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LAKE MARTHA PROJECT ANNUAL REPORT

1997-1998

Project was developed and carried out by
Steve Velie and Tim Hall
for the
City of Osseo.
Funded through an Adopt-a-Lake grant from the DNR.

Final Report
Lake Martha Project
Osseo-Fairchild HS
Steve Velie, Tim Hall

During each of the five years of the project the Freshman Biology class has had a ten day unit on aquatics. This would be four classes of approximately 20 students per class. A total of about 40 hours of teaching time per year. In this class we have calculated stream flow rates into Lake Martha. We have done habitat assessment. We have spent time with DO using the DO meter purchased through the grant. We have recorded DO levels in Lake Martha as well as in the Beef River. We have done water quality assessments through the use of aquatic insects sampling.

Tim Hall and Steve Velie have served as community lake resource experts. We spoke at the commercial club meeting regarding the dredging projects, the bottom draw dam, siltation fill in rates and the fishery. Steve Velie also has been a presenter at the DNA sponsored meeting at Beaver Creek Reserve for Adopt a Lake Projects. A total of about 8 hours.

Tim and Steve did a lake survey in 1997. At that time we took depth measurements at 100 ft intervals across the lake. We plotted this data using Autocad. Our purpose in the survey was to use this information to determine siltation fill in rates. We have not done another survey since that time but we do have the data and are anticipating doing another survey to determine fill in rates. Twenty hours of time was put into the survey.

Our biggest effort with the lake has been with the bottom draw dam. We have put temperature probes out above and below the lake and gathered temperature data. This data has been used in Advanced Biology. The students were taught the purpose and intent of the bottom draw dam and were then given data and assigned writing a report which involved the interpretation of the data taken from Lake Martha. Approximate teaching time: one week unit, two classes, 10 hours / year.

In the 2001-02 school year we had an independent study student Tristin Bensler. Tristin was involved with gathering temperature data and trying to relate this data to the opening and closing of the bottom draw dam. When our dam is completely open the lake level can actually be lowered. Thus we need to find a point where we can have the greatest amount of water flowing out the bottom while not lowering the lake. Tristin worked with the city having them vary to amount of flow and seeing what affect this had on the below lake water temperatures. Another concern out city people have is that is some water does not flow over the top of the dam we have a greater algal growth. We also tried to see if this was true or not. The data gathered by Tristin has been compiled in his report on Lake Martha. Approximate hours, 25.

We have also been involved with netting of fish using the fike nets purchased through

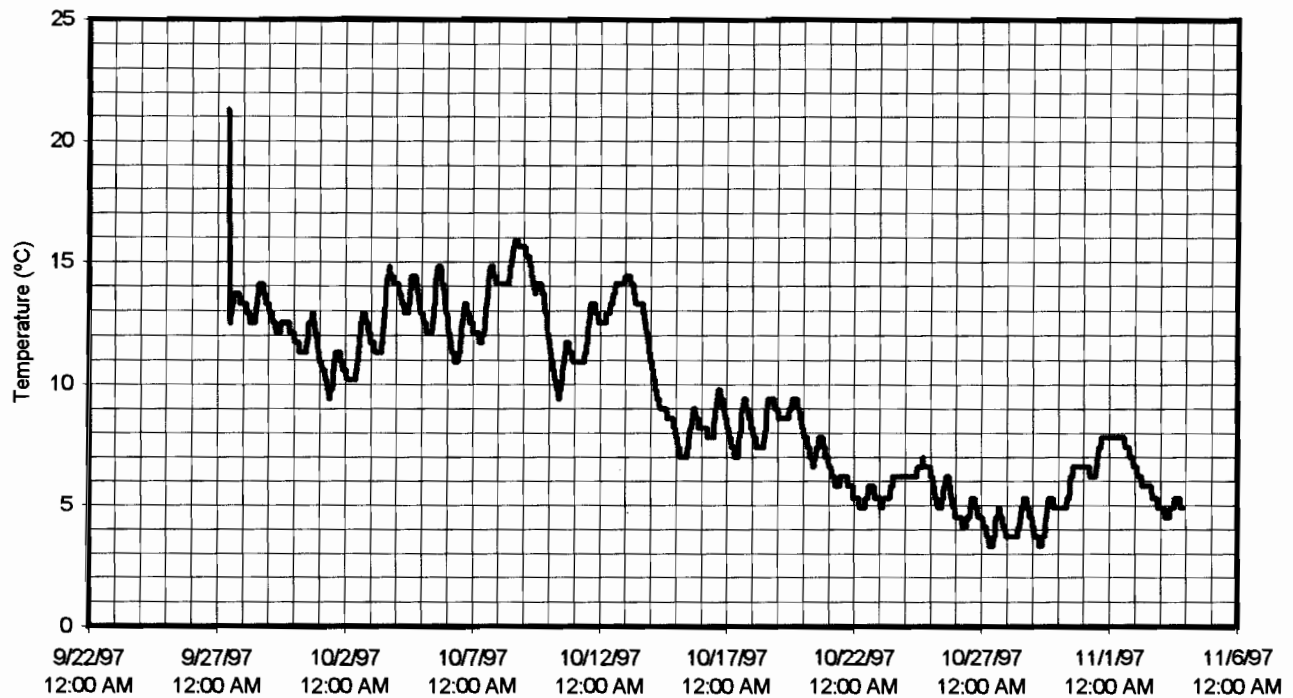
the grant. We set the fike nets out each year in our Advanced Biology classes. We recorded and reported our results as part of our collectors permit requirements. Our success was at best sporadic. We often caught no fish at all. We believe our problem is the size of our fike nets. It is difficult for us to get good sets because the water drops of too quickly. We have been surprised occasionally with some fairly good catches. We have caught some very small fish indicating reproduction is happening. We have never caught a trout. Since the river is primarily a trout stream this has somewhat surprised us. Two classes per year with about four days of netting comes to eight hours per year.

