



PROPOSAL
FOR THE
AERIAL
LAKESHORE ANALYSIS
OF
FLOYD LAKE

A.W. RESEARCH LABORATORIES

- WATER ANALYSIS • LAKE ANALYSIS •
- ENVIRONMENTAL AERIAL PHOTOGRAPHY •

DATE: April ,11 1996

TO: Pelican River Watershed District
Richard Hecock
803 Roosevelt Avenue Suite 100
Detroit Lakes, MN 56502

SUBJECT: **PROPOSAL FOR THE AERIAL LAKESHORE ANALYSIS OF
FLOYD LAKE**

FROM: Gordon Johnson
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INTRODUCTION

AW Research Laboratories (AWRL) has extensively used low altitude remotely sensed imagery since 1974 to define nutrient and toxic conditions in lakes.

The success of using remote sensing in lake management is based on the simple fact that aerial imagery provides a wealth of complex environmental data. Aerial images present this data to the average individual in a format that he or she can relate to and identify with. Lakeshore residents can then gain a better awareness of their effect on the environment, and with that awareness a willingness to rectify problems. If residents are ignorant of their relationship to the environment, or are forced into complying with regulations that they do not understand, very often the individual will rebel or do the minimum to comply.

In the Aerial Lakeshore Analysis (ALA) A.W. Research Laboratories' Remote Sensing System records the entire lakeshore with visible and near infrared 35 mm slide film using an airborne platform. The infrared and visible slides are correlated to geographic maps and analyzed for land use practices which have enhanced or deteriorated water quality. This allows for total land use analysis including point and non-point source pollution and/or nutrient loading to the lake (septic systems, runoff, toxic input, etc.). The functional beauty of this system has been evident by resident's increased understanding of their relationship to the environment and their subsequent corrective and preventive land use decisions.

The purpose of conducting an Aerial Lakeshore Analysis for any given body of water is to detect point and nonpoint sources of nutrients and toxins. Once these sources are located and investigated for their nutrient and/or toxic content, the governing units along with the residents can all do their part to neutralize these sources. These successful efforts will result in attaining the ultimate goal of a higher water quality along with a cleaner and healthier environment for everyone to enjoy.

PROPOSAL

The shoreline of Floyd Lake will be photographed with 35mm slide film from an altitude of approximately 500 feet in the visible and near infrared range of the electromagnetic spectrum.

The slides will be numerically correlated to the lake on a USGS 7.5 minute quadrangle map expanded from 1:24,000 to 1:12,000.

The lake imagery will be analyzed for the following:

1. The extent of eutrophication with respect to aquatic vegetation.
2. The following possible nutrient or toxic inputs:
 - a. nonpoint septic
 - b. point septic
 - c. nonpoint runoff
 - d. point runoff
 - e. nonpoint toxic
 - f. point toxic
 - g. no excessive nutrient or toxic sources
3. A dwelling count of shoreline residences and the subsequent mathematical interpretations; such as feet of shoreline per dwelling.
4. The slides will be numbered and geographically correlated to a map. The numbers will also be color coded to represent a range of possible environmental impacts.

EFFECTIVE USES OF THE IMAGE DATA

1. Current documentation of weed growth and shoreline development on which to base:
 - a. population estimates and density
 - b. lake usage estimates
 - c. future development potential
 - d. future monitoring programs
 - e. basis for planning lake restoration
2. A rapid method of reviewing a particular location without actually going into the field.
3. An easily understood means of showing individuals their effect upon the environment.
4. An historical data base that will allow the Pelican River Watershed District, Becker County, and the Floyd Lake Property Owners to review and compare future lake uses and their impacts to uses as they existed during the summer of 1996.
5. A method of defining and prioritizing high nutrient point sources draining the various sub-watersheds entering the lake. This will enable the administrators and/or citizens monitoring the lake to prioritize their efforts in further investigation of the nutrient sources.

GENERAL CONDITIONS

The following conditions are to be met by the Pelican River Watershed District, Becker County, and the Floyd Lake Property Owners upon acceptance of this bid:

1. All payments will be made in accordance with the terms provided in the financial section of this document.

PERFORMANCE SPECIFICATIONS

The following conditions are to be met by A.W. Research Laboratories on acceptance of this bid:

1. All materials, supplies, labor, transportation, etc., will be provided by A.W. Research Laboratories.
2. The final report will contain the following:
 - a. A complete 35mm overlapping (visible and infrared range) color slide display of the lake shoreline.
 1. Each slide will represent approximately 300–500 feet of shoreline.
 2. Slides will be numerically coordinated with a map of the lake for easy selection.
 3. Slides will be mounted in clear plastic slide pages for storage.
 - b. Maps used will be enlarged 7.5 minute USGS quadrangles.

- c. A slide by slide analysis of the lake shoreline will be color coded on a map for the following possibilities:
 - 1. nonpoint septic
 - 2. point septic
 - 3. nonpoint runoff
 - 4. point runoff
 - 5. nonpoint toxic
 - 6. point toxic
 - 7. no excessive nutrient or toxic sources
 - d. A detailed comment section with an analysis of each map position (or slide) with recommendations for ground truth confirmation. This analysis section will assist in detailing the color coded map positions and prioritize those areas in need of the most immediate attention.
 - e. A conclusion and recommendation section in the final report to summarize the findings of the analysis and provide direction in possible future lake management activities.
 - f. A presentation to the Pelican River Watershed District, Becker County, and the Floyd Lake Property Owners.
- * Slides and/or report can be stored on CD ROM for an extra fee. A proposal can be submitted upon request of CD ROM storage option.

3. Time table for the project:

Flight to be conducted during the summer of 1996. The final report would be presented to the Pelican River Watershed District, Becker County, and the Floyd Lake Property Owners on or before April 1, 1997.

4. All Performance Specifications will be entirely represented in the following financial section.

FINANCIAL SECTION

The total cost of the project as specified in this bid with one copy of the final report to be presented to the Pelican River Watershed District, Becker County, and the Floyd Lake Property Owners.

The cost is based on the rate of \$550.00 per mile of shoreline.

<u>TASK</u>	<u>UNITS</u>	<u>RATE</u>	<u>TOTALS</u>
MN Lake ID # 03-387	8.4 miles	\$550.00	\$4,620.00
Mobilization to and from site	2 hrs	\$275.00	\$550.00
Presentation			\$700.00
			=====
Total Cost			\$5,870.00

SPECIFICATIONS FOR THE ALA OF FLOYD LAKE

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Aerial Lakeshore Analysis Study for Floyd Lake as outlined in the proposal dated 4-11-96.

The total cost of the project as specified in this bid with one copy of the final report to be presented to the Pelican River Watershed District, Becker County, and the Floyd Lake Property Owners \$5,870.00

Amount due after data acquisition flight:
30% of the total contracted cost \$1,761.00

Amount due on submission of the final report:
70% of the total contracted cost \$4,109.00

Flight to be conducted during the summer of 1996.

SIGNATURE BELOW CONSTITUTES ACCEPTANCE OF ABOVE SPECIFICATIONS

PELICAN RIVER WATERSHED DISTRICT

DATE

A.W. RESEARCH LAB

DATE

Please return to address listed on the title page of this proposal. The unit price and estimate charges in this proposal will be in effect through December 31, 1996. Beyond that time they will be subject to review and revision.

If additional A.W. Research Laboratories services would be required, such as further attendance at meetings, further research, data analysis, or field sampling they will be provided on a time and material basis confirmed through a written request for services.