Research Technical Completion Report
Project A-073-IDA

GRAPHIC RETRIEVAL, ANALYSIS AND SPATIAL PORTRAYAL
An Information System for Idaho's Freshwater Lakes

by

Nancy B. Hultquist
Geography Department
College of Mines and Earth Resources

Idaho Water Resources Research Institute
University of Idaho
Moscow, Idaho

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ACKNOWLEDGEMENTS

There are some thanks due. An integral part of the GRASP team is David Hall, an undergraduate student, who was working on irregular help monies. With patience and perseverance he tackled the error detection and corrections within the LAKES MASTER file. For many hours he sat blurry-eyed in front of a screen staring at those green letters and numbers. Data correction and entry is probably one of the most trying, tedious, and yet important facets of any research. Often corrections are made which are later re-made after an evaluation by someone up the line of command. David also helped immensely with his programming knowledge. He has been the instrumental force in completing the GRASP concept because of his added knowledge of PL/1 and STAMPEDE. I especially appreciate the work David completed, because I was the other part of the two-person team. If nothing else had come from this project, the sheer task of getting the LAKES MASTER file into good condition would be commendable. The other thanks is to the people on the side of the CLEAN LAKES PROJECT who were providing data for us to encode and checking our updates. Larry Kirkland and his assistant, Annette Jamshednejad, deserve many thanks for their relentlessness in providing something for us to enter into the system. Their concern for detail and consistency made our job easier; moreover, without their rechecking against the LAKES MASTER file printouts, we would not have been assured of an accurate data set.

We appreciate the support of the Idaho State Department of Water Resources who funded this project. Thanks to Jim Milligan who served as liaison during the proposal stage. Thanks to the local Water Resources Institute for their help, especially Linda Fulton for many things, and Leroy Heitz for advice. Most recently, thanks to Gloria Hall for putting the manuscript in final form.

ABSTRACT

This report and accompanying computer tape document the data processing support provided by this Idaho Water Resources funded project to the larger EPA funded "Clean Lakes" study. This project is known by the acronym GRASP which derives from Graphic Retrieval and Spatial Portrayal. The name reflects the purpose which is to develop a computer-based storage and retrieval system with analysis capabilities and which will facilitate graphic and/or spatial portrayal of the raw data or the derived information as requested by the researchers.

An exhaustive search was made by "Clean Lakes" researchers to identify all the lakes of Idaho. Because of nomenclature problems the list is slightly expanded and in its final form contains lakes, reservoirs, and ponds. Basic information for each water body is provided such that it is uniquely identified as to name, location, elevation, and size. Additionally 123 lakes are identified as being of "high priority" (as determined by the Clean Lakes researchers) and these are tagged in the system and given a "trophic status index", indicating the water quality.

As currently implemented the GRASP system can be accessed via the interactive CMS capability on the University of Idaho campus. The information can be displayed, corrected, or expanded using the "editing" functions of the CMS (Conversational Monitoring System). Sorting, logical operations, and analyses are possible using the interactive SAS (Statistical Analysis System) routines. Simple maps and other graphics are optional products available at the request of the researcher. The Idaho State outline map and all 44 county outlines are accessible to the researcher permitting the lakes of interest to be spatially portrayed at the appropriate level.

The GRASP project team provided storage and retrieval support for the CLEAN LAKES project while those researchers developed the listing of lakes and finalized the data. Listings, by various sorting requirements, were provided for their use and correction. While this data collection phase was in progress, other components of the GRASP system were developed and/or linked into the package as described in this document. Presently (December, 1981) the GRASP system is on-line and available for use by anyone with a valid user-number for the UI computer. Future availability and/or development has not been determined at this time. With the completion of this report the files will be transferred to magnetic tape and archive files because of lack of continuing computer support funds.

PROJECT

Problem

The work was initiated to supplement an EPA-funded project already underway through the Idaho Department of Health and Welfare, which was to characterize and classify the trophic condition of Idaho's freshwater lakes and to prioritize these lakes in terms of problem needs. The current project was to design and develop an information storage and retrieval system to protect and record the data obtained from the researchers of the other project.

Research Contribution to Problem Solution

The effort of the EPA-funded CLEAN LAKES PROJECT involved several conceptual components under the responsibility of different investigators. While each researcher was to obtain data specific to his own needs regarding each lake, there also was a battery of variables common to the needs of all researchers. The GRASP project sought as a goal to organize the storage, retrieval, analysis, and presentation of the data such that data collection of certain variables not be duplicated by individual researchers nor left undocumented at the completion of the project. A computerized procedure for data storage, data manipulation and analysis, and for some graphic portrayal of results would expand the usefulness of the data and of the existing CLEAN LAKES PROJECT to fill the needs of lake management in Idaho.

A total of 1547 entries were eventually made into the system. This is an exaggerated total of lakes in Idaho because of several cross entries by name and because of the inclusion of every noticeable body of water, even if it had no recorded name. For each entry, data were entered on location, drainage, size, and ownership. This system is interactive from terminals across campus and has searching, sorting, printing, and statistical capabilities. In addition, it has been enhanced by a simplified plotting display procedure.

Research Objectives

1. To meet the needs of the user. The data files were to be standardized to permit easy use of data by anyone.
2. To provide an interactive framework. GRASP is operative on the CMS time-sharing system with a provision for multiple listings of the requested searches. Backup of the master data file and programs developed exist on magnetic tape, which will be submitted with this report.
3. To enhance analyses and presentation. Numerous listings of lakes, sorted by basin, latitude and longitude, and alphabetically by lake and county were provided to the researchers of the CLEAN LAKES PROJECT. Additionally, we worked with research assistants to provide an understanding of a contour display package (STAMPEDE) already existing at the University so they could incorporate the visual output within their own research. STAMPEDE was not linked to the master data file because sufficient data are not available; however, documentation, sample setup, and output are displayed in the Appendix.

Potential Users

Users include anyone interested in research involving basic data for all of the lakes of Idaho. Because the files are established on the CMS interactive computer system, the power of the editing system currently on the IBM equipment is available. This provides for ease in updating the file, adding missing data (of which there are little now), or correcting entries. The file has been proofed and extensive corrections have been made.

The exciting research awaiting the use of the file depends on researchers' questions. GRASP is capable of searching and sorting by any variable which is contained within it and more variables can be added whenever collected. For example, measurements relating to trophic conditions can be placed on the file as they are determined by the CLEAN LAKES PROJECT researchers.

One subfile exists which was to include more detailed information provided by the CLEAN LAKES researchers. This file, called PRIORITY LAKES, contains 123 entries and the only additional variable (12/1/81) is a letter representing the trophic conditions of the lake assessed before summer on-the-scene measurements.

The GRASP PROJECT has developed a graphic display capability for the researcher issuing questions to the data file. A program was developed which converted latitude and longitude measurements for each lake in the system to x-y coordinates compatible with the existing county outlines and stored them in the lakes file. The researcher can request specific sorts from the file, and the selected lakes will be plotted within the state (or county) outline. For example, a question might be, "what lakes exist within Bonner County which are situated at an elevation of 2400' or under and have an acreage greater than or equal to 50 acres?" The search is set up within the retrieval system and the resultant lakes are annotated within a plot of the Bonner County outline.

With any of the plots, there may be an overlap problem because of adjacent lakes; however, the accompanying printer listing will indicate the specific names and locations. If the search and plot jobs are separated, a person can adjust the close or overlapping lakes before plotting. (Such an example occurs in the Appendix).

INTRODUCTION AND PROBLEM STATEMENT

In 1980, the University of Idaho received a grant from the Environmental Protection Agency through the Idaho Department of Health and Welfare to characterize and classify the trophic condition of Idaho's freshwater lakes and to prioritize these lakes in terms of problem needs. This is in response to the EPA's nationwide program to classify, protect and restore publicly-owned freshwater lakes. Idaho has within its borders many hundreds of freshwater lakes which, as the population grows and use intensity builds, will require a well-conceived strategy of protection and management. The EPA-funded project, hereafter called the CLEAN LAKES PROJECT, screened over 1500 freshwater bodies within the state. From its initiation, it was realized that a thoroughly documented system would serve the needs of the study and provide the data base for continued phases of the CLEAN LAKES PROJECT. More importantly, the organization, storage, retrieval, analyses, and presentation of the data collected for the lakes ought not to be duplicated by individual researchers nor left undocumented at the cessation of the CLEAN LAKES PROJECT since the follow-up studies of Idaho's lakes will necessarily draw on these same data. The current project, hereafter called GRASP, came about to answer a need for a computerized procedure for data storage, data manipulation and analysis, and for graphic portrayal of results which would expand the usefulness of the data and of the results of the CLEAN LAKES PROJECT to fill needs of lake management in Idaho.

This final report will address the tasks done within the framework originally presented in the proposal. First, the specific aims of the project will be presented and an explanation of the system's handling of each aim will be discussed in detail. Second, the procedure will be documented. Finally, the product resulting will be outlined in detail, complete with Job Control Language (JCL) necessary to accomplish the tasks. The Appendix provides listings of data files, program files, and GRASP setups to aid the user in utilizing the system. The Appendix is designed to serve as a manual for using GRASP on the University of Idaho terminal-based computing system.