In the summer of 2000 Tim and Steve spent a day with one of the DNR people wadding the upper tributary of Lake Martha doing stream quality assessment training. This training was put to use in the freshman biology classes. Approximate time for two people 6 hours.

We have integrated information which we have gathered and learned into our classes at many times through the course of each year. This Saturday March 13, 2003 Tim and Steve are presenting a Sci Kid presentation to 60 Girl Scouts. Our mission is to discover what the Villains are using to kill the fish in Lake Martha. We will be teaching such things as ph, protists and DO to find the problem. Our work through the grant has reached a large part of our community and hopefully helped them to better understand Lake Martha as a resource. Six hours.

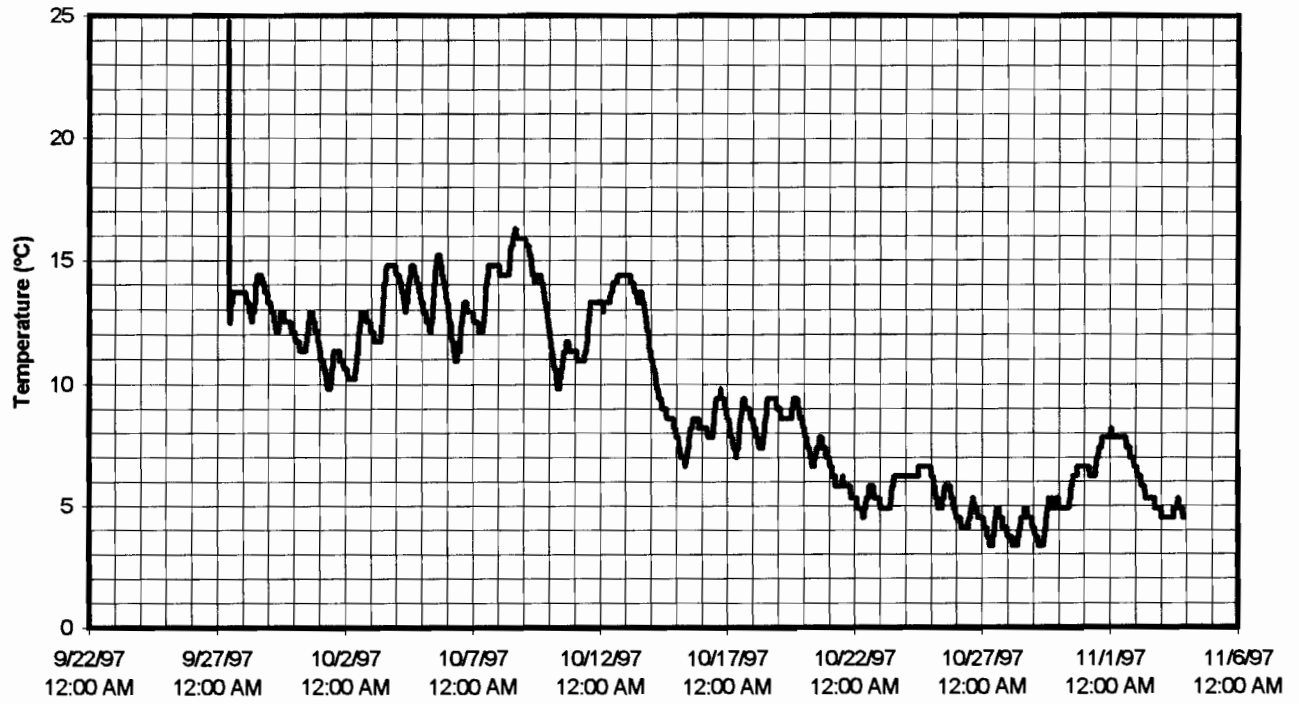
We will continue to use the materials purchased through the grant to teach our community and classes. We remain more than willing to share our information or to gather any information which we are able to for the DNR or other organizations.

