THE 1987 LAKE GEORGE LAY MONITORING PROGRAM

by

Eichler, L. W.
Rensselaer Fresh Water Institute
Rensselaer Polytechnic Institute
Troy, New York 12181

Dr. Charles W. Boylen, Director

January, 1988

FWI #88-1

THE 1987 LAKE GEROGE LAY MONITORING PROGRAM

by

Eichler, L. W.
Rensselaer Fresh Water Institute
Rensselaer Polytechnic Institute
Troy, New York 12181

Dr. Charles W. Boylen, Director

January, 1988

INTRODUCTION

In 1987, the Lake George Lay Monitoring Program completed its eighth 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). 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 program's inception in 1980; from a low of 14 sites in 1985 to a high of 28 in 1986. Eighteen sites were sampled during 1987. A map of the lay monitoring sites for 1987 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. If possible, measurements were limited to days when the weather was calm and clear to reduce the influence of waves and wind on the Secchi disk determinations.

RESULTS

The earliest surface water temperature and Secchi transparency data were reported on May 9 and data collection continued through September 27, 1987. In all, a total of 135 Secchi depths and corresponding surface water temperatures were reported.

Surface water temperatures varied from an early summer low of 8.5°C (47°F) on May 9th to a high of 25°C (78°F) on July 25th. An Autumn low of 16°C (60°F) was reported on September 27th, the last recorded sampling date. 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 5.5 meters (18 feet) at Warner Bay on September 2nd to a high of 13 meters (42.7 feet) at the mouth of Hague Bay on September 9th. The lowest average Secchi depth (6.8 m; 22.3 ft) was found at the Dunham Bay and Woods Point sites. The highest average Secchi depth

was reported from the site at the mouth of Hague Bay (11.6 meters; 38.1 feet).

A trend toward increasing Secchi depth (water transparency) continues to be apparent from the South to the North end of the lake (Figures 3 and 4). 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 (44 samples) was 7.6 meters, while the average for all sites north of Dome Island (91 samples) was 9.9 meters. The average for all Secchi depth measurements collected during 1987 was 9.1 meters, which is greater than the averages reported for 1985 or 1986 (8.8 and 8.6 meters, respectively; Figure 4).

There does not appear to be a measurable seasonal trend in transparency, possibly due to the variability in Secchi measurements. This variability may be the result of physical conditions at the time of sampling (i.e. wind and wave action and relative cloud cover).

CONCLUSIONS

The results of the 1987 Lake George Lay Monitoring Program indicate a number of trends present in the Secchi transparency of the various sites sampled. These trends include:

- Greater Secchi transparency in the North basin than the South basin.
- An increase in overall Secchi transparency in Lake George relative to results from the 1985 and 1986 Lay Monitoring Program.

- Transparency results for 1987 were higher than results reported between 1982 and 1986 but lower than results for 1980 and 1981.

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 and riparian 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.

REFERENCES

Aulenbach, D.B. 1979. Nutrient budgets and the effects of development on trophic conditions in lakes. Fresh Water Institute Report No. 79-2, Rensselaer Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY.

Dillon, P.J. 1983. Nutrient budgets for Lake George, New York. In: C.D. Collins (ed.) The Lake George Ecosystem, Volume III. The Lake George Association, Lake George, NY pp 157-167.

Ferris, J.J. and N.L. Clesceri. 1977. A description of the trophic status and nutrient loading for Lake George, New York. In: North American Project - A Study of U.S. Water Bodies. EPA-600/3-77-086, USEPA, Corvallis, OR.

Fresh Water Institute. 1987. Report on the Lake George chemical monitoring program, March 1986 - November 1986. Fresh Water Institute Technical Report No. 87-1, Rensselaer Fresh Water Institute, Rensselaer Polytechnic Institute, Troy, NY.

Gibble, E.B. 1974. Phosphorus and nitrogen loading and nutrient budget on Lake George, New York. Masters Thesis, Rensselaer Polytechnic Institute, Troy, NY.

Sutherland, J.W., J.A. Bloomfield and J.M. Swart. 1983. Final report for the Lake George urban runoff study, nationwide urban runoff program. Bureau of Water Research, New York State Department of Environmental Conservation, Albany, NY.

