

#### Dry Spell Drops Lake Level

The prolonged drought that has plagued the upper Midwest is having a variety of consequences -- most of them unfortunate. Some of the springs that feed Ten Mile Lake appear to have dried up -- or nearly so. The level of the lake has dropped to the lowest in many years. At the time of the freeze-up in late November it stood at 1377.5 feet which is 2.5 feet below the high-water mark of June 1974 and about 2 feet below where we'd like it to be. Most of our neighbors on other lakes have a similar problem.

As a consequence of the damage that occurred last spring, the Birch Lake dam has been rebuilt, but for months there has been no water flowing over it. Nor has Ten Mile Lake been draining into Birch Lake. We are continually reminded of what a precious resource our water is. The hunting and fishing seasons had to be curtailed because of the dangerous fire situation, the seriousness of which was brought home to us in scary fashion by the disastrous Badoura fire in September. Forestry officials fear an even worse fire danger in 1977.

#### Best-Ever Crop of Fingerlings from Jake's Pond

The progress of stocking walleye fingerlings from our own rearing pond continued last year. John Kollar and his crew from the Minnesota Department of Natural Resources planted 60,000 fry into Jake's Pond on May 10, the same number as in 1975. On August 5 a trial netting yielded 11 lb. (671 fingerlings.) The final harvest extended from September 28 to October 5 and produced 415 lb., a record, compared with the previous high of 272 lb. in 1975. At 35 per lb. they were over twice as big as our earlier record for size (75 per lb. in 1974.) The larger size greatly improves their chances of surviving after being transferred into Ten Mile Lake.

A group of Association Members assisted the DNR workers in clipping off the right front fin of each fingerling. A total of 15,611 fingerlings was harvested and stocked into the lake, and 14,698 of these were clipped. We are told that this clipping does not noticeably harm the fish. The object is to permit identification and thereby provide a measure of the extent to which the fingerlings from our rearing pond are contributing to the walleye population of Ten Mile Lake. After these particular fingerlings grow up, probably a couple of years from now, it is hoped that Ten Mile anglers who catch walleyes with the right front fin missing will report the details to the DNR or to the Ten Mile Lake Association. We'll remind you in 1978 and 1979 and give more detailed instructions.

#### Sailboat Races Scheduled for July 9

Residents of Ten Mile Lake and their guests are invited to participate in the first annual all-class sailboat races to be held July 9, 1977. There will be two races with all boats being rated and handicapped. A trophy for first and second places will be awarded in each class. If you want to enter, please submit your name, address and type of boat, and do it before May 1. Do it now. Send the information to Mark Hoffman, 210 Shorewood Drive, International Falls, MN 56649.

For anyone planning to buy a sailboat, the Ten Mile Lake Sailing Club strongly recommends a "C" scow and will be glad to furnish demonstration rides and sailing lessons. If you have a "C" boat and haven't been in the races, they invite you to join and have a lot of fun. Call Garbish at 675-6573, Brandt at 675-6103 or Hoffman at 675-6372.

#### Sailing Seminar

Mr. Gordon Bowers of Bowers Sales in Minneapolis will present a lecture-slide series on sail boats and sailing on June 28th, Tuesday, 3:00 - 7:00 P.M. There will also be an "on water" demonstration. This is an excellent opportunity for beginners and "old salts" to hear one of the "winningest" sailors in the United States. Anyone wishing to attend should notify me by May 5th as it is for a limited audience of 35 persons. Send a card with Ten Mile address and phone number to: Mr. Kion Hoffman, 210 Shorewood, International Falls, MN.

#### Shimmering Dwarfs of Ten Mile Lake

Ten Mile Lake's unique little dwarf tullibees continue to intrigue scientists at the University of Minnesota as well as the fisheries experts in the DNR. Prof. James C. Underhill of the Zoology Dept. at the University conducted test nettings at intervals during last summer and fall. Dwarf tullibees were found at just about all depths, including the deepest part of the lake (over 200 feet.) A number of our members assisted Prof. Underhill and his graduate students. They had a good time.