SPECIFIC AIMS

(1) To Meet the Needs of the User

For the CLEAN LAKES PROJECT there was a need for a coordination of data efforts such that consistency and compatibility of data items resulted. Standardized data files permit easy use of data by any of the potential users who may be concerned with lake management in Idaho, and the potential for cross-use of the hydrologic, biologic, economic, or demographic data will be enhanced. These data were stored and properly documented for future reference.

The vehicle utilized for the storage and retrieval of data is an existing package at the University of Idaho: the Statistical Analysis System (SAS). SAS is leased from the SAS Institute, Inc., Cary, N.C., and supported for the University community on the IBM system. It is available both in batch and in interactive modes. It was chosen because of the simplicity of data input and its report-generating capabilities. Additionally, this system appears to have widespread usage in the United States. Not only are data handling capabilities included but very importantly, most statistical methods one might need to analyze the data are available, as well as sorting and formatting capabilities for use of SAS as an intermediary program to prepare data as input to other existing programs. For example, one can use SAS to initiate the data files for each lake, to merge existing files into a master file, and to sort by location for ease in checking by researchers. SAS can also be used to calculate codes to be attached to each lake as an identifier, because it has all arithmetic and logical functions available. SAS has output report-generating capability to produce forms which are automatic to the user. The user does not have to worry about what fits on a page; that is accomplished by the program as well as the carryover to succeeding pages. Reports are numbered by observation, labeled, and paged. Finally, SAS can be used to build new data sets and write them in a standardized format, or pass them to other programs which will display the data.

(2) Provide an Interactive Framework

The University of Idaho recently implemented a new computer system, which utilizes two IBM 4341's to handle batch and interactive (terminal) computer processing within the University. The terminals provide easier access to shared data files and sophisticated analysis packages. The information system created by GRASP is implemented on the interactive system with a backup on the batch processor, as well as protection of the data files and programs on peripheral storage (disk while operational, and magnetic tape at the close of the project). The only reason for not leaving the system up and operational at all times is the cost of disk space required to maintain the interactive capabilities. (Minimum required is $9.00/month, plus 1¢/track/day for batch disk space used (about $5.00/month); temporary disk storage for operation of programs from the terminal is charged for, as is the run itself).

The new computer system allows for multiple use of the data files by different users from varying sites on campus. Only two individuals were involved in the data input of the lakes data on Idaho because of the need for consistency and minimization of errors during input. We could, however, work at our convenience. From the terminal corrections are added to the file by using the editor facility provided by the interactive computing system, XEDIT. A cursor is easily moved around the screen and corrections are made simply by typing over the existing symbol. Complete lines of data can be added or deleted by the typing of one character. Viewing the data file is easily accomplished. Changes throughout can be made very easily. For example, if reservoir has been misspelled several times, a global spelling change can be made to correct all entries in the data file; or, all occurrences of "reservoir" could be changed to "reser" for consistency in the file. If a change is needed in an observation, and its location within the data set is unknown, a search can be made for any set of adjacent or continuous letters or numbers to find the item.

Messages can be sent back and forth between users while on the system, or they can be left for future announcements when the other researcher "logs on". From the interactive mode, one can enter a "job" to back up corrections made and list the new data file, either sorting alphabetically or just getting a straight listing of the data file. Data files can be used to store data as well as FORTRAN, SAS, or PL/1 programs to manipulate the lake data files.

The data handling facility of the interactive full screen terminal is invaluable to a researcher trying to initialize a large data file such as one with variables on all the lakes of Idaho. Trying to do this with a punched card format would take much longer and open up all other sorts of errors. Harder yet would be opening up the data set to more than the one person who had access to the cards. The data set is always current, regardless of which researcher accesses it. A 'read only' mode insures that no one can tamper with the basic data set.

(3) Enhance Analyses and Presentation

The third primary aim of the GRASP PROJECT was to provide the capability of accurately portraying the accumulated information about Idaho's freshwater lakes in a graphics mode. There is a statistical graphics capability available through the SAS package. Vertical and horizontal bar graphs are easily requested from the system for any variables within the file. For example, it is possible to obtain the graphical representation of a frequency bar chart of lakes by elevation. This is accomplished by adding one statement to the SAS requests: PROC CHART; VBAR ELEV; (for a vertical bar graph) or PROC CHART; HBAR ELEV; (for a horizontal bar graph). If there is a desire for scatter diagrams or REGRESSION analyses between or among variables, similar statements concisely written will obtain the information. There is no need to detail all possible graphic capabilities because there is a thick manual on the SAS system and it is designed to be user-friendly. Another useful graphic available on SAS is the pie chart.

At the start of the project it was thought that data would be forthcoming from the battery of researchers which would lend itself to display through county maps (shaded -- choropleth), or even three dimensional perspectives of some data. Data display programs are available in SAS for the former (SAS-GRAPH) and through external sources in the Geography Program Library for the latter (SYMAP, SYMVU). No data are currently available on lakes for inclusion in this report. There is a SAS-GRAPH system manual in the University Bookstore and one for the complete SAS system. Inquiries can be made to the Geography Department for information regarding available computerized mapping systems.

Frequency bar charts, pie charts, and other graphics of the SAS system can be obtained as printer output or plotter output. Examples of some of the available graphics are displayed in Figures on the next few pages.

All figures on pages 12 through 25 were produced using SAS statements.

The frequency bar chart on page 12 is produced on the plotter by SAS-GRAPH, and the coresponding printer vertical and horizontal frequency bar charts appear on pages 13-14. The HEIG in each case was a classification variable constructed from elevation values to sort lakes into a height category from less than 1000 feet above sea level to over 9,000 feet above sea level. (Complete definition is on page 30.)

The frequency bar charts on pages 15-16 are produced in the same way and display the frequency of lakes in Idaho stratified by eleven basin codes (detailed on page 28). For example, the largest number of lakes are in basin 6, the Salmon.

Pages 18 and 19 display the classification category described in detail on page 30. The printer charts indicate the greatest number of lakes in the file are of SIZE 1 (less than 50 acres). There are only 20 lakes with over 5000 acres.

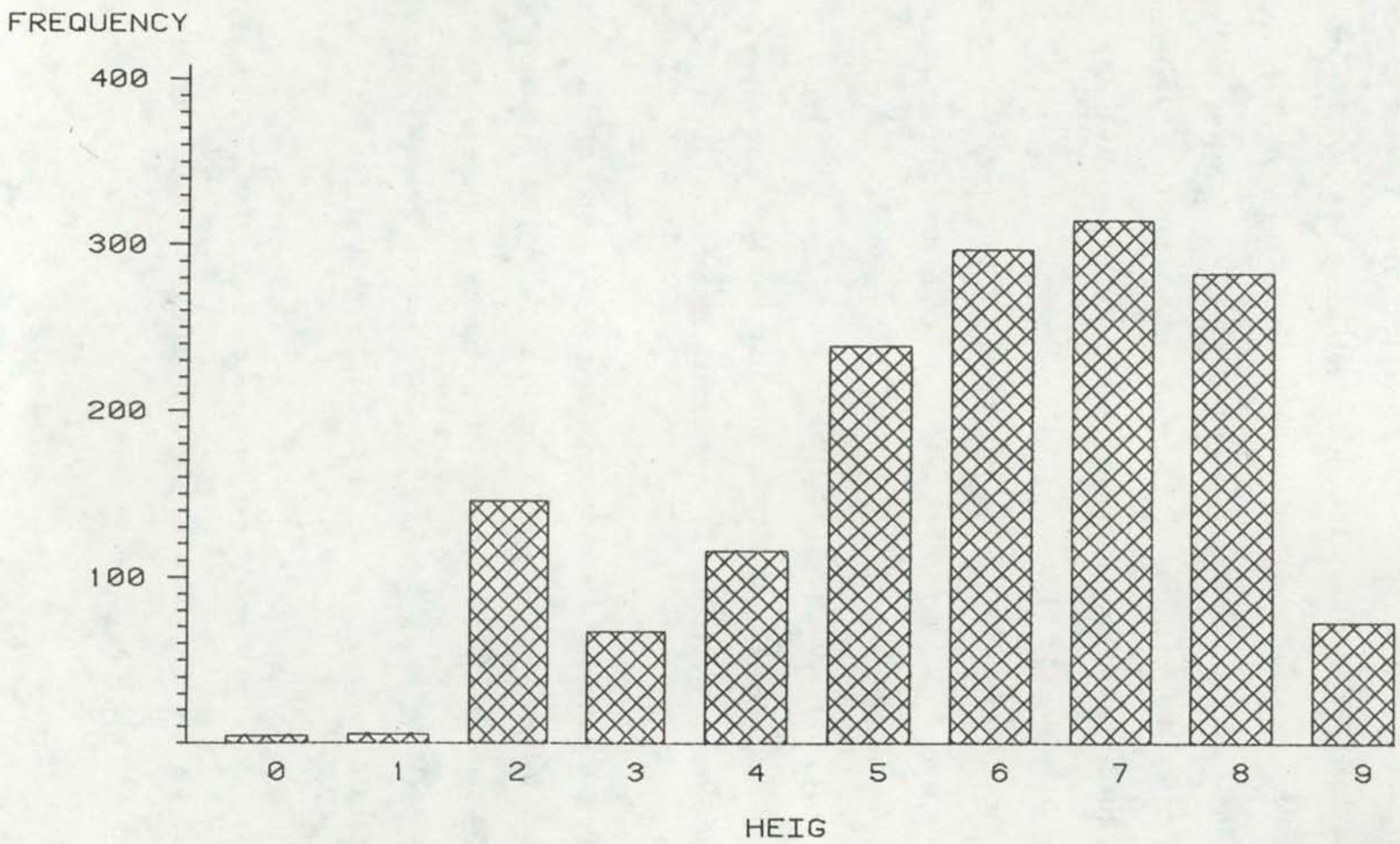
Pages 20 and 22 demonstrate the distribution of lakes by national forest code. Payette and Boise national forests contain a few more than 150 each.