Beef River (Velie's House)

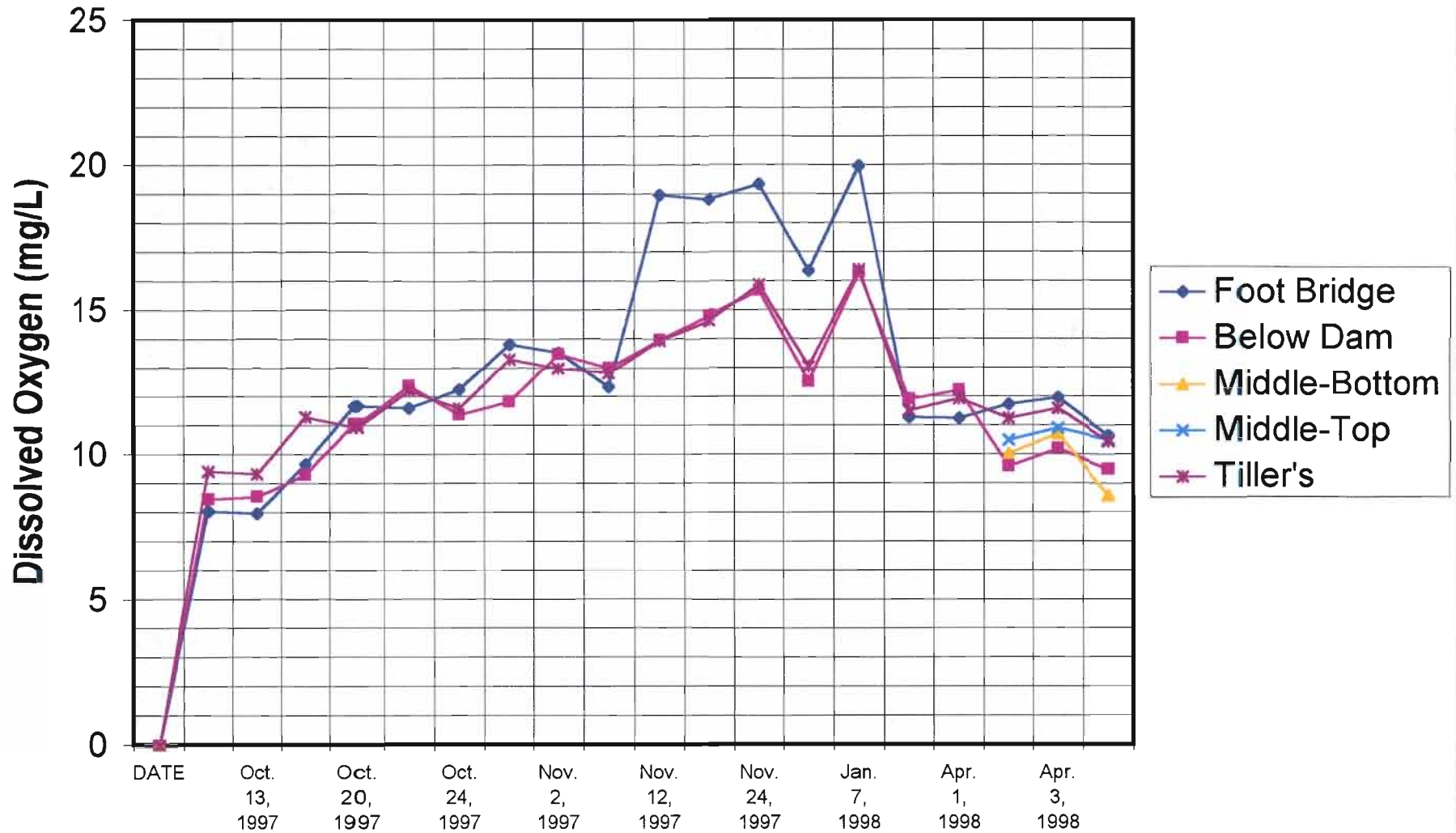


Velie's is located on the North Branch while the foot bridge data is on the South branch just above Lake Martha. These two sets of data were taken to test the temperature probes. This was the first time they were used. In comparison these two sites show very similar temperature trends. I would expect this as they are very similar ~~and~~ in vegetation cover. Both being wooded.

