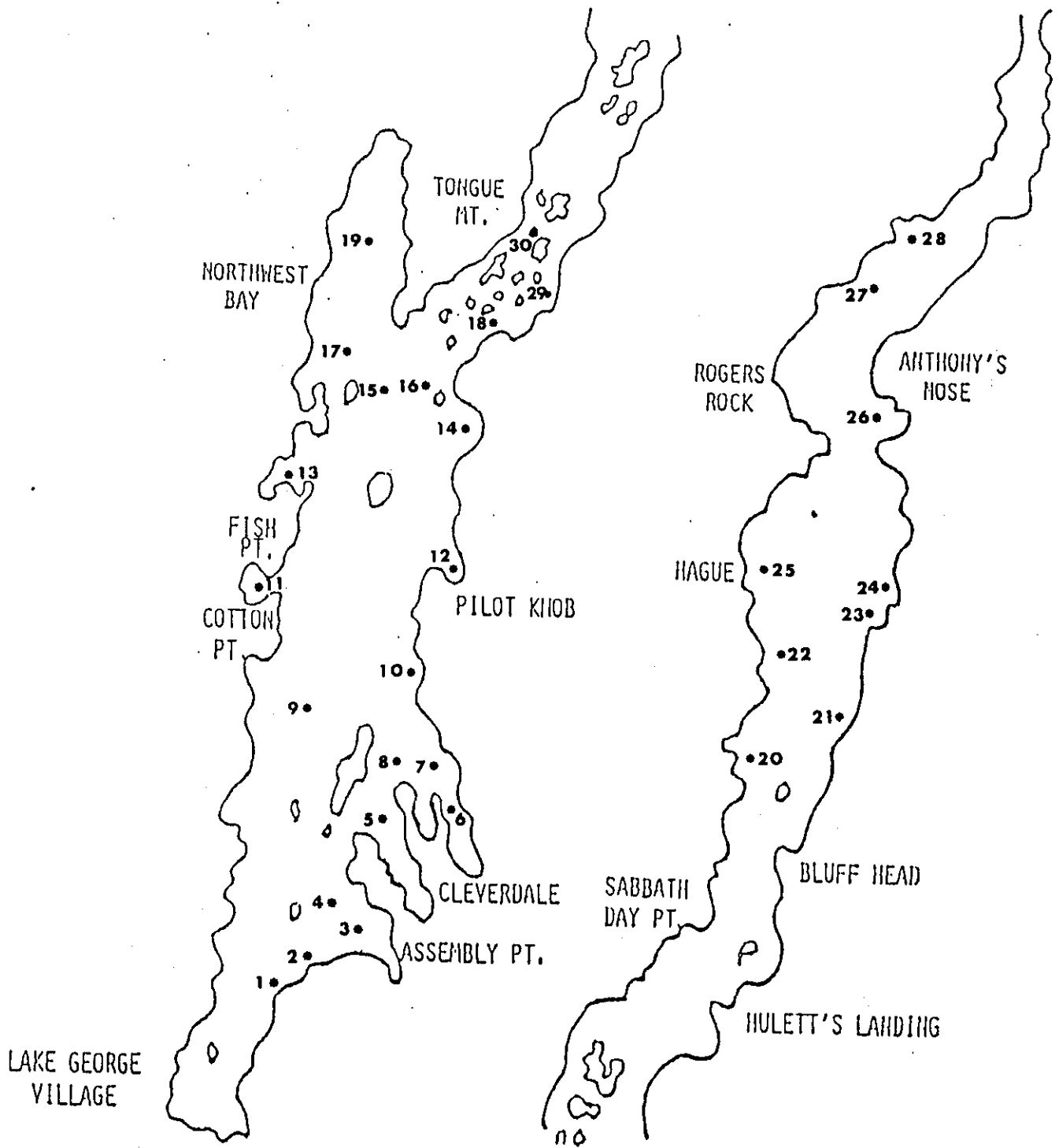


Figure 1. Locations of sampling sites in the north basin (right) and south basin (left) of Lake George. Numbers refer to the site description in Table 1.