Page 23 shows a pie chart produced by SAS-GRAPH of lake entries distributed by basin. For example, basin 6 (Salmon) has 446 lake entries. Page 24 shows a similar pie chrt of frequency by national forest.

A scatterplot produced on SAS-GRAPH for the Priority Lake file makes a comparison between the two variables, trophic status and elevation on page 25.

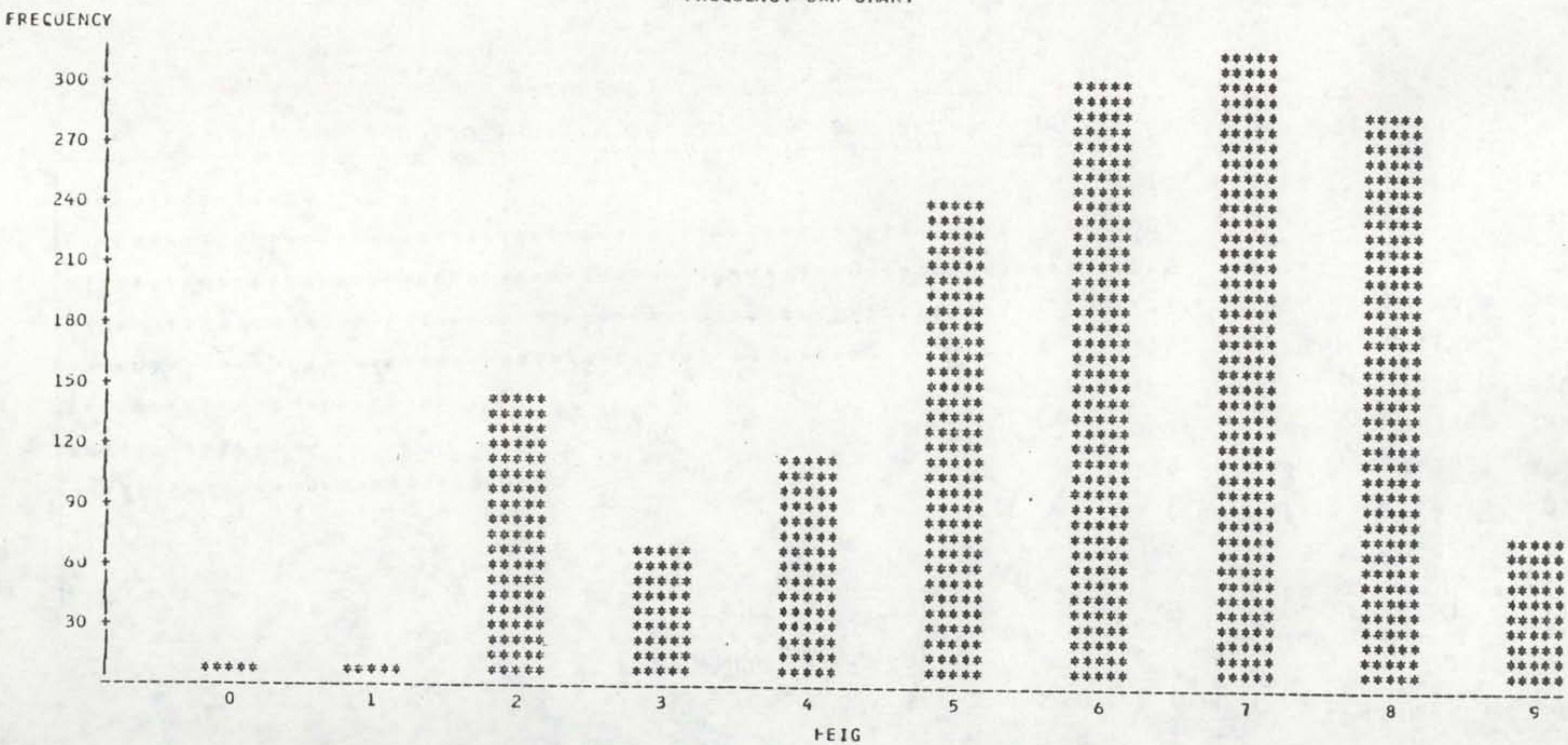
All plots or diagrams can be done through GRASP very easily. The program listing that produced the printer charts in on page 61; the one for the SAS-GRAPH plots is on page 66.

IDAHO LAKE DISTRIBUTION



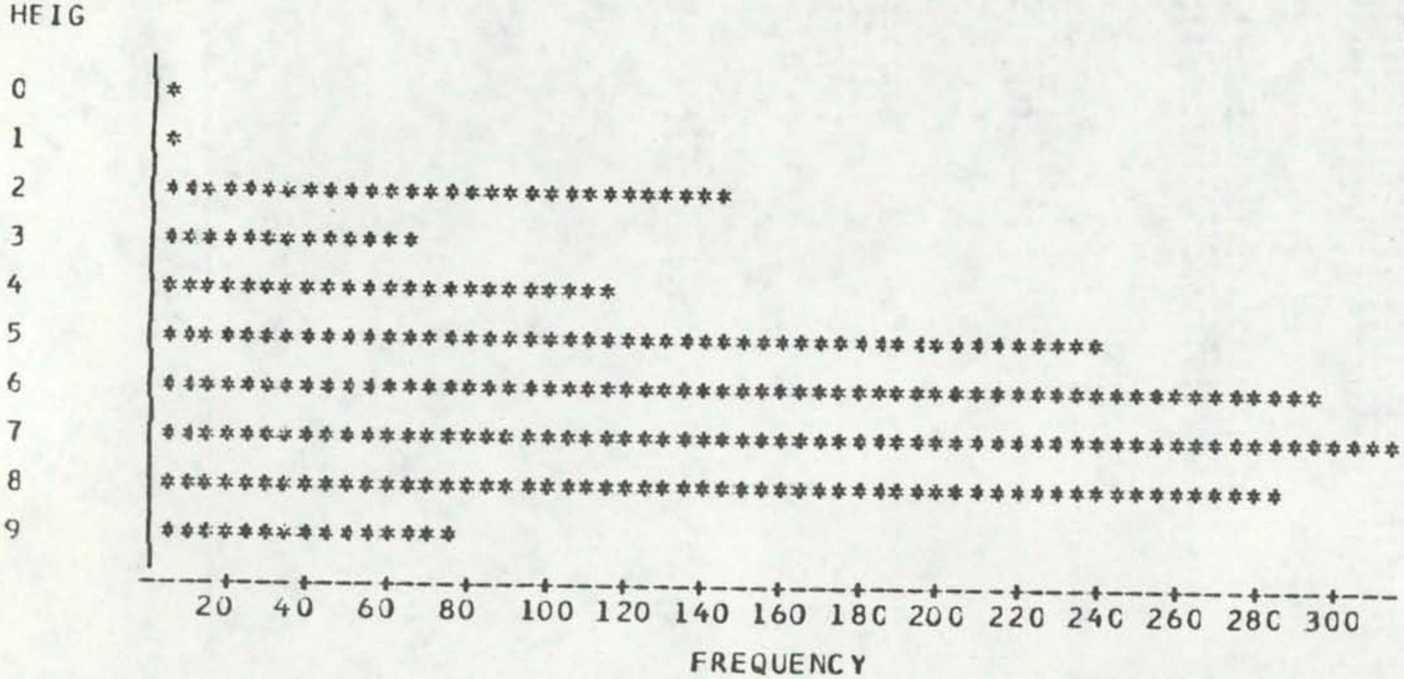
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