Temps Above Foot Bridge



Dissolved Oxygen in Lake Martha



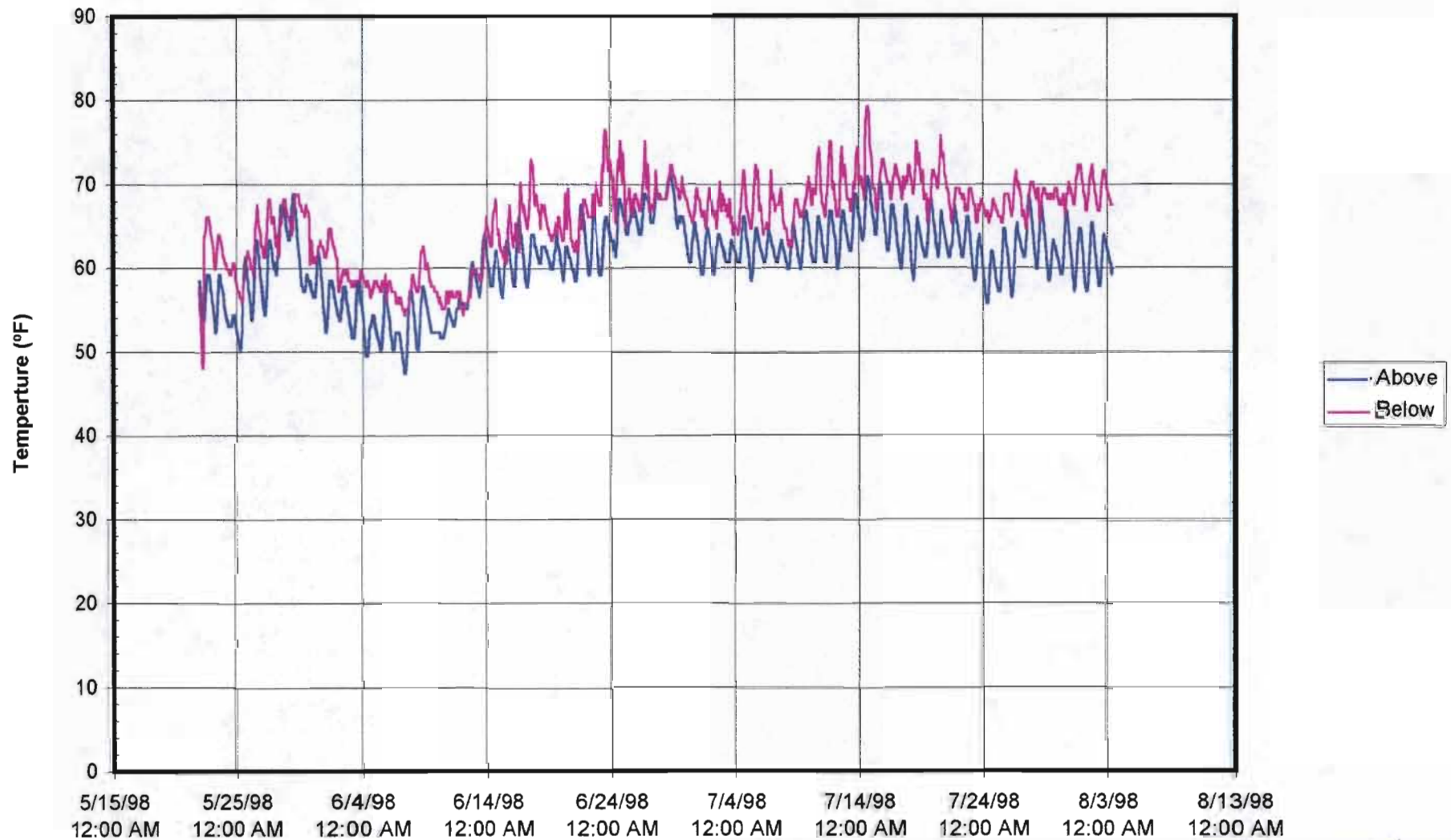
The data taken on this and the following chart were recorded by an independent study student using a hand held YSI model 55. During this time lake Martha was lowered approximately 6-7 ft. So flow through time in the lake should be pretty short. Although we would still expect some warming in the lake.

