APPENDIX A

MANAGEMENT OF HESS LAKE AND ITS WATERSHED: A HISTORICAL PERSPECTIVE

Glacially created during the last ice age, Hess Lake was once surrounded by a dense virgin Pine forest and possessed an abundant fishery. As the forest were logged and the fish were caught, man's disturbance of the lake and its ecosystem has created some severe problems. Aquatic weeds now dominate the lake bed and algae blooms pervade the lake water, as the lake has aged at a faster rate. There are many events in the history of the lake and its watershed which have played important roles in determining its future. While dealing with today's problems, an understanding of past events and their impacts will allow successful and satisfactory solutions to be developed.

THE EARLY HISTORY

Hess, an easterner who had come to Michigan seeking his fortune in lumber in the mid 1800's, purchased a large tract of land in the southwest corner of Brooks Township including the west end of Hess Lake. He established a lumber mill on the northwest side of the lake. Subsequently, a little village, "Hessville", popped up around the mill. During the winter, logs were shipped across the ice. While the ice was off slabs of wood and piles of sawdust were dumped into the lake. When Mr. Hess found the operation not profitable enough, he sold the property which was eventually acquired by Mr. Pierce. The old mill and Hessville boarding house on the lake burned down by accident several years later.

It was in the 1870's, that Hess Lake first became popular, the lake continued to develop as a resort throughout the rest of the nineteenth century. The clean waters were enjoyed by swimmers, fishermen, and sailors alike. Residents of Newaygo, eventually constructed a clay bike path to speed up the trip to the lake. Fishing was excellent and catches of two to three hundred yellow perch in an outing were recorded. The Michigan Fish Commission stocked the lake in the early 1890's with yellow perch, walleyes, catfish and carp.

Russell, NSCD; David E. Jordan, Newyago County Drain Commissioner; Gordon Wenk, MDA Environmental Division; Robert VanderMuelen, NSCD; and Scott L. Strahle, NSCD met once each monthly (11/26/85; 1/9/86; and 2/4/86). The committee discussed the project and its goal and objectives, as well as, the activities of the project employee which were drafted by Scott Strahle. Recommendations and suggestions were made as increasing the resources available to the project. The committee approved the quantitative estimates of the project objectives, employee accomplishments, and employee activities (Appendices D-1, D-2, and D-3 respectively).

A budget form was created and approved. A seperate account was established for the project by the district treasurer, Art Nelsen. Appendix E includes the expenses for the project employee, equipment and supplies purchased (including a seperate detailed accounting), and administrative costs. Those services provided in-kind have also been reported in Appendix E.

Summaries of project meetings and board meetings were made for documentation purposes. They will be used to keep track of activites as they relate to the project. A copy of the project committee synopses are included in Appendix F.

SUMMARY:

The Hess Lake Watershed Project commenced in November with the hiring of Scott L. Strahle as the project coordinator. The goals and objectives of the project were established and monthly quantitative estimates were drafted with the assistance of monthly project advisory committee meetings. On site contacts and practice application were limited due to weather and season although two SCD cooperators from the watershed were signed up during this quarter. Publicity for the project took the form of a press release and subsequent article. The project was introduced to the Hess Lake Board and the Hess Lake Improvement Association and assistance by Mr. Strahle was offered. In order to understand the problem and develop strategies, a history of the lake and watershed was developed. A newsletter to watershed residents has been developed and is currently being printed and distributed. A survey form for the watershed residents was also drafted and included in the newsletter mailing. The survey responses will be used for development of future newsletter articles and informational meetings. To make these other mailings easier, a computer mailing was developed on the computer purchased to organize the project. The computer has been used for word processing and database management. Report and budget formats were developed and adapted by MDA for all watershed projects use.

Although trout were occasionally found in the streams around the lake, bass and winter ice fishing became increasingly important. In order to accomodate all of the fisherman and vacationers, boat liveries added to the already high boat population of the lake. Sailboats and rowboats were common, however, there were occasional steamer boats.

In 1916, the lake was subject to a major watershed alteration. Prior to this time, the lake's watershed was confined primarily to the land immediately surrounding it. The Wheeler Drain flowed into Rice Lake and the Grand River via the Rogue River from the agriculturally diverse central Grant Township. In 1915, a group of land owners proposed to divert the flow of the Wheeler Drain to Hess Lake and into the Muskegon River watershed. After public meetings and hearings in the summer of 1916, the project was officially approved and construction began.

The new watershed was approximately three times the size of the original watershed. The Wheeler Drainage District with subsequent development, now extends west to Ferris Avenue, south to 132nd Street, and east to Spruce Avenue. Drains such as the Downing and VanDorn have since been added to the district. Alger Drain, another drain in the watershed west of the Wheeler, was established in 1919. The drain extends into Ashland township and was created to improve drainage. No new acreage was actually introduced into the watershed, although the improved drainage increased the drain's potential effect on the lake.