FREQUENCY BAR CHART



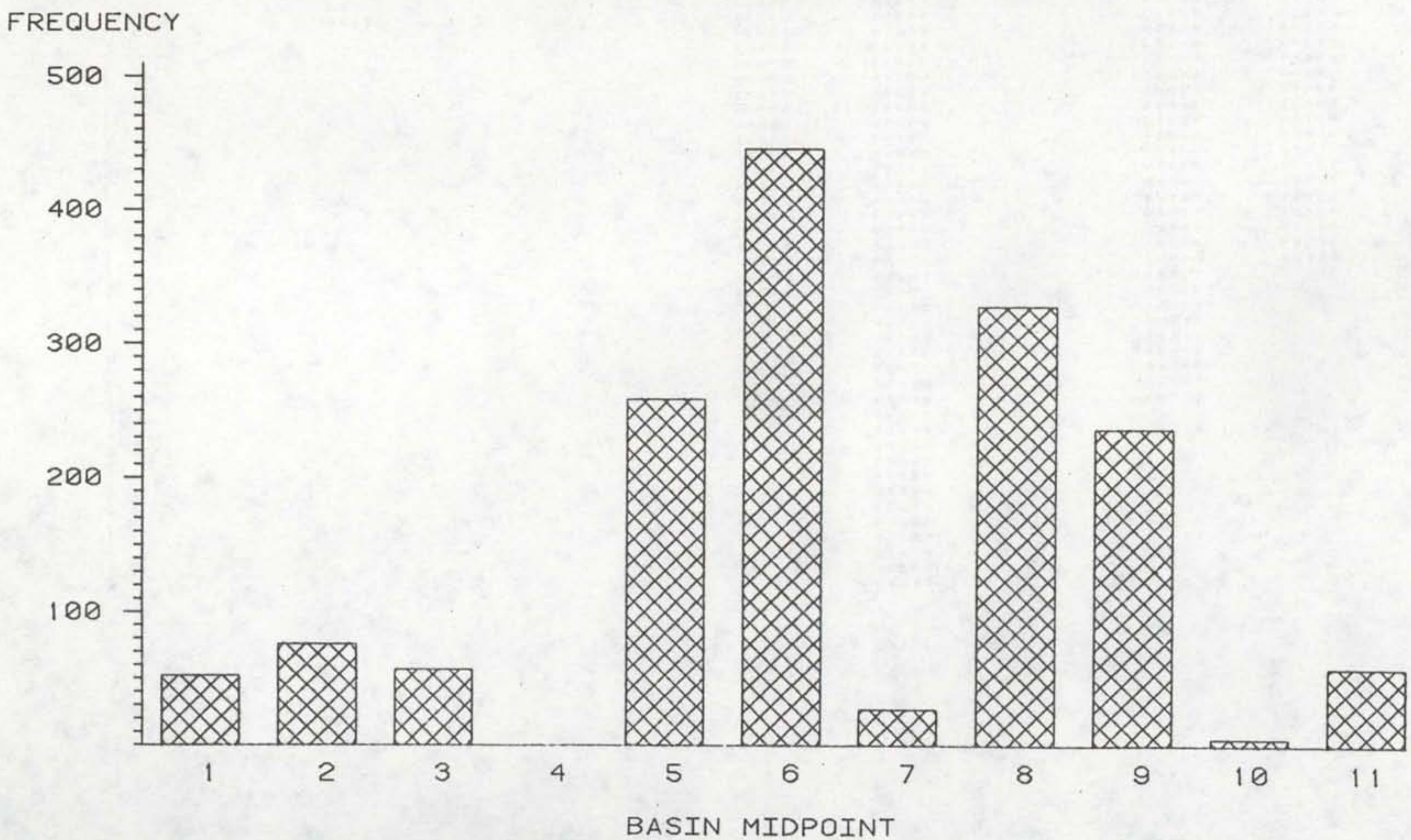
STATISTICAL ANALYSIS SYSTEM

FREQUENCY BAR CHART



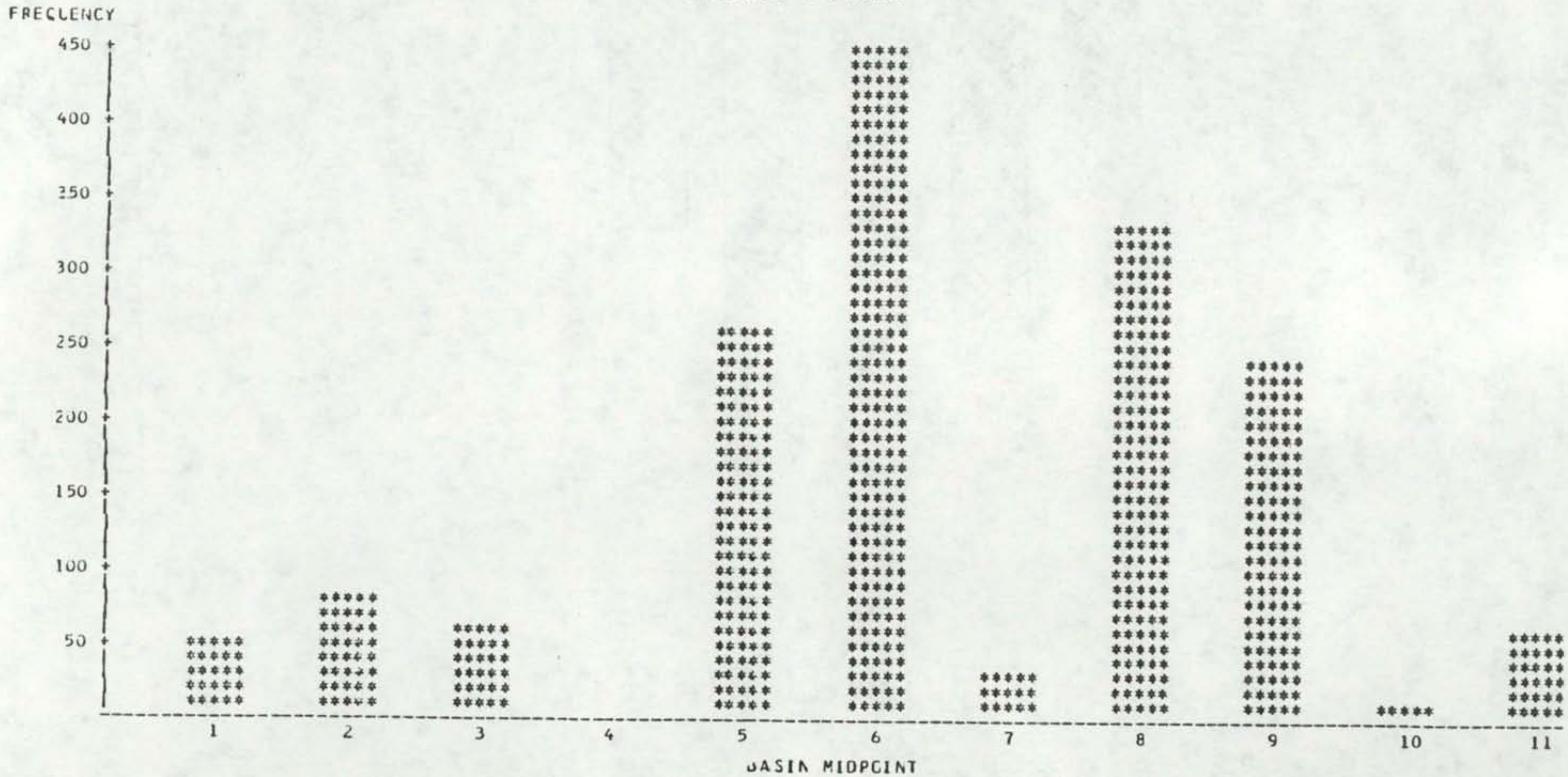
HEIG	FREQ	CUM. FREQ	PERCENT	CUM. PERCENT
0	5	5	0.32	0.32
1	6	11	0.39	0.71
2	146	157	9.44	10.15
3	67	224	4.33	14.48
4	116	340	7.50	21.98
5	239	579	15.45	37.43
6	297	876	19.20	56.63
7	315	1191	20.36	76.99
8	283	1474	18.29	95.28
9	73	1547	4.72	100.00