Carol Buckmann wrote another article for the Brainerd paper on this interesting subject, and we are pleased to include a copy with this letter.

To a considerable extent the characteristics and habits of these little creatures are believed related to the water temperature and concentration of dissolved oxygen (D.O.) at various depths and times. Prof. Underhill has made instruments for measuring these variables available to one of our members who is assisting him by conducting year-around monitoring of the lake at all depths. See the next section.

#### A Lot Goes on Beneath the Surface

The density of water changes with temperature and is greatest (heaviest) at 39°F (4°C). Water that is either warmer or colder will be lighter and will float on top of water that is near 39°F, i.e. the water stratifies. Such stratification and the changes in density that occur as winter and summer alternately cool and warm the surface strata cause the lake to "turn over" twice each year. The spring turnover takes place soon after the ice goes out. The fall turnover last year occurred October 20-21.

With the instruments made available to us by Prof. Underhill, we have been measuring profiles of temperature, dissolved oxygen (d.o.) and conductivity at intervals in the deepest part of the lake (208 feet). Some typical profiles for temperature and D.O. are shown in the attached plots.

The profiles for temperature show that, in the summer a relatively warm stratum (epilimnion) is on top. The water remains rather cold down below, in the hypolimnion. Between these two strata is a layer of transition known as the thermocline. These profiles show that the thermocline moves down as the season progresses from summer through autumn. Its downward journey becomes quite fast as the fall turnover culminates. The phenomenon is illustrated vividly by the profiles for D.O., especially those for October 19 and 22. During this interval the relatively high concentration of oxygen in the epilimnion was fast penetrating into the depths and, by October 22, had reached the bottom. The fall turnover was complete!

The concentration of D.O. is extremely important to the well-being of fish in the lake, especially game fish. It depends on a number of factors, among which are growth of algae (which produce oxygen) and bacteria (which consume oxygen.) In the depths where little or no sunlight penetrates there is little if any algal growth, and the concentration of D.O. becomes depleted by bacterial action and related biological phenomena. The oxygen in the deeper parts of the lake is replenished each time the lake turns over. The extent to which the oxygen near the bottom becomes depleted between turnovers is a very important criterion for judging a lake's condition.

What does all this mean? Ten Mile Lake does exhibit considerable loss of oxygen near the bottom, but much less than in other (shallower) lakes. It would be premature to judge now whether this oxygen depletion is excessive. We need to compare the results from year to year and determine whether the oxygen depletion is getting worse. That would be bad news.