LAY MONITORS

Summer Surface Water Temperature

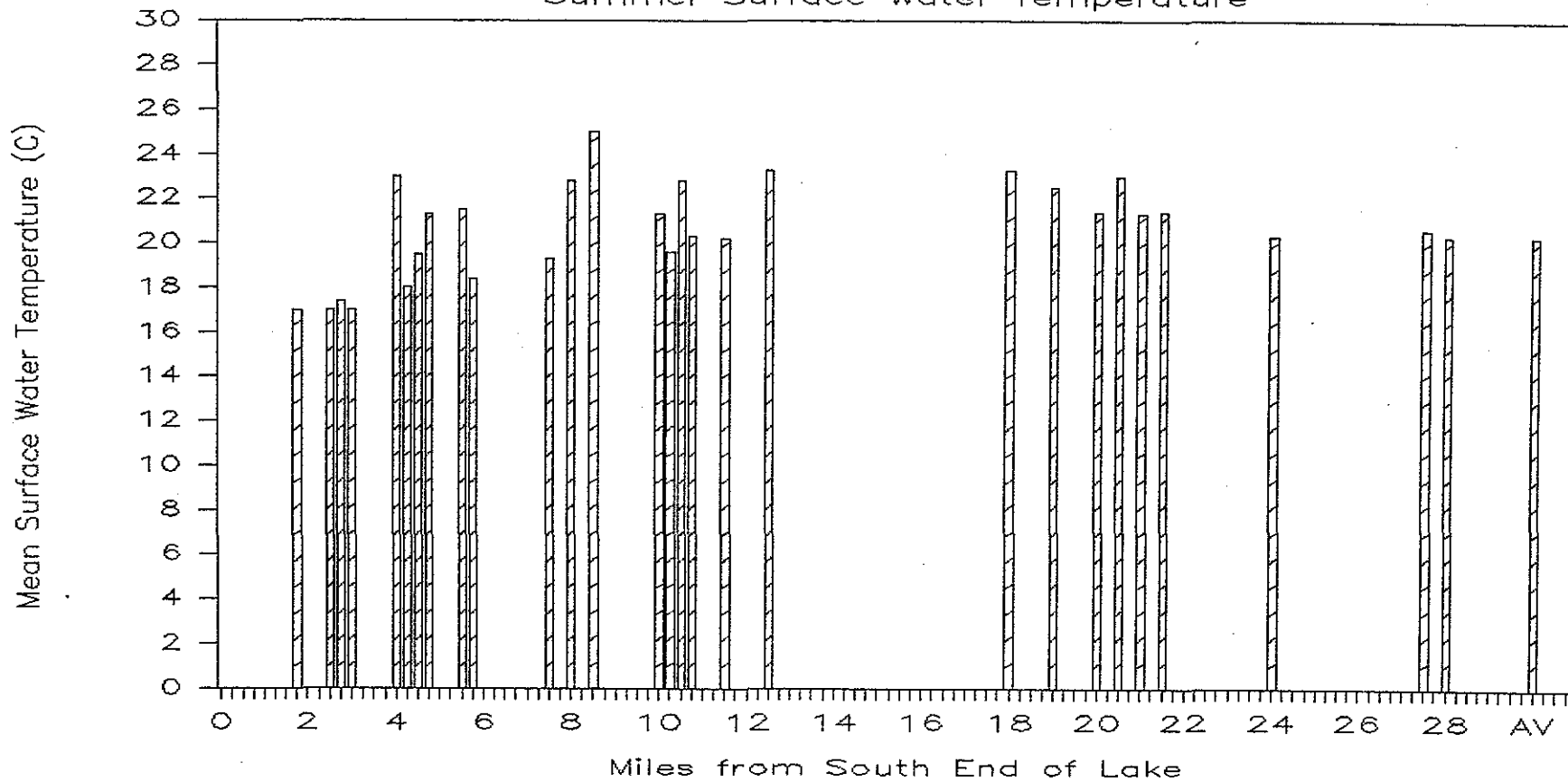


Figure 2. Mean surface water temperature in degrees centigrade (C) at all Lay Monitoring sites during 1986.