Wood, L.W. and G.W. Fuhs. 1979. An evaluation of the eutrophication process in Lake George based on historical and 1978 limnological data. Environmental Health Report No. 5, Environmental Health Center, Division of Laboratories and Research, New York State Department of Health, Albany, NY. 73 pp.

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
Sebold	4	Kattskill Bay	4.50
	5	Midlake between Long Is. and Cotton Point	5.50
Kennedy	6	Warner Bay	4.40
	7	Basin Bay	7.50
Summerhayes	8	Midlake between Crown Is. and Shelving Rock	10.50
	9	Midlake between Montcalm Pt. and West Shore	10.80
	10	Juanita Island	11.50
Whalen	11	Knapps Bay	10.00
	12	Fourteen Mile Island	10.60
Bryant	13	Jenkins Point	20.00
	14	Gull Bay	21.00
	15	Hague Bay	21.50
Martin	16	Hague	22.00
	17	Blairs Bay	24.00
	18	Rogers Rock	27.50

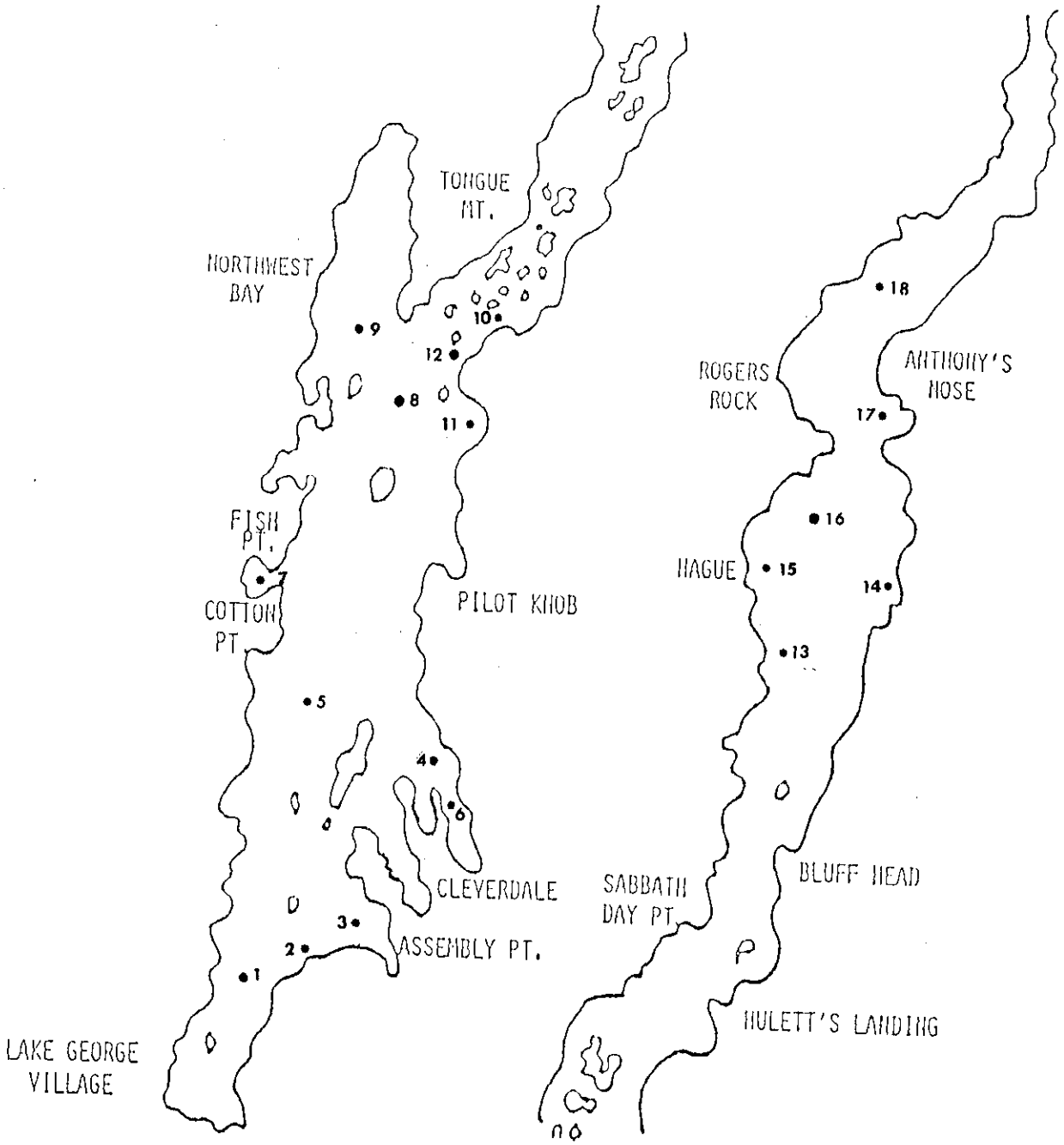

Figure 1. Locations of sampling sites in the north basin (right) and south basin (left) of Lake George.

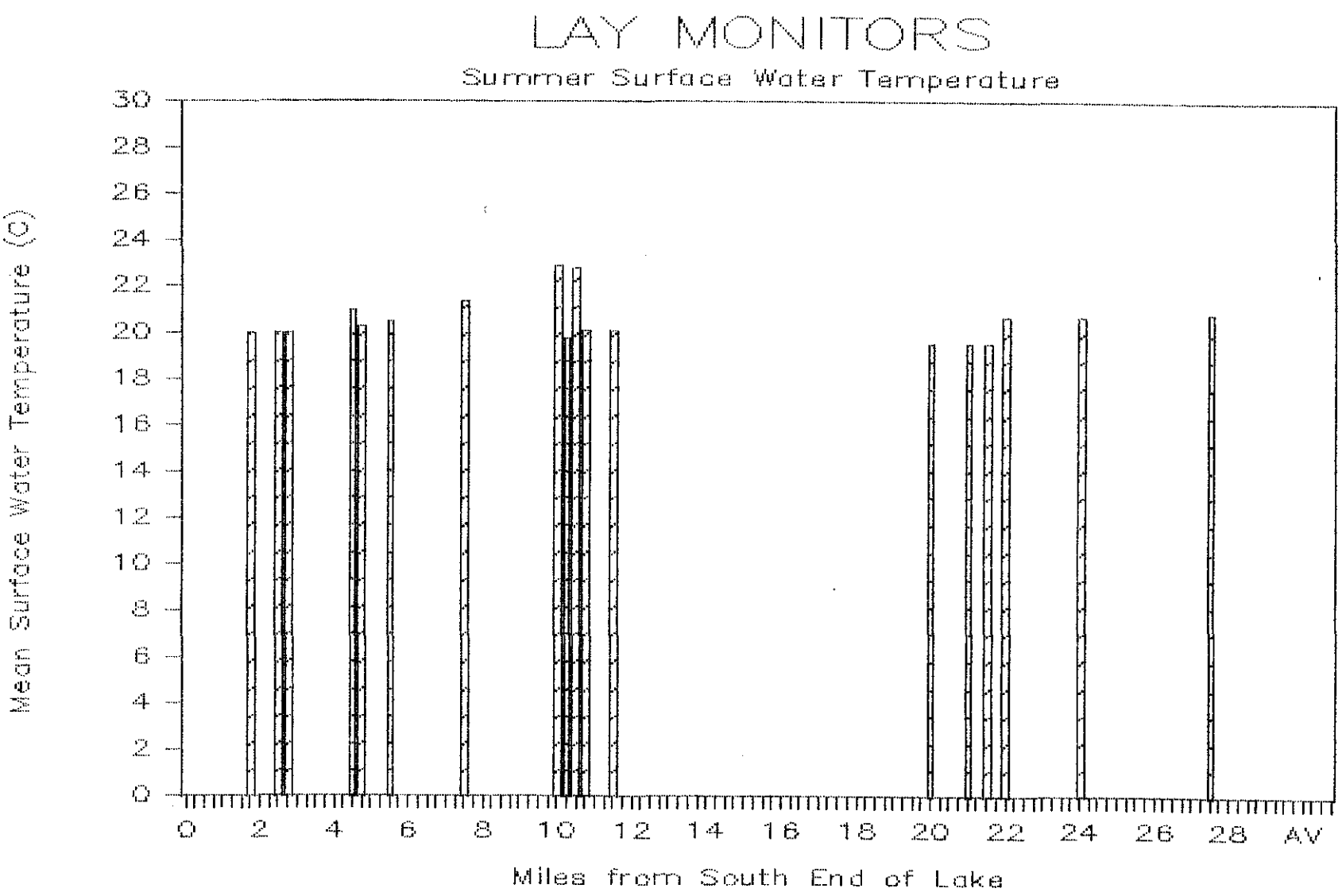

Figure 2. Mean surface water temperature results for all lay monitoring sites.