#### Scientists From FMC Continue Study of Ten Mile Lake

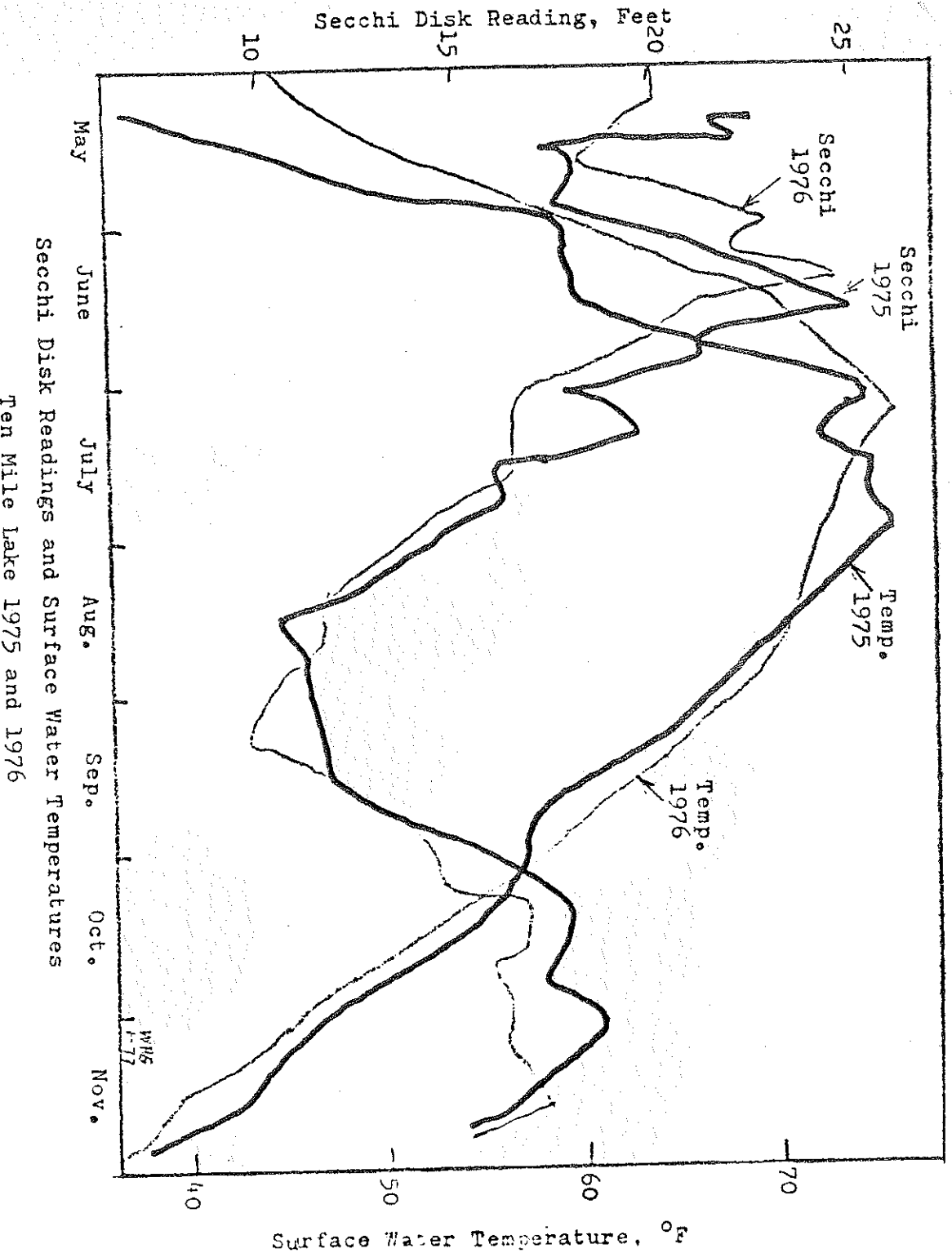
Other closely related criteria for determining the condition of lakes have been the object of studies conducted in Ten Mile Lake by scientists from the Environmental Research Laboratories of the FMC Corporation in Princeton, New Jersey, as reported in our 1976 newsletters. Those who requested were furnished copies of the complete FMC report along with information about the significance of the data. We are happy to report that these biologists and chemists continued their studies of Ten Mile Lake during 1976, for which we are deeply grateful to the FMC Corporation. We won't attempt here to condense or summarize the latest findings other than to observe that there were no dramatic differences between the 1975 and 1976 results. We will send a copy of the complete 1976 report to those who request it and of course will welcome questions and comments.

#### Tests of Water Clarity Continued in 1976

The water in Ten Mile Lake is exceptionally clear, probably because it is deep and spring-fed. The studies conducted by scientists from the FMC Corporation indicate relatively low concentrations of the nutrients required for the growth of algae. The lake is essentially oligotrophic. In a deep lake, such as Ten Mile, these nutrients that settle to the bottom are not returned to the upper stratum (photic zone) as readily as in shallower lakes, so algal growth is restricted.

Again in 1976 the clarity of the water was measured at frequent intervals by lowering a Secchi disk until it could no longer be seen. The depth at which this disk disappears from view is a measure of turbidity which, at least in Ten Mile Lake, is mostly the result of algal growth. The algae are most evident during the warm summer months.