LAY MONITORS

Mean Secchi Depths

1986

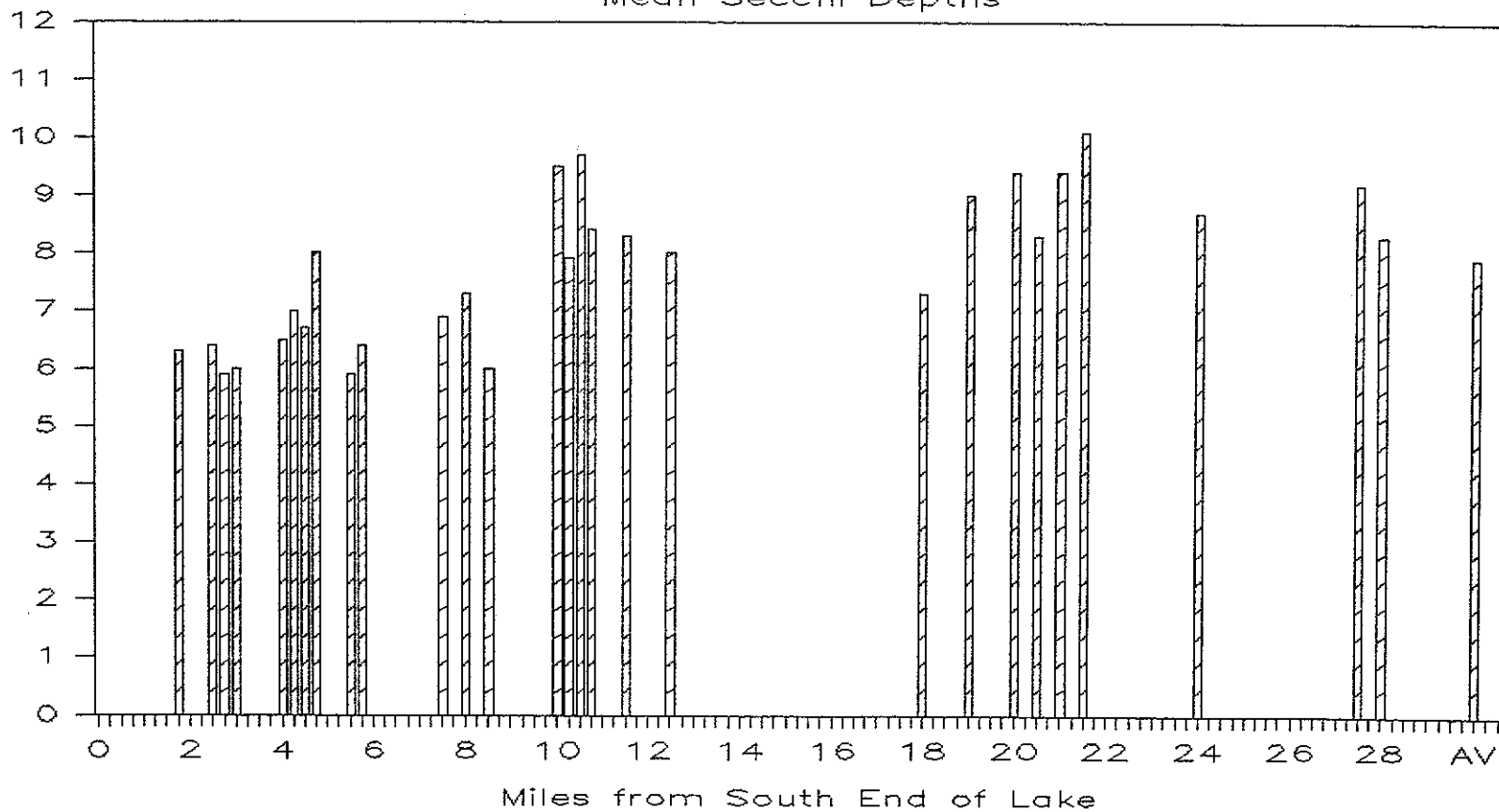


Figure 3. Mean Secchi depths in meters at all Lay Monitoring sites during 1986.

