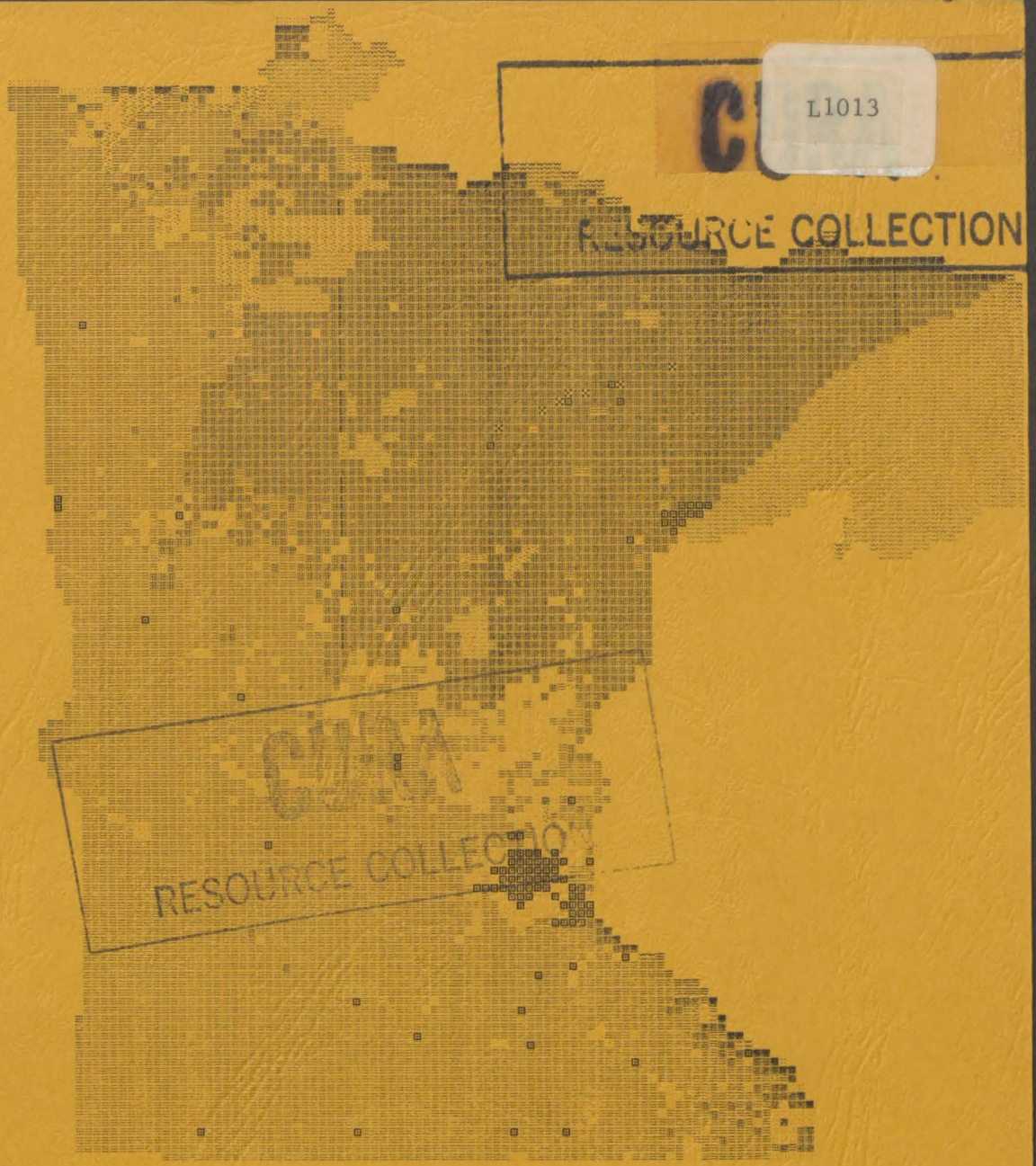

MLMIS

MINNESOTA LAND MANAGEMENT INFORMATION SYSTEM

Forestry Demonstration Case Using the Minnesota Land Management Information System. CURA and Minn. State Planning Agency. by Jeffrey Anderson et al. Nov. 1974.