The following plot of both Secchi disk readings and water temperatures at the surface shows the results of this study for both 1975 and 1976. These readings were taken where the water is deep in the main part of the lake. The results were quite similar for the two years except that the maximum readings in 1976 occurred earlier than in 1975. So did almost everything else.



DNR Again Monitors Whitefish Netting in Ten Mile Lake

As reported in previous newsletters it was decided several years ago not to open the whitefish netting season in Ten Mile Lake until mid-November in order to avoid or minimize the taking of walleyes. This change in the season seems to have accomplished its purpose, as evidenced by test netting and monitoring of licensed nets by the DNR.

The 1976 season was the fourth in succession in which John Kollar and his crew conducted these studies. A brief summary of the results, year by year, is as follows:

	Number of Fish Caught per 100-Foot Net per Set		
	Whitefish	Northern Pike	Walleyes
1973 (Nov. 15-20)	8.00	2.17	0
1974 (Nov. 19-21)	9.00	3.67	0
1975 (Nov. 18-20)	8.87	0.50	0.33
1976 (Nov. 18-24)	15.3	2.00	0.13

A great deal of additional information has been obtained from this monitoring. A number of licensed netters confirmed the fact that yields of whitefish were improved last season. Any game fish that do get caught in the nets must be released. Netters try to avoid northern pike because they mess up the nets.

We enclose an article by Carol Buckmann, reprinted from the Brainerd Daily Dispatch, which describes these studies in more detail.

Deep Portage Conservation Reserve

Starting in about 1970, various citizens of the community and the Cass County Chapter of the Izaak Walton League urged that some of the land owned by the County be set aside for use as a nature reserve. As a result of these efforts the Cass County Commissioners established the Deep Portage Conservation Reserve comprising 6,107 acres approximately six miles east of Hackensack. It will be preserved in its natural state and, at the same time, provide opportunities for environmental education, research on resource management and recreation. The area is almost entire forested and contains or borders on about a dozen lakes and ponds of various sizes, including two in the Boy River chain (Little Boy and Big Deep.)

Much progress has been made, and much more lies ahead. Classes are being held throughout the year on a wide variety of subjects such as wild flowers, forest management, wildlife habitat, cross country skiing and many other aspects of environmental education, some for