IDAHO LAKE DISTRIBUTION



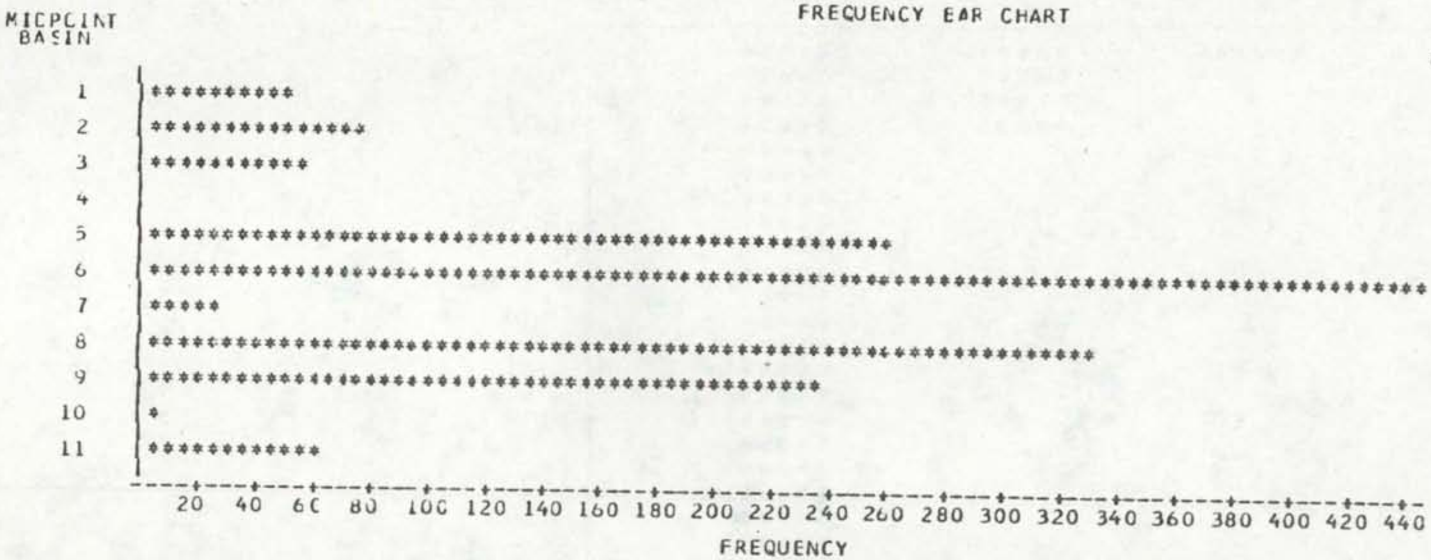
STATISTICAL ANALYSIS SYSTEM

FREQUENCY BAR CHART



S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

FREQUENCY BAR CHART



MIDPOINT BASIN	FREQ	CUM. FREQ	PERCENT	CUM. PERCENT
1	52	52	3.37	3.37
2	76	128	4.92	8.28
3	57	185	3.69	11.97
4	0	185	0.00	11.97
5	259	444	16.76	28.74
6	446	890	28.87	57.61
7	27	917	1.75	59.35
8	328	1245	21.23	80.58
9	237	1482	15.34	95.92
10	5	1487	0.32	96.25
11	58	1545	3.75	100.00

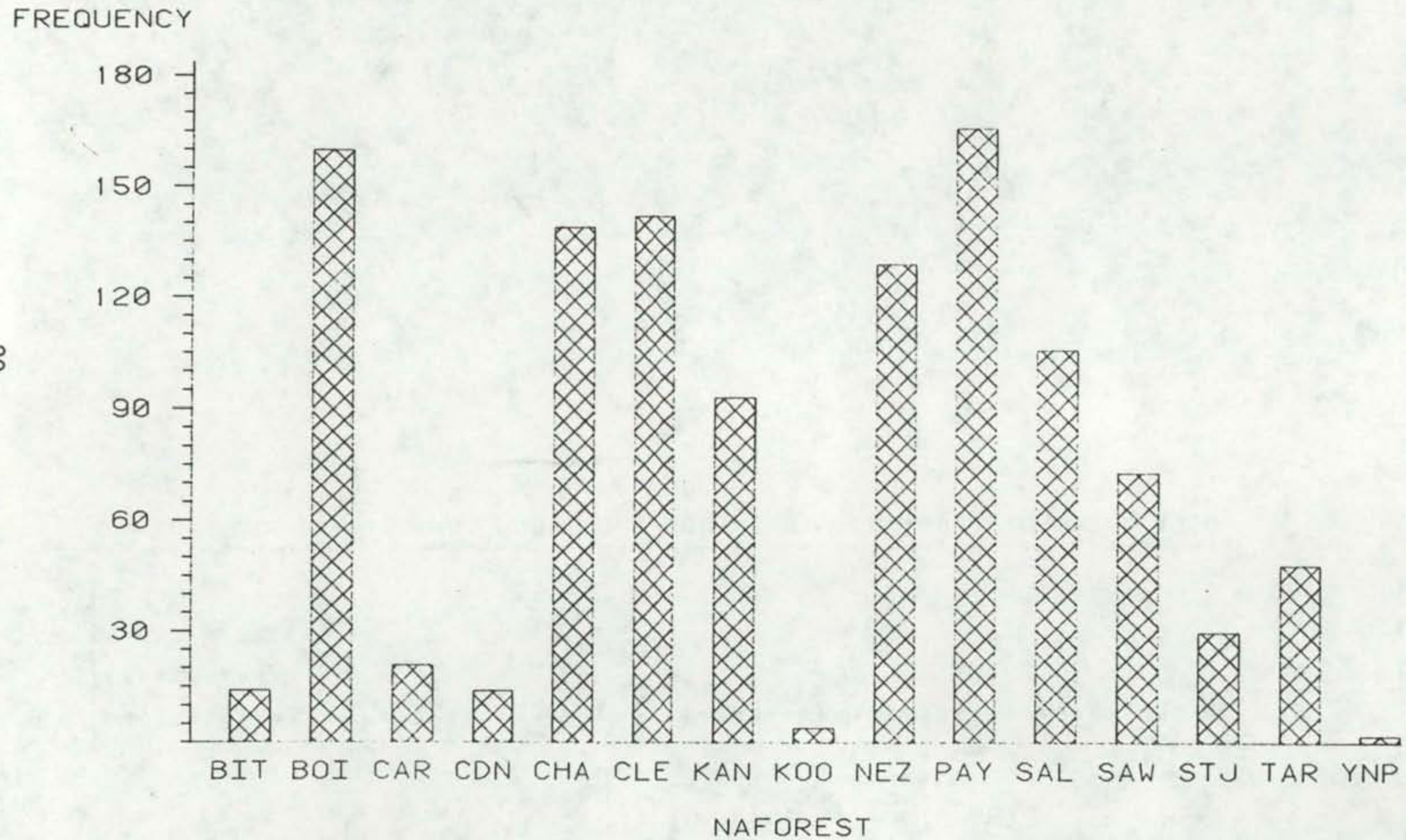
```
                S T A T I S T I C A L   A N A L Y S I S   S Y S T E M
                               FREQUENCY BAR CHART
    FREQUENCY
          |     *****
          |     *****
     1200 +     *****
          |     *****
          |     *****
          |     *****
     1000 +     *****
          |     *****
          |     *****
          |     *****
      800 +     *****
          |     *****
          |     *****
          |     *****
      600 +     *****
          |     *****
          |     *****
          |     *****
      400 +     *****
          |     *****
          |     *****
          |     *****
      200 +     *****     *****
          |     *****     *****
          |     *****     *****
          |     *****     *****     *****
          --------------------------------------------
                  1         2         3         4

                                 SIZE
```

S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

FREQUENCY BAR CHART

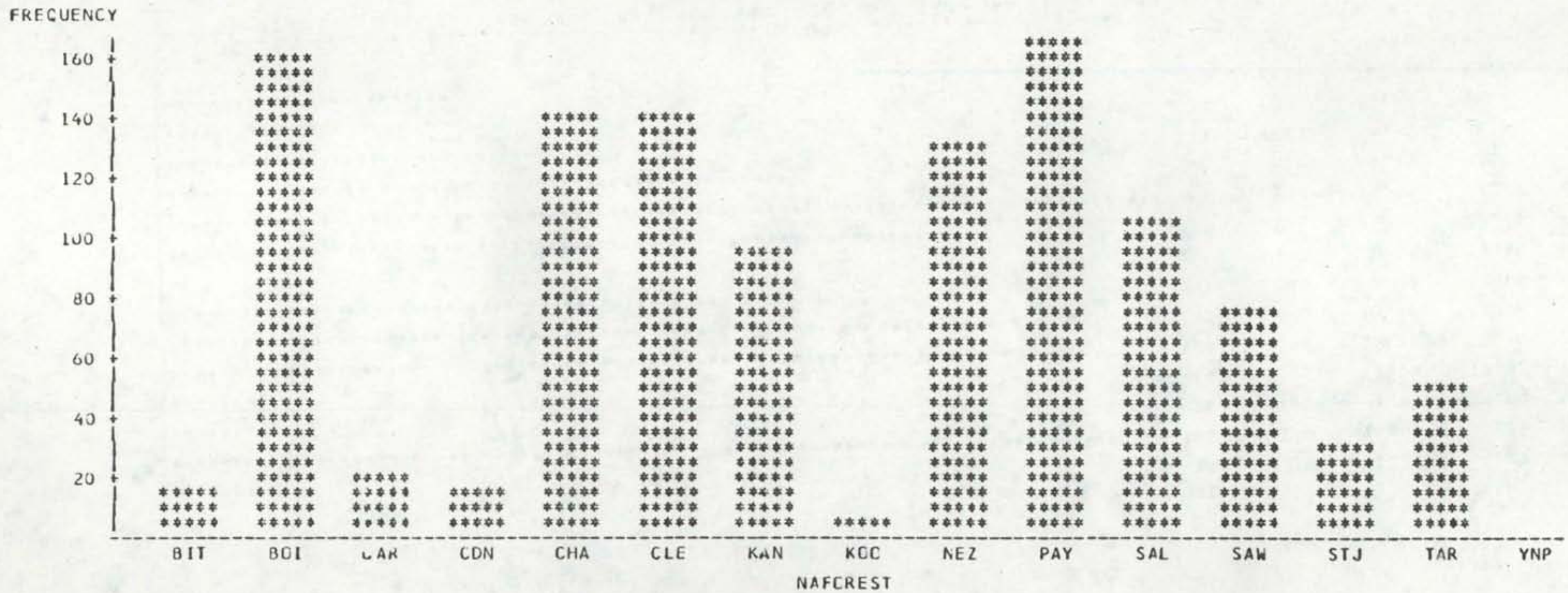
```
SIZE                                                                                FREQ   CUM.   PERCENT     CUM.
                                                                                           FREQ             PERCENT
     |
1    |*****************************************************************            1290   1290    83.39      83.39
2    |**********                                                                    192   1482    12.41      95.80
3    |**                                                                             45   1527     2.91      98.71
4    |*                                                                              20   1547     1.29     100.00
     |
 ---------+----+----+----+----+----+----+----+----+----+----+----+----+
         100  200  300  400  500  600  700  800  900 1000 1100 1200 1300

                                  FREQUENCY
```