CURRENT HISTORY AND EUTROPHICATION

As a large shallow recreational lake in what is now an agricultural watershed, Hess Lake in Newaygo County has been subject to natural and cultural eutrophication. Eutrophication, the natural aging of the lake, is the result of years of aquatic plant growth, leaf deposition, and decreased lake depth. As a lake continues to age, it fills in until it becomes a bog then a wetland and eventually can be drained to become fertile and productive land. Hess Lake is suffering from long term "cultural" eutrophication. The process by which man's intervention and development within a watershed speeds up the natural process is cultural eutrophication. Relevant examples of cultural eutrophica-

tion include soil erosion from farms, homes and road building, and nutrient deposition from animal wastes, fertilizers and septic systems.

The increase of sediment and phosphorus entering the lake has created some severe problems. As the result of sediment entering the lake from the agricultural watershed from soil erosion and from deterioration of the shoreline, the lake has increased in turbidity and decreased in depth. The large quantitity phosphorus and other nutrients has resulted in accelerated algae and aquatic plant growth which has greatly reduced the the recreation potential of Hess Lake. Because of the decrease in water quality and in increase in aquatic plants, fishing, swimming, waterskiing, and boating have all been adversely affected.

Since the lake depth has been reduced, new problems have been created and old problems have increased. Now that the lake is shallow, the wind can easily cause wave action which constantly stirs up the bottom creating turbidity, making the water cloudy and murky. Second, the plants are physiologically and photosynthetically depth limited, and typically will not grow below 15 feet deep. Therefore, aquatic plants can take root over a greater area of the lake because the sunlight can penetrate to these depths. The effect of reduced depth along with increased nutrients has been to allow aquatic plants and algae to grow faster and larger.

Since the early to mid 1970's, Hess Lake has been subject to an explosion of an aquatic plant, the Eurasian Water Milfoil, Myriophyllum spicatum. The Eurasian Water Milfoil was originally imported into the United States as an exotic aquarium plant. Since, its accidental release into the environment, it has caused severe lake problems all over the United States, as one of the most difficult aquatic plants to control. This plant grows very quickly and can out compete almost any other aquatic plant in this area. It is typically brought to a lake from an outside source, another lake, by means of drying on to a boat motor propeller or a duck foot. This recent increase in milfoil is not the result of any significant increase in nutrients from the watershed or the lake residents. It is more likely the result of the plant's exploitation of the pool of nutrients which have accumulated over many years.

While the milfoil has created a large increase in aquatic weed material in the lake, Hess Lake has had other aquatic weeds, as do most lakes, for many years. In order to control these weeds, harvesting of the leaves and stems of the plants has been undertaken for many years. Clippings from such harvest are bets managed by hauling them away and incorporating as fertilizer on a farm or in a garden. The problem with harvesting is that the roots of the plant are not removed. The plants can continue to grow as they have in Hess Lake. It will take a program of treatments with herbicides to kill the entire plant.

PREVIOUS STUDIES

In 1982, Edmands Engineering completed a study of the effects of the watershed for the Hess Lake Board and the Newaygo County Drain Comissioner. The report estimated that over half of the phosphorus in Hess Lake came from the Wheeler Drain. Alger Drain, was responsible for just over a quarter of the total phosphorus. The residential septic systems around the lake were responsible for about one eighth of the annual phosphorus budget.

The report discussed a number of alternatives for reducing the sediment and phosphorus entering the lake from Wheeler and Alger Drains. One alternative suggested diverting the southern portion of Wheeler Drain back into the Grand River watershed via the Rogue River. Another alternative which was highly recommended by the engineering firm was to by-pass Hess Lake by damming the Wheeler Drain and piping it through and beyond the lake to Brooks Creek, downstream of Brooks Lake. The possibility of treating the drain with alum to remove phosphorus was also discussed. Development of a 200 acre lake to remove phosphorus and sediment was the most expensive alternative suggested. Managing the watershed was a secondary alternative, and the firm felt it would be a very long and difficult process.

Recommendations were also made concerning actions to improve the lake. Dredging was highly recommended. Edmands suggested that just under a third of of the lake should be dredged to a depth of 15 feet or more. Drawing down the water level lake to expose aquatic plant roots to air and freezing temperatures was disregarded as technologically unfeasible. It was also recommended that weed harvesting should continue with the start up of chemical treatments to

kill the entire aquatic weed. Aerating the water was discounted on the premise that it would be ineffective with Hess Lake.