Temperature of Lake Martha



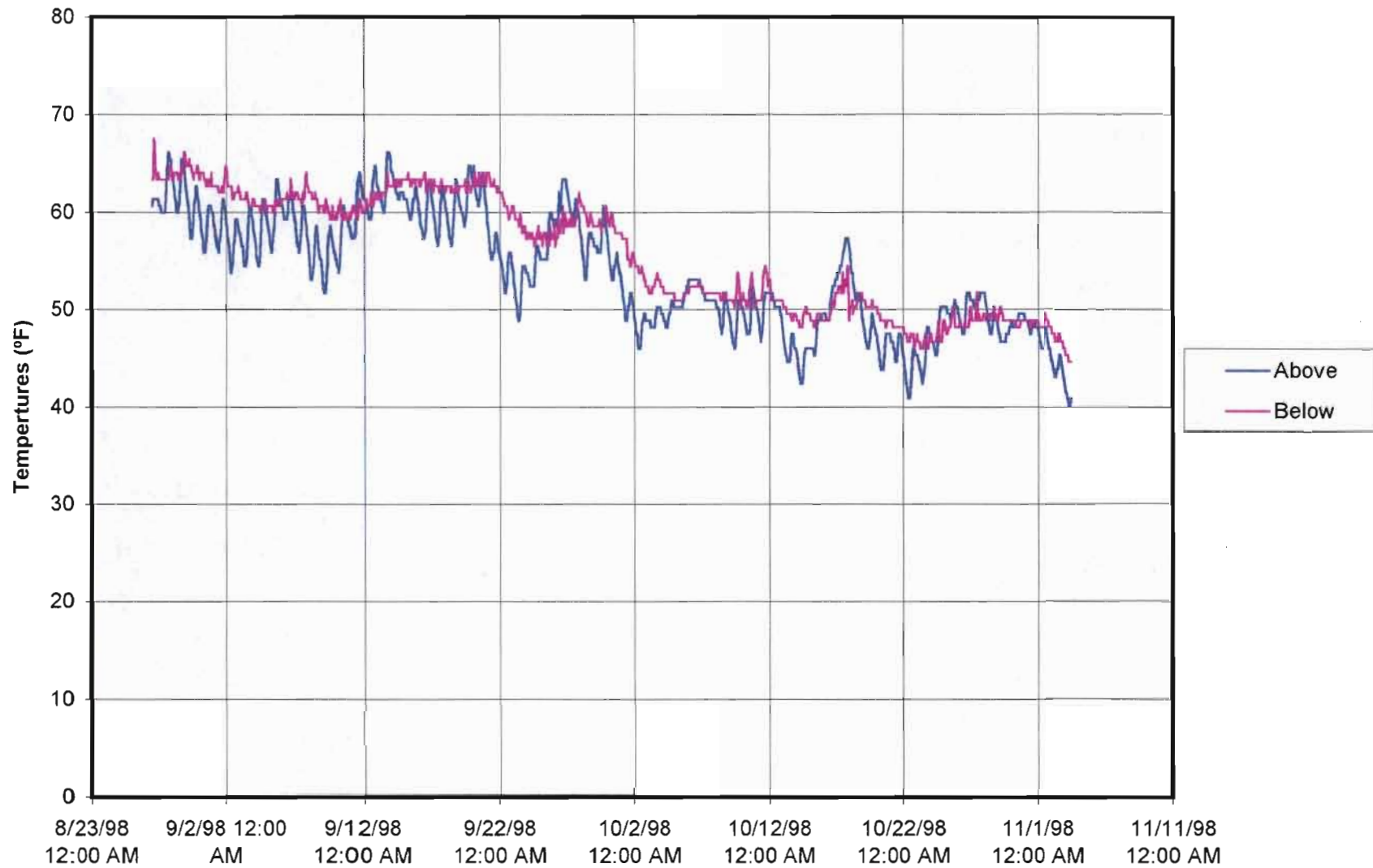
Warmest temperatures occur below the dam, which is what we would expect. During this time the size and depth of Lake Martha was greatly reduced so there probably isn't the significant amount of heating. Water was flowing over the dam during this time.