COPY 1

MINNESOTA LAND MANAGEMENT INFORMATION SYSTEMS (MLMIS) (CURA)

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MINNESOTA LAND MANAGEMENT INFORMATION SYSTEMS (MLMIS) (CURA)

UNIVERSITY OF MINNESOTA
CENTER FOR URBAN AND
REGIONAL AFFAIRS

STATE PLANNING AGENCY

FORESTRY DEMONSTRATION CASE USING THE MINNESOTA LAND MANAGEMENT INFORMATION SYSTEM

4003

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NOVEMBER, 1974

THE MINNESOTA LAND MANAGEMENT INFORMATION SYSTEM STUDY

The Minnesota Land Management Information System project is an endeavor of the Center for Urban and Regional Affairs (CURA) of the University of Minnesota and the State Planning Agency. Important contributions to the project have been made by other executive and legislative branches of state government, numerous University departments, and other institutions.

The primary goal of this project is to improve the quality of public-private sector land use decisions. The project is doing this by building a data bank containing information on physical resources, relative accessibility to market of these resources, and information on current land use, zoning, and ownership patterns.

Concurrent with the data collection effort is a research program that is using the collected data to simulate land use decisions and conflicts.

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FIGURES

FORWARD

This report is the summary of a hypothetical problem addressed using MLMIS data and software developed by the systems staff of CURA/MLMIS. The hypothetical problem was created and tested during July, 1974. This example has been presented to various state agencies to demonstrate the capabilities of MLMIS.

Special thanks go to Jonathon Gross for his assistance in developing the gray scale dot plotter maps used in this report.

CREATION OF THE EXAMPLE

The example presented in this report is the result of a request from the Minnesota State Planning Agency to exhibit the use of MLMIS data and computing capabilities. This is strictly a hypothetical problem and was purposely kept simple so that it could easily be explained and understood without numerous qualifying conditions.

A small test area was selected in order to minimize costs in computing, mapping, and field checking. A problem pertinent to the forest industry was selected since forestry is a primary industry in Itasca County, a MLMIS pilot study area. Care is taken to specify an example that can be expanded in scale to an area as large as county or development region size without destroying the meaningfulness of the example.

SELECTION OF A TEST AREA

A small test area was desired in order to minimize costs. For convenience and ease of identification, the Public Land Survey (PLS) township was chosen as the basic unit, with the test area consisting of nine such townships arranged in a three-by-three block. Each test township contains 576 quarter-quarter sections, making the total area 324 square miles.

A test area was required which would contain a variety of conditions, but which could also contain suitable aspen cutting areas. To select the nine townships, single variable maps of Itasca County were examined. The area finally chosen contained several urban areas and had a variety of forest cover types, soil types, and ownership characteristics. The area also contained a state park and a potential Project 80 recreation site.

STATEMENT OF THE PROBLEM

The following statement summarizes the hypothetical problem:

A timber company located in Big Fork, Minnesota wishes to purchase forested land in Itasca County. Its requirements are as follows:

1. The tracts must be located in these townships:

T59N, R24W	T60N, R24W	T61N, R24W
T59N, R25W	T60N, R25W	T61N, R25W
T59N, R26W	T60N, R26W	T61N, R26W

2. The sites must have a current forest cover of aspen.

3. The company is wishing to acquire privately owned land.

4. The minimum tract size is 160 acres and a 600 acre site is preferred.

5. Some indication of the forest productivity of the selected sites is also desired.

DATA FROM MLMIS USED TO SOLVE PROBLEM

Forest Cover: This data was acquired from maps loaned to the MLMIS by Alex Vasilevsky of the U.S. Forest Service, North Central Forest Experiment Station. Forest cover was interpreted from aerial photographs and mapped on county highway maps. This information was prepared in conjunction with the Third Look at Minnesota's Timber, 1962.

Forest Productivity: This expression of the expected annual timber production (cu.ft/acre/year) is based upon an interpretation of the soil material. The interpretations were developed through the joint effort of the Soil Conservation Service, MLMIS, and the Soils Department, University of Minnesota.

Ownership: State and county ownership data was obtained from the DNR Land Classification Study, DNR Land Bureau. Federal ownership information was taken from agency maps and records.

SOLUTION TO THE PROBLEM

The following procedure is used to locate parcels with the desired characteristics:

1. Restrict study to the nine specified townships.

   This step of the process consists of writing a FORTRAN language computer program to test the township/range codes so that parcels in the nine desired townships can be isolated and written into another computer tape file.

2. Select only those parcels which are privately owned and have a forest cover of aspen.

   This step consists of writing another FORTRAN program to test each parcel in the nine desired townships to see if the parcel has the desired characteristics of aspen cover and private ownership. Data for parcels with the desired characteristics are stored on another computer file.