CURRENT PLAN AND RECOMMENDATIONS

Last year, the Newaygo County Drain Commissioner established a retention pond just above the Wheeler Drain dam. The purpose of the pond and dam is to allow the sediment in the runoff of the drain to settle out and collect due to the slowing of the flowing waters. The pond would be dredged as it fills up with sediment. Its effectiveness has not been studied, but it should be effective for reducing sediment and phosphorus attached to sediment. However, phosphorus dissolved in the water, which is the easiest form of phosphorus for aquatic plants to use would most likely not be reduced. If the sediment ponds were associated with reed or other wetland plants, some uptake of the dissolved phosphorus might take place. However, these plants would require more regular maintenance of the ponds, due to the need for cutting and removing the growing plants. The Commissioner also did major work of sloping and stabilizing Wheeler Drain. Three smaller sediment basins installed approximately 1.5 miles upstream from Hess Lake.

In 1985 the Newaygo county Drain Commissioner encouraged the Newaygo Soil Conservation District to apply for watershed-water quality assistance money from the Michigan Department of Agriculture. A state review committee selected the Newaygo Soil Conservation District received $30,000. It was one of only seven districts in the state to receive those grants. The special grant will be used to manage the watershed and to coordinate efforts of other agencies including the Soil Conservation Service (SCS), Agricultural Stabilization and Conservation Service (ASCS), Cooperative Extension Service (CES), Department of Agriculture (MDA) and Department of Natural Resources (DNR). Along with these and other county and local agencies, the project coordinator will be working with residents of the watershed and lake.

The primary effort in managing the Hess Lake watershed will be to control soil erosion and phosphorus runoff into the lake. The SCS and ASCS will be working with landowners to develop conservation plans and practices which will reduce these problems. The Newaygo County Drain Commissioner will provide

leadership, guidance and direction to the total project. The Michigan Youth Corps program will stabilize the drains leading into the lake and develop buffer zones along the drain. The Conservation Reserve program which will come into effect early in 1986 may be used. The Department of Natural Resources will help to monitor streams and drains in the watershed to identify problem areas and confirm improvements and advancements. The Newaygo County Department of Health may help with checking septic systems around the lake.

The plan of action for the lake includes other facets. First, an education program will be developed with the help of CES to inform lake and watershed residents on proper lawn fertilization practices, septic tank management, shoreline protection, and general soil and water conservation practices. The Hess Lake Association and Board will continue to harvest aquatic weeds. They will also begin to treat the lake with 2,4-D to reduce the weed problem. This is a process which will take several years to get control of the weeds. Proposals for funding dredging of the lake will be drafted.

SUMMARY AND CONCLUSIONS

Hess Lake has a tremendous history as a commercial and recreational lake. It was once the site of a saw mill for the harvest of the virgin pine forest which once surrounded it. Starting, in the late 1800's it was developed as a resort. With the development of the property and the land which surrounds the lake, problems with cultural eutrophication arose. The cottages contributed nutrients in the water by ineffective or nonexistant septic systems which lead to increased growth of aquatic weeds. The watershed of the lake was increased significantly with the diversion of Wheeler Drain into the lake. Due to the intensive agriculture of the region, the effect of this diversion was tremendous. The land this area has been highly susceptible to soil erosion and nutrient (phosphorus) runoff which ends up in Hess Lake. The resulting increased plant growth and decreased lake depth only compounded the lake's problems.

The public awareness of the lake problems is due to the recent increase in aquatic weeds. Attempts to control the aquatic weed problem by harvesting of excess plant material has taken place for years. However, within the last

decade, the lake has been invaded by the Eurasian Watermilfoil, one of the fastest growing and most difficult aquatic weeds to control. Harvesting of this plant may have actually increased the density of this plant in the lake. Therefore, other alternatives for plant control such treatment with 2,4-D are currently under consideration by the Hess Lake Board.

There have also been a number of efforts to control the sediment and nutrient problems with the watershed and particularly Wheeler Drain. Sediment basins have been established by the Newaygo County Drain Commission near the mouth of the drain which may be significantly reducing sediment and phosphorus. However, current efforts of the Newaygo Soil Conservation District are to reduce the soil erosion and animal waste and fertilizer runoff. The combination of efforts with other agencies and organizations should create a significant reduction of the watershed impact is on the lake. Within the lake, efforts are also being made to obtain funding to dredge about a third of the lake to increase its depth which should help nutrient and aquatic plant problems.

An important to fact to realize is that this is a problem which has been building up over many years. There is no one instantaneous solution to the entire lake and watershed problem. It will take the combined effect of several different action including dredging, chemical treatment, harvesting, and managing the watershed with soil and water conservation. Improvements will be noticeable, but slow. By understanding the lake's past and present, hopefully its future will be brighter with the development of a successful long term plan.