Lake Martha-Summer 98



During this time the new dam with bottom draw was in place but we believe the bottom draw was not in operation. It was not in use when we took probes out. Our questioning makes us believe it was not being used. The next set of data did have the bottom draw in operation but we are unsure as to what % of possible flow was coming through. (cont Back.)

Tempertures Fall 1998



During this time the bottom draw is in operation to some extent. It does appear that above and below temperatures have come closer together. We will put probes out very early this spring and we will monitor the bottom flow usage.

Report for Lake Martha: Fall 2001

In early September I put out temperature recording probes in the lake. One was placed just above the footbridges, one just below the dam outlet, and one in the stream below the lake. Also, one at the surface of the lake and one at the bottom of the lake. All of the probes were in the lake from September 11th until Sept. 21st.

While the probes were in the lake I contacted Randy Ottestad several times, he controls the amount of water the dam would let through by opening and closing it off. During all of this I kept records of the water level of the lake at two places. The idea of this was to find how far open the dam could be opened up and still allow the lake to remain at the desired level of depth.

On September 11th, a Tuesday all of the probes were set out into the lake. The next day the dam was totally closed up. I took lake level measurements at two places, right above the footbridge. I stuck a meter stick into the water where I had marked the bank. Down at the bottom I put a rock on the bottom to keep the readings constant. The initial reading with the dam fully closed was water that was 80cm deep.

The other measurement was taken on the dam. I took the meter stick at found how far down the water line was from the top ledge on the concrete part of the dam. This initial measurement with the dam fully closed was 64 cm from the top of the dam ledge.

The obvious assumption that I made at this point was right because the dam was already fully closed; I would not see any readings that had higher water levels. The lake levels could only go down when the dam was reopened.

Friday morning 9-14 the dam was totally opened at 10:30 am and was left open all weekend long until Monday morning when it was closed to halfway. The water depth at the footbridges was 40cm deep. The water level had dropped 40cm. The level at the dam was 85cm below the reference point, it had dropped 21cm.

On Wednesday the dam was fully closed up around 10:30 am. By this time the water level was back up to 70 cm deep at the footbridges, the dam the level was 74 cm from the top. By this time the water was just about ready to flow over the top of the dam.

Thursday the 20th at the footbridge was 72 cm deep, and 64 cm from the top of the dam. One thing that I saw was that by lowering the lake all of the scum and duck weed was corralled near the dam and was beginning to all flush out of the lake. The dam has to be around 2/3's open for the lake to remain at an acceptable depth of about 60cm; from the dam's reference point.

The next day, Friday the 21st I took all of the temperature probes out of the lake to observe the data that they collected. The data was collected and the graphs were compared to one another. I concluded that the water coming into the lake was about 3-8 degrees cooler than the water leaving the lake. One other interesting thing that I observed from the graphs shows a delay in time before a temperature spike will work its way from the bridges down the lake and into the dam. For example a high reading of 58°F at the footbridges will show up as a spike of 61°F at the dam a few hours later. By looking at the graphs it looks like the time is 4-6 hrs from the time the water comes into the lake to the time it empties the lake. Surely the lake does not turnover in this time so I'm guessing there is a main channel that the water follows.