3. Develop a map with the selected parcels indicated in tones of gray. These gray tones represent the relative forest productivity of each parcel.

   This step consists of mapping forest productivity, a variable presently stored on the MLMIS parcel record. The mapping is done on a VARIAN STRATOS 31 dot matrix plotter in shades of gray, with darkest shades indicating highest productivity. Lakes are also mapped to give a better locational perspective. The gray scale map is shown in Figure 1.

4. Review the map and designate those areas of 160 acres or more as having "acquistion potential." These parcels must be field inspected to confirm their suitabilities and to weigh any existing amenities or limitations which are not considered in the computer model.

   As can be seen from examining the gray scale map, several sites meeting the constraints and having high productivity are designated. Several of these sites were visited during August, 1974.

Staff members of the MLMIS and the State Planning Agency drove to the study area to field check several of the selected sites and to check on the reliability of our single variable maps. Four sites were inspected, each of which was at least 160 acres in area and had a high relative forest productivity (Fig. 1, 2). Because this productivity index is based upon existing soil characteristics, a special effort was made to examine the soil types at the selected sites.

Site 1

Location: This site is located in Section 5, Township 59 North, Range 26 West. The site is about 3 miles north of Marcel between Turtle and Johnson lakes on Highway 38.

Site Size: Approximately 360 acres.

Observations: About 40 acres of this site had been clearcut. It was estimated that this cutting occurred (in 1971 or 1972) since a thick cover of aspen suckers (8-12 feet) covered the cut over area (Fig. 3). The remainder of Site 1 was predominantly covered by mature aspen. The soil at this site was a clay-loam which would meet the qualifications of the XLWL landscape unit recorded for this site (Fig. 4).

Site 2

Location: This site is located in Section 30, Township 60 North, Range 26 West. The area is approximately 4 miles north of Marcel-north and west of Mike Lake on Highway 43.

Site Size: Approximately 280 acres.

Observations: Mature aspen covers this area with scattered clear cuts ranging from 20-40 acres in size. A clay-loam soil with pockets of sandy gravel was observed. This soil type is consistent with the XLWL unit which is recorded for this area.

Site 3

Location: This site is located in Sections 31 and 32, Township 61 North, Range 26 West. The area is about 3 miles southwest of Big Fork on Itasca County Highway 255, just south of the Big Fork River.

Site Size: Approximately 600 acres.

Observations: 40 acres of this site were recently clearcut using full tree logging (Fig. 5, 6). The remainder of the site had a forest cover of aspen and birch. The soil in the cutting area is a heavy clay loam which would be an accurate representative of the CCWL unit recorded for this particular site. SSWL and LLWL soil landscape units which both occur in close proximity to the cutting site were also examined.

Site 4

Location: This parcel is located in Sections 34, 35, and 36, Township 59 North, Range 24 West. The site is found on either side of Highway 7, east of King Lake.

Site Size: Approximately 2400 acres.

Observations: A Blandin Paper Company informational sign indicated the owner of this site. Mature aspen covers the area and several small clear cuts could be seen from the road. The soil characteristics at this site were not examined.