IDAHO LAKE DISTRIBUTION



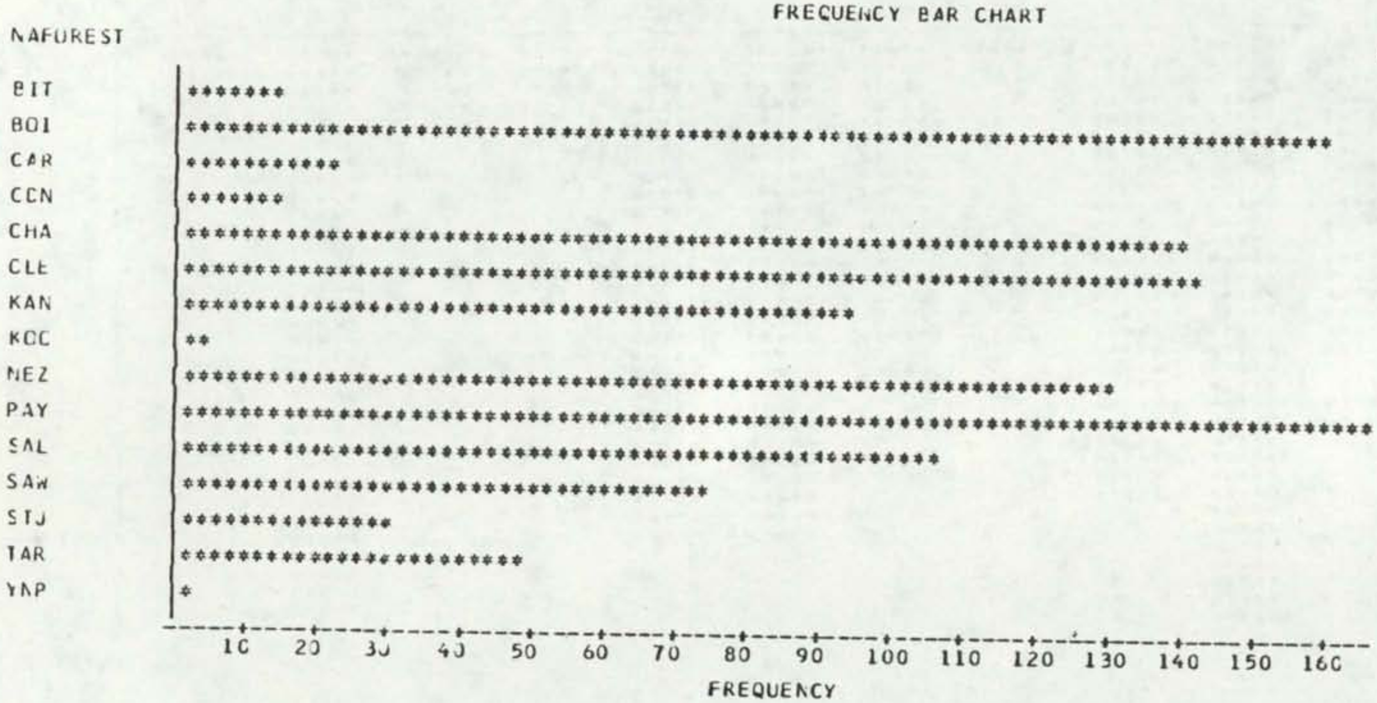
S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

FREQUENCY BAR CHART



S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

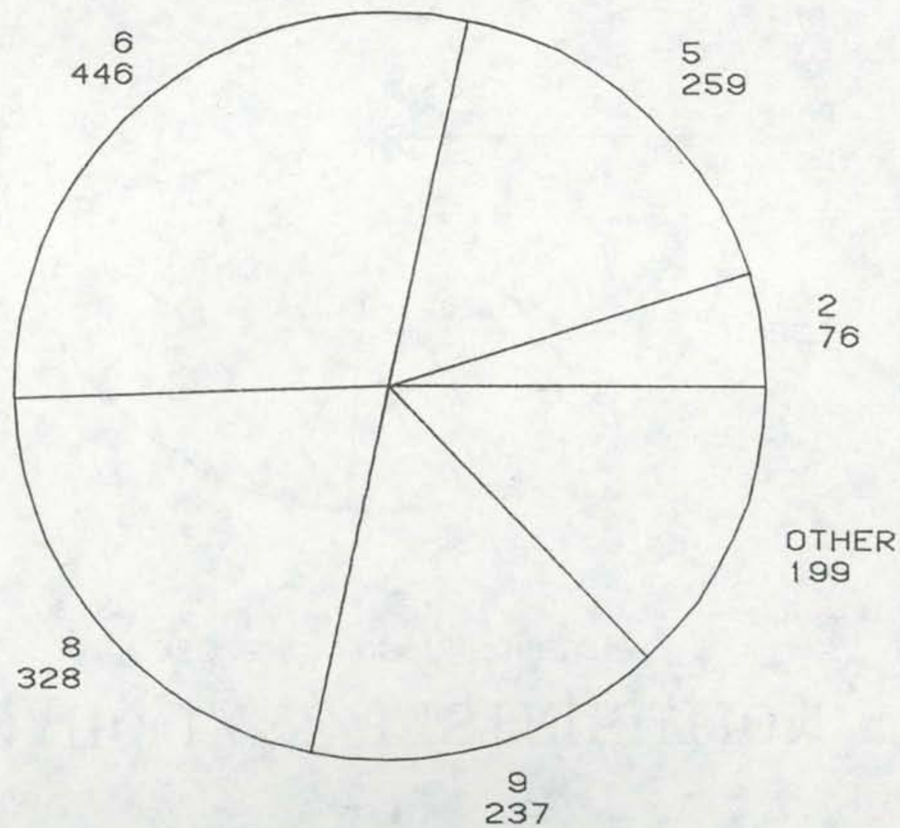
FREQUENCY BAR CHART



NAFOREST	FREQ	CUM. FREQ	PERCENT	CUM. PERCENT
BIT	14	14	1.23	1.23
BOI	160	174	14.02	15.25
CAR	21	195	1.84	17.09
CCN	14	209	1.23	18.32
CHA	139	348	12.18	30.50
CLE	142	490	12.45	42.94
KAN	93	583	8.15	51.10
KOC	4	587	0.35	51.45
NEZ	129	716	11.31	62.75
PAY	166	882	14.55	77.30
SAL	106	988	9.29	86.59
SAW	73	1061	6.40	92.59
STJ	30	1091	2.63	95.62
TAR	48	1139	4.21	99.82
YAP	2	1141	0.18	100.00