The data for the top of the lake did not work because the probe was set wrong. It could not be compared to the rest of the charts. However the data I did get showed that

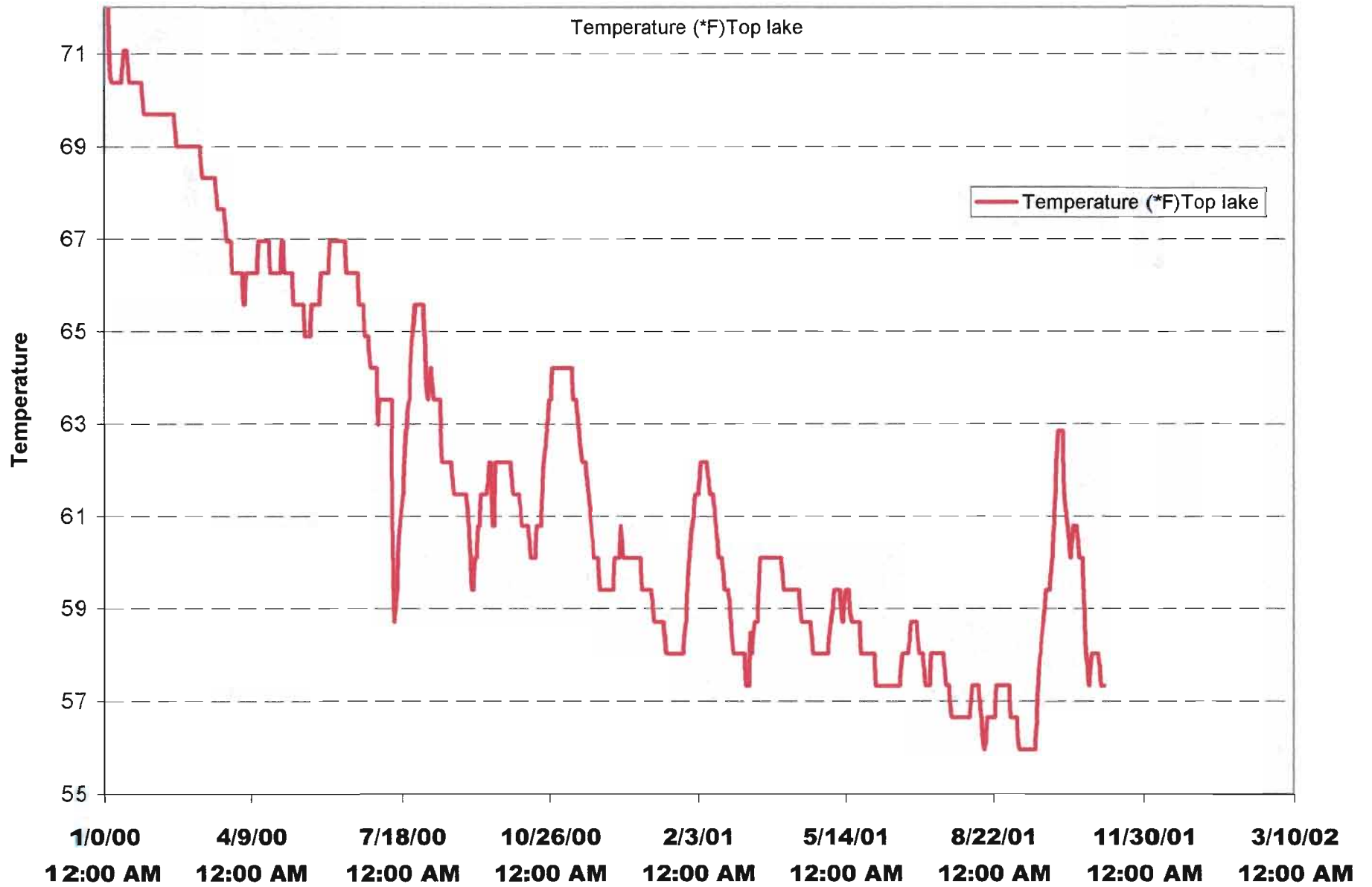
the top of the lake had the most drastic temperature changes. The temperature ranged from 72°F to 56°F, more than any other probe's range.

A week later I relaunched the probes in the lake. This time I put four of them in the bottom of the lake in a straight line going across the width of the lake. The other two probes were put by the footbridge and the dam. This October project revealed some more information.