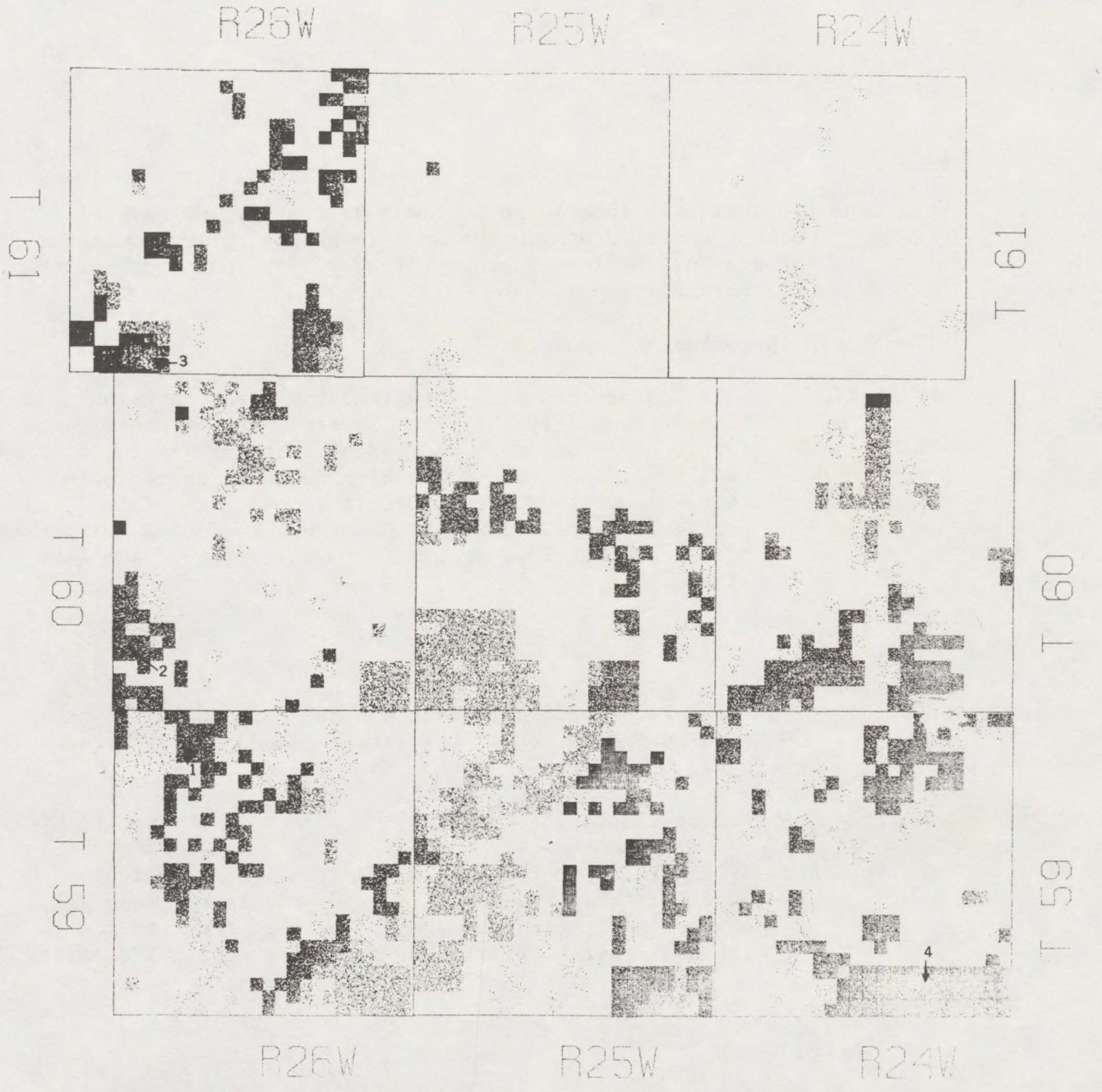

FIGURE 1. Computer generated map indicating relative forest productivity for privately owned aspen parcels. Test sites are labeled.