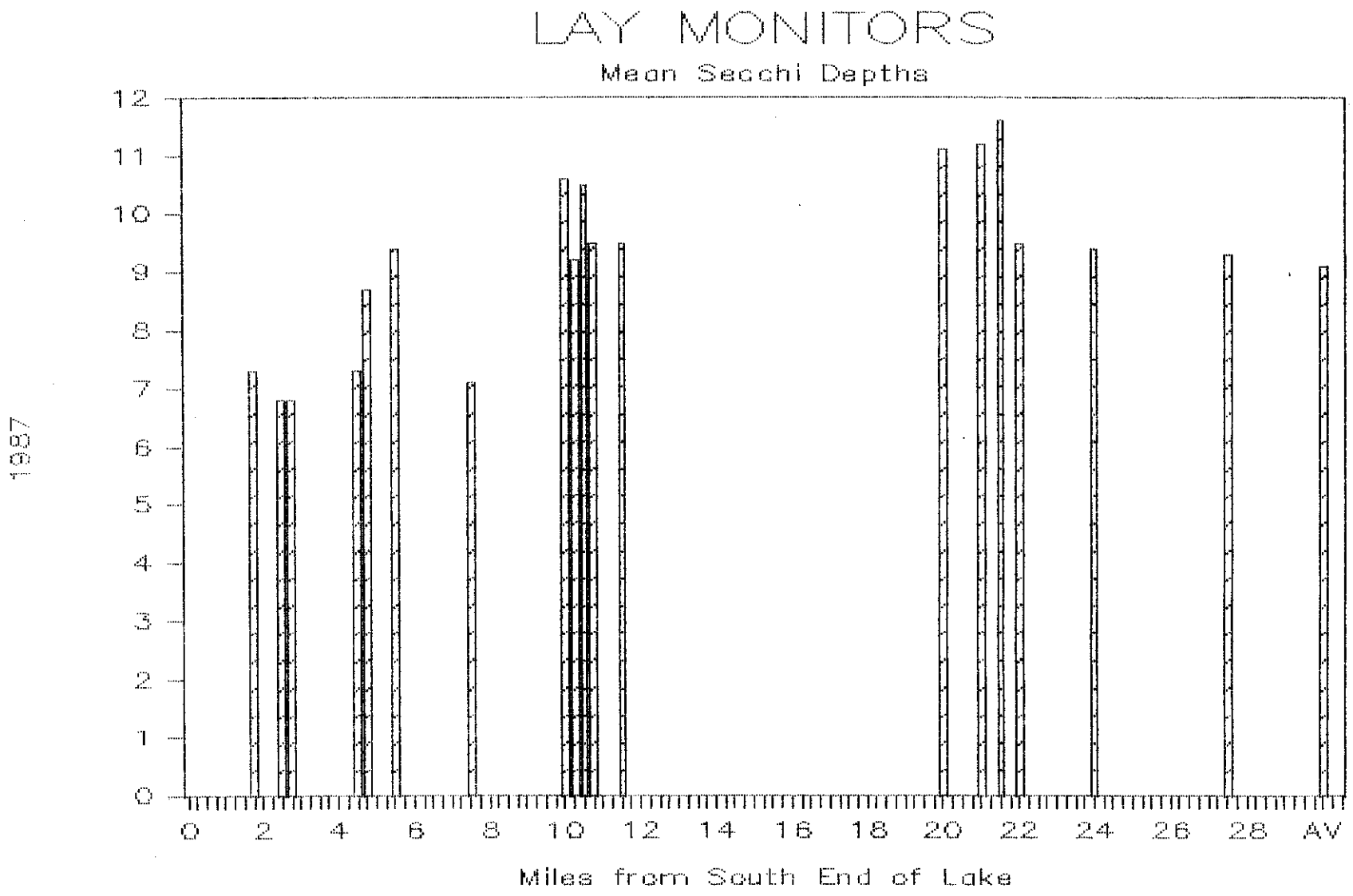

Figure 3. Mean secchi transparency results from all lay monitoring sites. Results are in meters.

