



October 20, 2017

Pickerel and Kimball Lakes Improvement Board  
306 S. North Street  
PO Box 885  
White Cloud, MI 49349-0885

Re: Proposal for Lake Management Plan Evaluation  
For Pickerel and Kimball Lakes, Newaygo County, Michigan

Dear Board Members:

Progressive AE is pleased to present this proposal to develop a Lake Management Plan for Pickerel and Kimball Lakes. Progressive AE's Water Resources Group has had extensive experience working on lake improvement projects across Michigan. Enclosed is a brochure which 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 Pickerel and Kimball Lakes. The study would include an assessment of the current physical, chemical, and biological condition of the lakes, an evaluation of the watershed, and a report that includes recommendations for management strategies to reduce nutrient inputs to the lakes.

#### **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 Pickerel and Kimball Lakes.
- B. Perform Base Mapping
  - 1. Create a geographic information system (GIS) database for the project.
  - 2. Digitize the shoreline of the lakes using recent aerial photography, rectified to NAD83 datum.
  - 3. Digitize the lake bottom contours from the Michigan Department of Conservation maps of Pickerel and Kimball Lakes.
  - 4. Import the data into the GIS database.
  - 5. Create updated bathymetric (i.e., depth contour) maps of the lakes. The maps would depict adjacent roadways and shoreline features in addition to depth contours.
  - 6. Calculate the physical characteristics of the lakes 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 maps of the Pickerel and Kimball Lakes watershed overlain on USGS topographic base maps and recent orthodigital aerial photography.
  8. Determine the number of homes currently bordering the lakes and evaluate the extent of natural versus disturbed shoreline around the lakes.
- C. Assess Water Quality
1. Collect water samples at ten-foot intervals from the surface to the bottom from the four deepest basins in Pickerel Lake and from the deep basin in Kimball Lake during spring and late summer to measure temperature, total phosphorus, dissolved oxygen, chloride, pH, and total alkalinity. Measure total suspended solids and chlorophyll-a levels within the photic zone and water transparency during each sampling period.
  2. Determine lake trophic state; thermal and chemical stratification; oxygen depletion; and phosphorus levels relative to aquatic plant growth in the lakes.
  3. Compare data collected with historical water quality data for Pickerel and Kimball Lakes.
- D. Assess Aquatic Vegetation
1. Conduct an annual 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 across shallow water portions (<15 feet) of both lakes. At each grid point, a two-sided rake attached to a line would be used to collect plant samples and the type and relative abundance of each plant species present would be recorded. This survey method would document the type and relative abundance of plant species in the lakes over time.
- 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 Michigan State University Extension regarding best management practices to reduce nutrient inflows to the lakes.
- F. Feasibility Evaluations
1. Evaluate the feasibility of in-lake and long-term watershed management alternatives to improve conditions in Pickerel and Kimball Lakes.
  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 Pickerel and Kimball Lakes 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 authorization to proceed and would be completed over a four-year period (2018–2021).

## **PROFESSIONAL COMPENSATION**

The total cost of the services outlined above would be \$20,000 (twenty thousand dollars). Progressive AE would bill for services bi-annually on a lump sum basis over a four-year period. Each year of the evaluation, \$2,500 would be billed in January and \$2,500 would be billed in October. The final installment of \$2,500 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.

We look forward to hearing from you.

Thank you for your consideration.

Sincerely,



Anthony F. Groves, MS  
Water Resources Practice Leader

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