EXCELLENT FOREST PRODUCTIVITY

GOOD FOREST PRODUCTIVITY

FAIR FOREST PRODUCTIVITY

LAKES

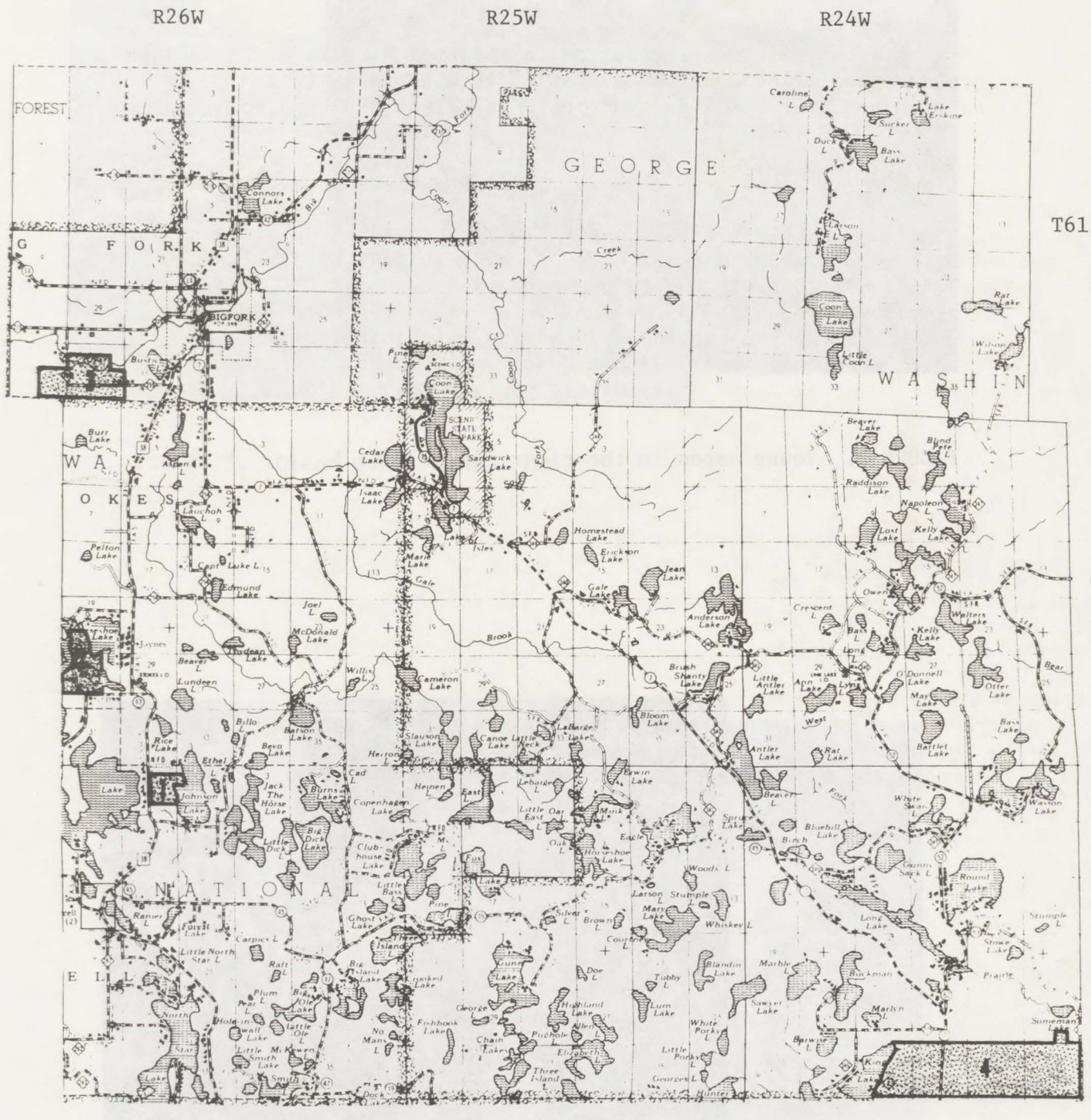

FIGURE 2. County highway map of nine township study area showing four test sites.

FIGURE 3. Young aspen in the clear cut at site 1.

FIGURE 4. Clay top soil of the XLWL landscape unit at site 1.

FIGURE 5. Clear cut area at site 3.

FIGURE 6. Timber landing at site 3.

COSTS OF THE EXAMPLE

The two categories of costs considered in this example are computer time and personnel wages. Computer costs to isolate the nine townships were approximately $10.00. Computer costs to select the desired parcels were $3.00. The gray scale maps cost approximately $6.00.

Personnel costs will be considered only for actual solution of the problem, since statement of the problem took longer than the solution. The writing and running of FORTRAN programs to select the desired parcels took approximately one-half day. Modifying the mapping program which had previously been developed and making mapping runs took another half day.

Cost of field checking are not computed but may be estimated by the reader. Means of transportation, starting point of travel, and duration of examination could significantly modify any cost figure given.

All of the above costs are ideal since computer breakdowns, debugging problems, or redefinition of the problem could increase the cost figures.

CONCLUSIONS

An important finding of this test is that MLMIS data is reliable for the size of area considered. Forest cover data is accurate even if not that recent. Indicated ownership patterns are also found to be reliable.

The test also demonstrated some of the time saving advantages of computer inventory of forest production sites. Areas that appear small and compact on computer maps seem to grow in size when field checked. The time saving aspect of this type of study suggests the value of the data and inventory methods for state, regional, or county planning. For forestry planning in particular, the study increases our confidence that similar inventories could be accomplished for county or region size areas.

The soil landscape unit classification scheme proved very useful. Using this scheme it was possible to assess forest land capability based on soil type. The soil landscape units themselves were accurately represented on the soil maps and reliably described the nature of the land and water features present.

A final conclusion is that more studies of this type should occur. The potential for application of MLMIS data to land inventories is enormous. Once this fact is more universally recognized, especially by local governments and regions in Minnesota, it may be possible to greatly enhance the process of defining and seeking solutions to future land use problems.