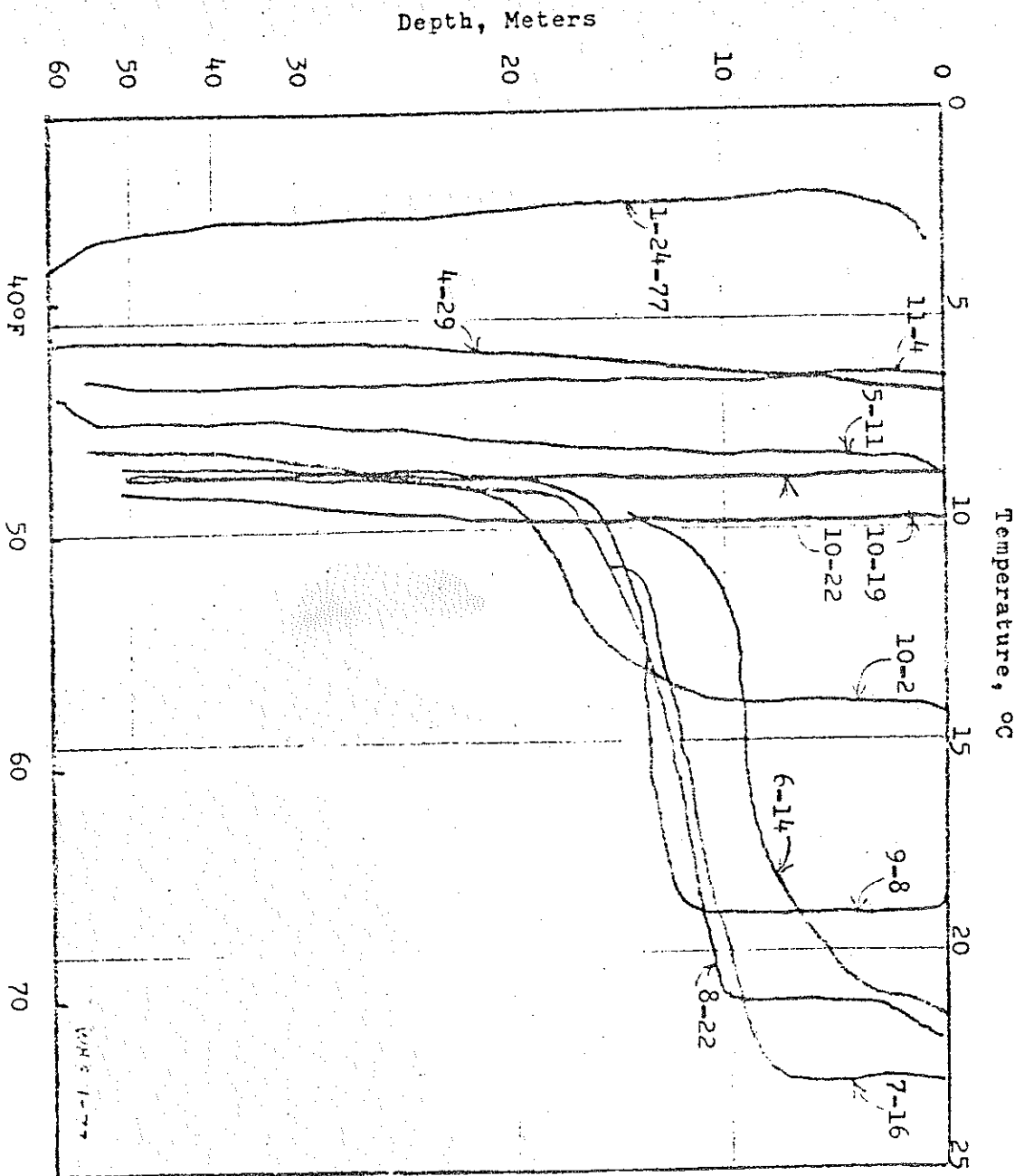
children and others at the adult level. Plans are going forward for construction of headquarters facilities. A number of our members are serving on the Deep Portage Foundation which was formed to seek funding. This is a splendid undertaking, practically in our front yard, that will add greatly to the opportunities for enjoying our local environment. Let us know if you desire further information, or inquire at the Cass County Land Office in the Court House at Walker.

