

progressive

November 9, 2017

Hess Lake Improvement Board
306 S. North Street
PO Box 885
White Cloud, MI 49349-0885

Re: Proposal for Lake Management Plan Evaluation
For Hess Lake, Newaygo County, Michigan

APPROVED AT TAB
11-13-17 MTE

Dear Board Members:

Progressive AE is pleased to present this proposal to develop a Lake Management Plan for Hess Lake. Progressive AE's Water Resources Group has had extensive experience working on lake improvement projects across Michigan. Enclosed is a brochure that describes our services along with listings of several publications and presentations prepared by Progressive AE's Water Resources Group. For your consideration, following is our understanding of the project, our scope of services, proposed schedule and compensation.

UNDERSTANDING OF PROJECT

The project, as we understand it, is to develop a comprehensive lake management plan for Hess Lake. The study would include an assessment of the current physical, chemical, and biological condition of the lake, an evaluation of the watershed, and a report that includes recommendations for in-lake and watershed management.

SCOPE OF BASIC SERVICES

Based upon the above project understanding, Progressive AE will provide the following scope of services:

A. Review Existing Information

1. Review historical reports as well as water quality and fisheries data available for Hess Lake.

B. Perform Base Mapping

1. Create a geographic information system (GIS) database for the project.
2. Digitize the shoreline of the lake using recent aerial photography, rectified to NAD83 datum.
3. Conduct a detailed hydro-acoustic (i.e., a SONAR) survey to measure bottom depth and plant bio-volume (i.e., the height of plants in the water column). Grid points would be established with a global positioning system (GPS) at 100-foot intervals over the entire lake bottom to be used as a navigation guide in acquiring complete SONAR coverage of Hess Lake.
4. Import the hydro-acoustic data into the GIS database.
5. Create an updated bathymetric (i.e., depth contour) map of Hess Lake. The map would depict adjacent roadways and shoreline features in addition to depth contours.
6. Calculate the physical characteristics of the lake including lake surface area, maximum depth, mean (or average) depth, lake volume, area of the littoral (rooted plant growth) zone, lake shallowness factor, and shoreline development factor.

7. Create an aquatic plant survey map that includes the lake shoreline, depth contours, numbered survey waypoints, and Michigan Department of Environmental Quality (MDEQ) plant survey codes.
8. Create updated maps of the Hess Lake watershed overlain on USGS topographic base maps and recent orthodigital aerial photography.
9. Determine the number of homes currently bordering the lake and evaluate the extent of natural versus disturbed shoreline around the lake.

C. Assess Water Quality

1. Collect water samples at five-foot intervals from the surface to the bottom from the three deepest lake basins during spring and late summer to measure temperature, total phosphorus, dissolved oxygen, chloride, total suspended solids, pH, and total alkalinity. Measure chlorophyll-a levels within the photic zone and water transparency during each of the aforementioned sampling periods.
2. Determine lake trophic state; thermal and chemical stratification; oxygen depletion; and phosphorus levels relative to aquatic plant growth.
3. Compare data collected with historical water quality data for Hess Lake.

D. Assess Aquatic Vegetation

1. Confer with the Lake Board's herbicide applicator as to timing, location, and targeted species for aquatic herbicide application(s) during the study period. Conduct a detailed aquatic plant survey using the point-intercept method. With this method, grid points would be established with a global positioning system (GPS) at 300-foot intervals along the shoreline and one-acre intervals (approximately 208 feet) across the vegetated portions of Hess Lake as determined by the hydro-acoustic survey. At each grid point, a two-sided rake attached to a line would be used to collect plant samples; the type and relative abundance of each plant species present would be recorded. This survey method would document the type and location of plant species in the lake. A table would then be generated that lists all plant species observed in the lake and their relative abundance.
2. Import aquatic plant bio-volume data from the hydro-acoustic survey into the GIS. Create a geo-rectified map showing location and height of plant beds in Hess Lake.
3. Create a map that depicts the location of invasive species such as Eurasian milfoil (*Myriophyllum spicatum*) and starry stonewort (*Nitellopsis obtusa*).
4. Compile treatment records filed with DEQ and assess type, amount, frequency, and timing of herbicide applications and evaluate the current aquatic plant control program.

E. Assess Watershed

1. Evaluate land use and drainage patterns in the watershed and impacts on lake water quality.
2. Conduct field surveys to identify problem areas in the watershed and confer with the Newaygo Conservation District, the Newaygo County Drain Commissioner, and MSU Extension regarding best management practices to reduce nutrient inflows to the lake.

F. Feasibility Evaluations

1. Evaluate the feasibility of in-lake and long-term watershed management alternatives to improve conditions in Hess Lake.
2. Prepare a detailed cost estimate for recommended lake improvements.
3. Describe alternatives to organize and finance the recommended improvements, including potential grants and cost-share opportunities.

G. Deliver Report and Presentation

1. Prepare a written report of study findings, conclusions, and recommendations.
2. Meet with the Hess Lake Improvement Board to review and discuss the report.
3. Present study findings at a public meeting and answer questions from lake residents.

SCHEDULE

Work would begin upon receipt of written authorization to proceed and would be completed over a three-year period (2018–2021).

PROFESSIONAL COMPENSATION

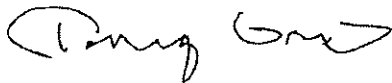
The total cost of the services outlined herein would be \$30,000 (thirty thousand dollars). Progressive AE would bill for services bi-annually on a lump sum basis over a three-year period. Each year of the evaluation, \$5,000 (five thousand dollars) would be billed in January and \$5,000 (five thousand dollars) would be billed in October. The final installment of \$5,000 (five thousand dollars) would be due upon presentation of study findings.

If this proposal meets with your approval, please sign and return the attached Letter of Intent. Your signature will be our authorization to begin the work.

Thank you for your consideration.

We look forward to hearing from you.

Sincerely,



Anthony F. Groves MS
Water Resources Practice Leader

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Enclosures
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