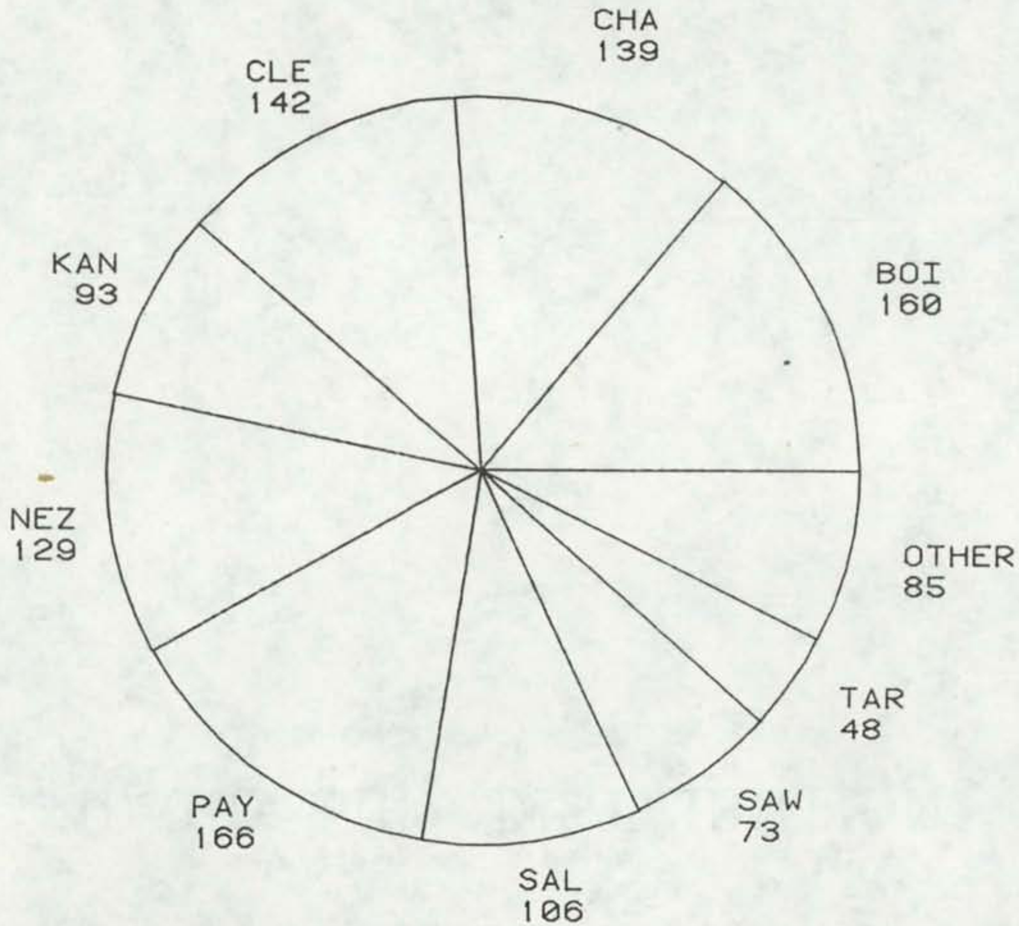
IDAHO LAKE DISTRIBUTION

FREQUENCY OF BASIN



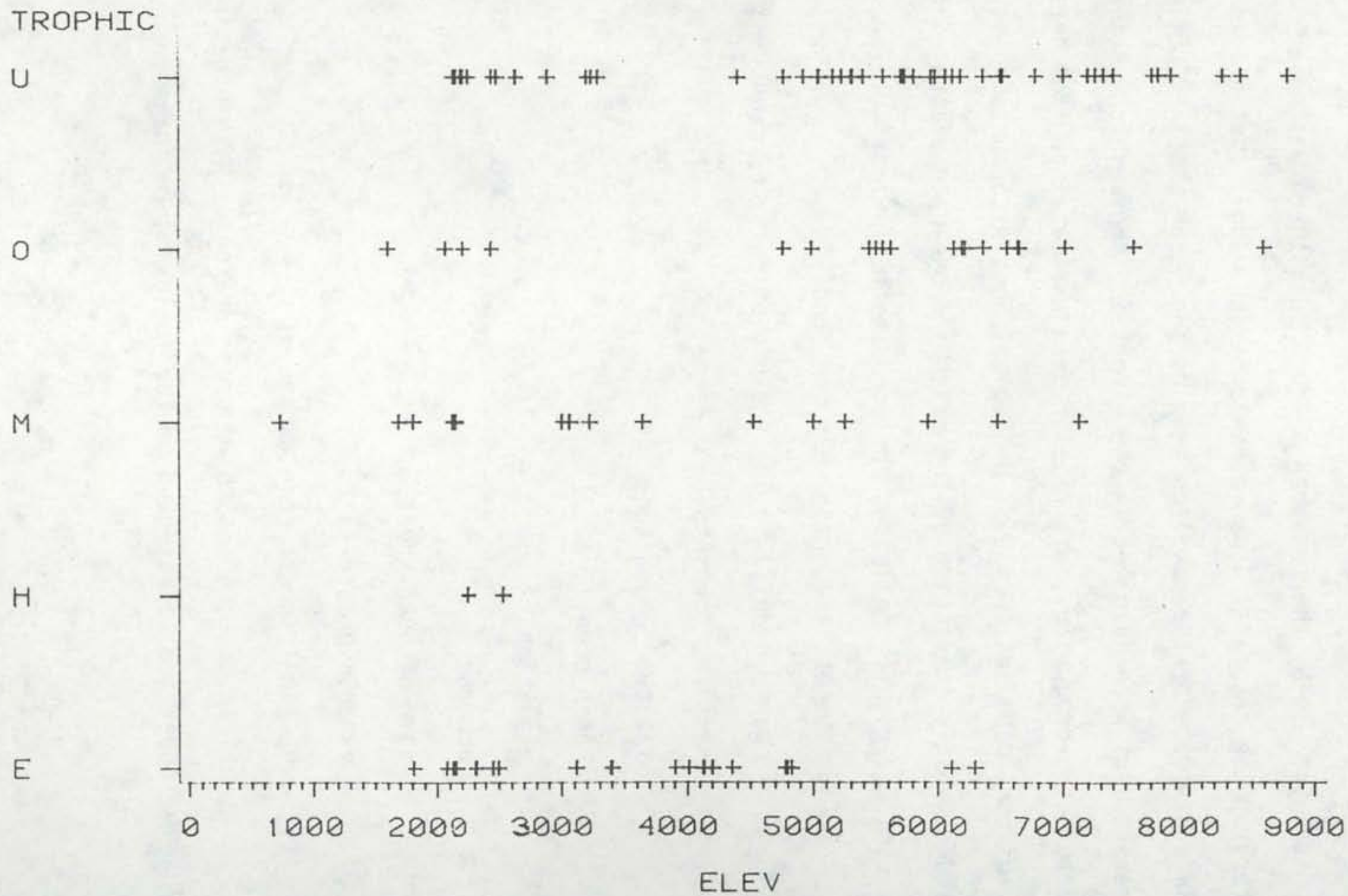
IDAHO LAKE DISTRIBUTION

FREQUENCY OF NAFOREST



PRIORITY LAKE SCATTERPLOT

TROPHIC STATUS VS. ELEVATION



PROCEDURES

In order to accomplish the project's aims, a number of steps were taken. The first goal was to accumulate, store, and make available for analysis all of the common information on lakes of Idaho in a systematic nature for use by the research team. Since there was no existing inventory of the natural and man-made lakes in Idaho a list had to be made. This was done by the research team on the CLEAN LAKES PROJECT. Several researchers were involved in the effort and the result was three different, but overlapping, data files. Data was obtained from Metzger County maps for Idaho and from U.S. Geological Survey topographic maps for Idaho, mostly consisting of the seven and one-half minute quadrangle series. Variables collected included the following:

name of lake, reservoir, or pond
county code (1 to 44) - alphabetically by county name
section, township, and range
latitude, longitude
basin code (1 to 11)
elevation
acreage
name of quad sheet
ownership code (1 to 7)
national forest code (acronym)
first, second and third order drainages within basin

The codes are represented on the following two pages:

COUNTY CODE (CTY)	NAME (COUNTY)
1	ADA
2	ADM-ADAMS
3	BANNOCK
4	BEAR LAKE
5	BENEWAH
6	BINGHAM
7	BLAINE
8	BOISE
9	BNR-BONNER
10	BNL-BONNEVILLE
11	BOUNDARY
12	BUTTE
13	CAMAS
14	CANYON
15	CARIBOU
16	CASSIA
17	CLARK
18	CLEARWATER
19	CUSTER
20	ELMORE
21	FRANKLIN
22	FREMONT
23	GEM
24	GOODING
25	IDAHO
26	JEFFERSON
27	JEROME
28	KOOTENAI
29	LATAH
30	LEMHI
31	LEWIS
32	LINCOLN
33	MADISON
34	MINIDOKA
35	NEZ PERCE
36	ONEIDA
37	OWYHEE
38	PAYETTE
39	POWER
40	SHOSHONE
41	TETON
42	TWIN FALLS
43	VALLEY
44	WASHINGTON

BASIN CODE	BASIN
1	KOOTENAI
2	PEND OREILLE
3	SPOKANE
4	PALOUSE
5	CLEARWATER
6	SALMON
7	BORDER SNAKE
8	LOWER SNAKE
9	MIDDLE SNAKE
10	UPPER SNAKE
11	BEAR RIVER

OWNERSHIP CODE	OWNERS
1	NATIONAL FOREST
2	BUREAU OF LAND MGT
3	STATE
4	INDIAN RESERVATION
5	RESERVES, ENCOURAGE USE
6	RESERVES, DISCOURAGE USE
7	PRIVATE

NATIONAL FOREST CODE	FOREST
BIT	BITTERROOT
BOI	BOISE
CAR	CARIBOU
CHA	CHALLIS
CLE	CLEARWATER
CDN	COEUR D'ALENE
KAN	KANIKSU
KOO	KOOTENAI
NEZ	NEZ PERCE
PAY	PAYETTE
SAL	SALMON
SAW	SAWTOOTH
STJ	ST JOE
TAR	TARGHEE
YNP	YELLOWSTONE

At the initiation of the CLEAN LAKES PROJECT, the CMS interactive system was barely beginning on campus. Terminals were not everywhere available and cluster sites across the campus did not exist. For that reason, the data coming to us from the three sources had been punched into cards. Those were read into the batch system, stored, and transferred to the interactive terminal system for display as soon as the equipment became available. There were several persons gathering data from maps and others coding it for at least two different keypunchers. Inconsistencies and errors were easily introduced. The first chore was to correct the many obvious spelling and keypunching errors. Concurrently additions were being made to each file by the different researchers and entered by the GRASP team.

Eventually, a merge of the three files was attempted using the SAS system. This proved to be more difficult than expected. The reason for the difficulty was spacing and spelling in the lake names. Spring Valley Reservoir would not match with Spring Valley R, or Grey's Lake would not match with Gray's Lake, or Grays Lake. After much ado, a merged data file was obtained and named LAKES MASTER. This file went through much massaging and numerous corrections. During this process, many listings were presented to the researchers sorted by basin, county, lat-long, and alphabetically. Additionally, sorted versions of the list of lakes were taken or sent to various federal, state, and local agency offices to check completeness of the list and to provide additional data.