#### You Can Help the Mail Get Through

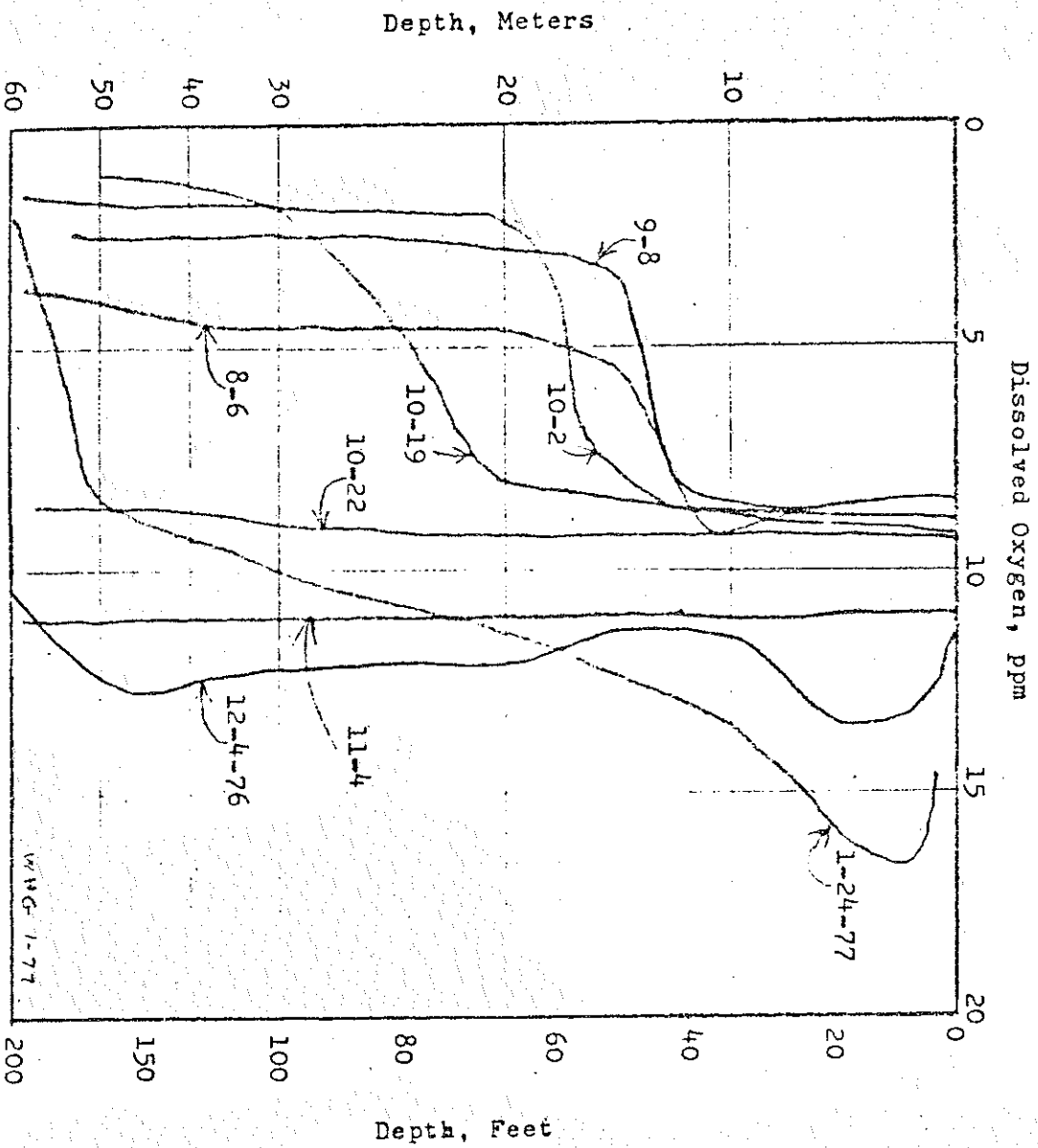
It seems unlikely to us that Lakeshore dwellers on other lakes could be as fortunate as we are when it comes to mail service. With well over 300 patrons, Murray and June Kraushaar conscientiously perform a difficult task of forwarding mail when we aren't there. When you leave at the end of the season be sure to inform the Kraushaars or the Hackensack Post Office and give them your forwarding address. This will greatly reduce the likelihood that next spring you will find mail in your box that has been there all winter. Your Hackensack Post Office needs and deserves your patronage.

#### Looking Back -- and Ahead

This has been a year of considerable accomplishment, some of which we have summarized herein, but all made possible because of the help and cooperation we receive from many individuals and organizations too numerous to list completely. Besides those mentioned elsewhere in this letter, we owe thanks for their helpfulness to our Cass County and township officials. We also enjoyed fine cooperation with many other lake associations and similar environmentally oriented organizations who, like ourselves, are dedicated to the preservation and improvement of our lakes and shorelands. This year and in the years ahead we foresee continued progress and further enhancement of the role played by the Ten Mile Lake Association in our community.



Some Typical Profiles of Temperature  
Ten Mile Lake  
April 1976 - January 1977



Some Typical Profiles Showing the Concentration  
of Dissolved Oxygen in Ten Mile Lake, 1976-77