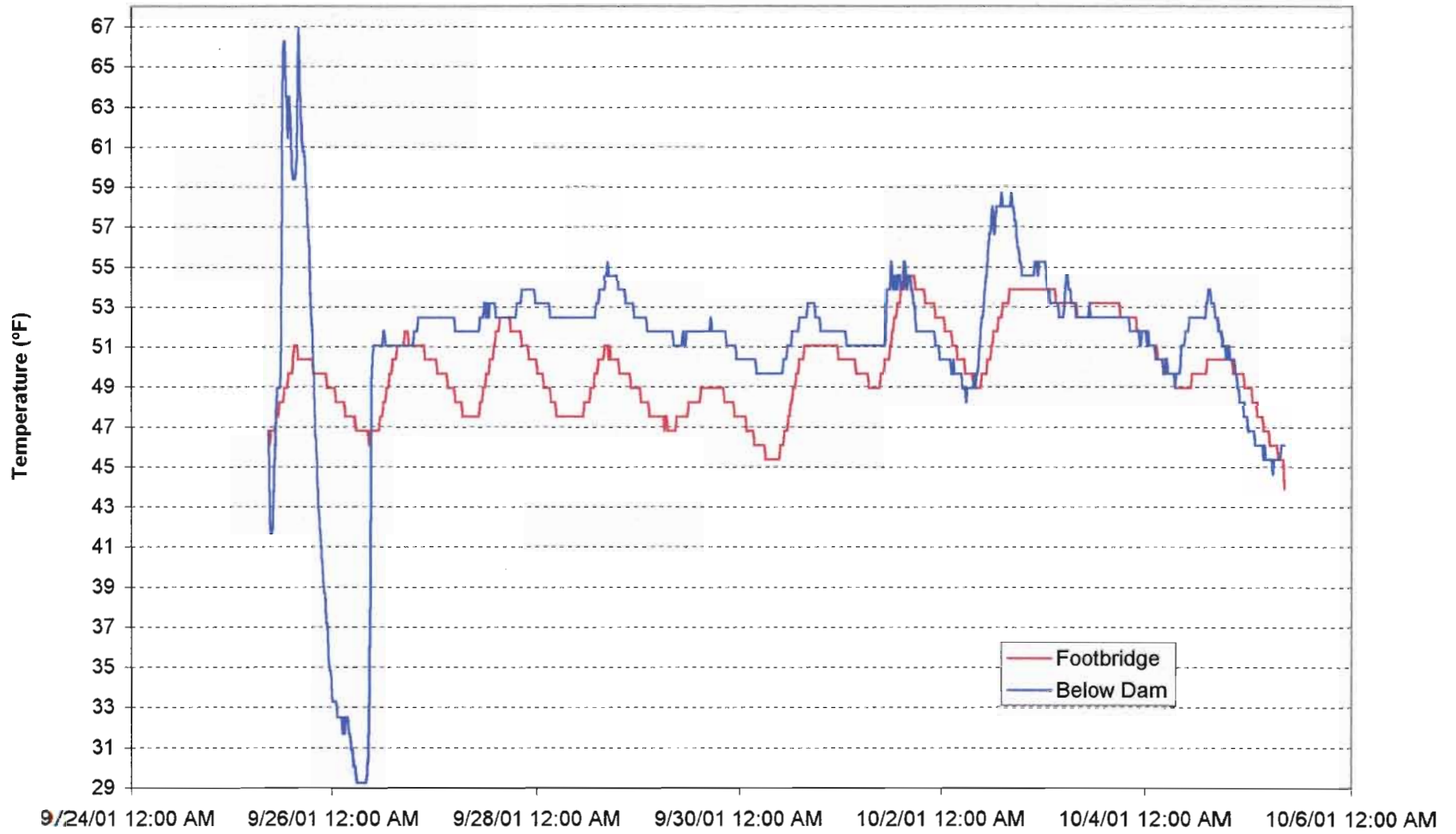
The temperature is quite stable at the bottom of the lake. The temperatures were all very close together. With the exception from probe number two. Which were about 1°-2°F higher than the rest. I thought when I placed these there would be a cold area where the channel ran through.

On the other hand the other 2 probes at the top and bottom of the lake were very different. The probe below the dam had a very large spike that I don't think was accurate. However the chart shows the dam water to be consistently about 4°F warmer than the footbridge water. Also like the charts from September the temperature spikes for the dam were delayed, allowing time for the water to flow through the lake.

Many things were observed from the lake, I would have liked to take pH-tests, etc. to see the condition of the lake in these aspects. I will do this when the lake thaws in spring.



Inlet and Outlet Temps. October 2001



Lake Temps. October 2001