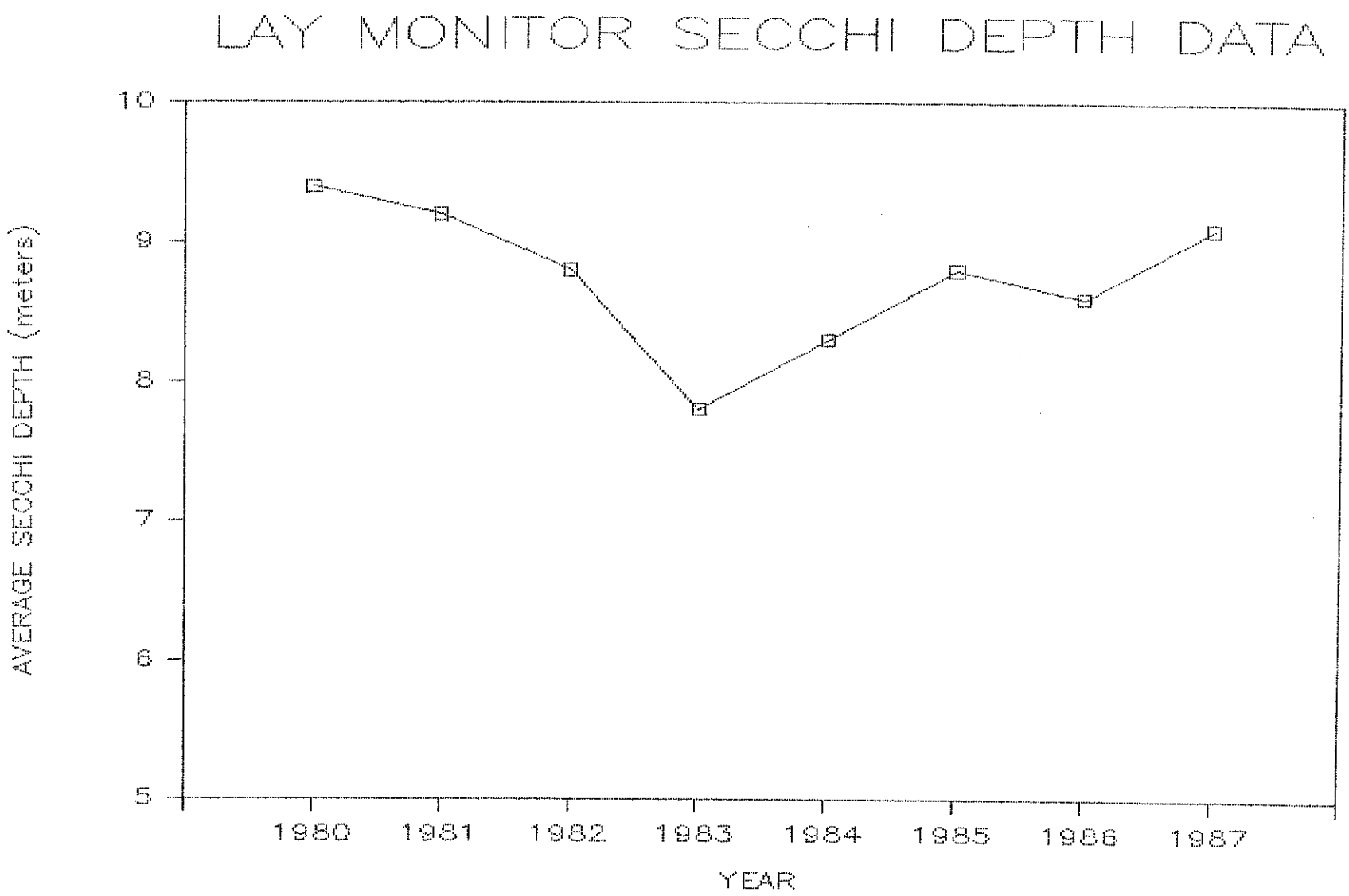

Figure 4. Average secchi transparency by year reported for the lay monitoring program.