A need was identified by the CLEAN LAKES PROJECT which required a subset of LAKES MASTER. It was titled PRIORITY LAKES. This file was obtained by adding a 'P' to each of 123 selected lakes within the LAKES MASTER file. The sort is accomplished by SAS statements.

The PRIORITY LAKES file was intended to be the file where more detailed data on lakes studied this past summer could be added. These variables need to be added when the CLEAN LAKES researchers get them recorded.

Unique Lake Identifier Code

Another request of the CLEAN LAKES research team was for a unique identifier for the lakes which was related to the lake itself, its location, size, and elevation. This was accomplished for all lakes by using the SAS system again. The code was an 11-digit concatenation of alphanumeric characters having the following meaning:

Character	Description
1-2	basin code
3-6	4 letters of lake name
7	SIZE:'1'= acreage less than 50
	'2'= acreage greater than 50, to 500
	'3'= acreage greater than 500, to 5000
	'4'= acreage greater than 5000
8-10	3 letter code for county name
11	HEIG:'0'= less than 1000' elevation
	'1'= GE 1000 and LT 2000' elevation
	'2'= GE 2000 and LT 3000' elevation
	'3'= GE 3000 and LT 4000' elevation
	'4'= GE 4000 and LT 5000' elevation
	'5'= GE 5000 and LT 6000' elevation
	'6'= GE 6000 and LT 7000' elevation
	'7'= GE 7000 and LT 8000' elevation
	'8'= GE 8000 and LT 9000' elevation
	'9'= GE 9000' elevation

The statement in SAS which provided the unique codes was as follows:

```
KODE=SUBSTR(BASIN,1,2)||SUBSTR(LAKE,1,4)||SUBSTR(SIZE,1,1)||
     SUBSTR(COUNTY,1,3)||SUBSTR(HEIG,1,1);
```

Except for defining two of the variables and setting their limits (HEIG, SIZE), that was all that was needed. The listing of the program setup in SAS is in the APPENDIX as 'KODE HEADER'.

Some Details on Listings

To obtain a listing of all lakes in the file, the only needed statement for an alphabetical sorting is:

```
PROC SORT; BY LAKE;
```

To obtain a listing by lake and within like names by township range, the statement would be as follows:

```
PROC SORT; BY LAKE TOWNSHIP RANGE;
```

Each of these statements must be followed by a print and variable statement such as:

```
PROC PRINT; VAR LAKE SEC TOWNSHIP RANGE CTY LAT LONG BASIN ELEV;
```

Also possible is a listing first sorted by basin, with each basin starting on a new page, and then the lakes are sorted by county and alphabetically listed. The statements for that are as follows:

```
PROC SORT; BY BASIN COUNTY LAKE TOWNSHIP RANGE;
PROC PRINT PAGE; BY BASIN;
VAR LAKE SEC TOWNSHIP RANGE CTY ELEV ACREAGE;
```

These statements are placed in 'MASTER TRAILER' (see APPENDIX).

Data Manipulation Through the SAS System

In the same manner as provided above in the examples on varied listings, a researcher can "question the data file". Any kind of logical search that can be written regarding the values embodied within the data file can be used for manipulation and creation of new variables about the lakes of Idaho. For example, the SIZE variable used above in the KODES program was derived as follows:

```
IF ACREAGE LT 50 THEN SIZE = '1';
IF ACREAGE GE 50 AND ACREAGE LT 500 THEN SIZE = '2';
IF ACREAGE GE 500 AND ACREAGE LT 5000 THEN SIZE = '3';
IF ACREAGE GE 5000 THEN SIZE = '4';
```

Therefore, SIZE is created as a function of the values of acreage.

PRODUCT

Essentially the product of GRASP is an amalgam of files created by the SAS system as it was used to create the standardized data files holding information on all of Idaho's lakes, along with a system which utilizes a search and spatial display program written in FORTRAN for the Calcomp Plotter. It is foremost the data base of Idaho lake information which heretofore was non-existent. The format is such that anyone can expand on its usefulness by adding more data variables as they become available.

<u>Files of SAS Statements, Data, and Programs (listed in Appendix)</u>

CREATE ADDPROGS	A setup showing how to load programs onto a partitioned data set in object form. This is the plot program.
CREATE PGMPDS	A setup showing how to initiate the disk space for the above creations.
ADD DATAPGM	A setup showing how to add study area outlines to the data file. All 44 counties and the Idaho State Boundary have been stored.
KODE HEADER	A SAS setup used early in the data file construction to establish letter versions of county codes, make several manipulations, and create a shorthand code for identifying each lake.
JCL SAS	The JCL to precede a batch run on SAS, yielding multiple copies. The account code will need to be changed to one that is current. Note prices.

MASTER HEADER	The SAS statements which must precede any SAS run. These provide initial definitions of variables and the columns containing the data variables.
MASTER TRAILER	This shows how to accomplish different sorts. This example is for an alphabetically sorted listing by LAKE name and within numerically by township, range. The variable CTY is a county code (number); COUNTY is an alpha code name of up to 15 letters and can be listed from the lakes file.
NAMELIST HEADER	This file precedes the MASTER HEADER on any run where identification of the codes (county, forest acronyms, basin, owners) is desired. It provides a header page on the computer output elaborating on all codes.
BASINALP SETUP	A sample setup of a batch run which will produce a listing sorted by basin, and alphabetized by county, lake, and township, range. Whatever file of lakes (MASTER or PRIORITY) is being used must be pulled into the setup after the line, CARDS; (this is done on CMS simply by typing GET LAKES MASTER) when 'CARDS;' is forced to be the record at the top of the screen.
SASPLOT PLIOPT	The source listing of a PL/1 program to convert latitude-longitude coordinates into X-Y coordinates which will be compatible with the county outlines for Idaho.

PRIORITY LAKES — A file containing 123 lakes earmarked from the LAKES MASTER because of interest in gathering more variables for a detailed study. At the moment the only additional variable added is a two-letter designation or code representing the supposed trophic condition based on known history prior to the on-the-scene summer measurements made by the researchers of the CLEAN LAKES project. This file awaits more data.

LAKES MASTER — A file containing 1547 entries, presently with 3 cards (records) for each lake. The JCL in MASTER HEADER describes where within the record each variable resides, along with the name assigned.

Variables include:

LAKE — The name of any body of water, including those without names assigned on maps. Unnamed waters are included as ZLAKE, ZLAKES, ZRES, N/N. Sometimes a number follows in parentheses indicating the count of several close by, or (E) for ephemeral.

Consistency was sought in spelling out LAKE or abbreviating RES. If a lake is normally called Lake Something, instead of Something Lake, it was entered in the file as LOWELL, LAKE with the comma; otherwise no comma is present.

Cross-entries are put in whenever both names are known, e.g. Lapwai L (Winchester). This expands the file somewhat, but it certainly helps in the identification when the local name is different from that on the published map.

KODE	11-digit code, as derived and discussed previously
SEC	The section (American System of Land Survey) expressed as two digits
TOWNSHIP	The township expressed as T09N
RANGE	The range expressed as R42E
LONGITUDE	The longitude expressed as 111 29 15 (degrees, minutes, seconds)
LATITUDE	The latitude expressed as 45 05 00 (degrees, minutes, seconds)
BASIN	A two-digit code ranging from 1 to 11 (codes presented earlier in this report)
CTY	A two-digit code, numbers 1 to 44 applied to the counties in alphabetical order
ELEV	The elevation of the lake expressed without decimal, as 5154
ACREAGE	The size of the lake expressed to the nearest tenth of an acre, as 5.7 (if that detail is known). Most of the acreages are specified as 58., instead of 58.0. When a printout is requested, however, the zero is printed
BASIN1	The primary drainage (usually the same as the number code used above in BASIN). For example, using SPRING VALLEY RESERVOIR, the BASIN code would be 5 (Clearwater) The variable BASIN1 would be an alphameric one, CLEARWATER R
BASIN2	The secondary drainage; in the case above, we have POTLATCH R
BASIN 3	The tertiary drainage; in the case above, we have BIG BEAR CK

P	A variable added to the LAKES MASTER to designate if the lake was a priority one or not. P means it is; nothing means it's not.
QUADSHEE	The name of the quadrangle from which the information was taken and on which the lake can be found. The name is expressed alphamerically as, MOSCOW MTN, ID If the name is preceded by an asterisk (*), then the lake appears on multiple quad sheets.
OWNERS	The codes for this variable are listed earlier in the report. The ownership of the lake and land immediately adjacent to it is indicated as private, BLM, national forest, etc. NOTE: The final lakes file enters these separately as OWNER1, OWNER2 ... etc.
NAFOREST	The codes for this variable are listed earlier in the report. Assuming the ownership is Forest Service, this variable is an acronym describing which forest, for example, BIT is the Bitterroot National Forest.
LATIN, LONGIN	The X-Y coordinate derived using SASPLOT PLIOPT to convert latitudes and longitudes to a coordinate system compatible with the plotter coordinates of county outlines.
TROPHIC	A two-character code expressing for PRIORITY LAKES only, the expected trophic condition of the lake (prior to summer measurements). O = oligotrophic OM = oligo-mesotrophic M = mesotrophic E = eutrophic HE = hypereutrophic U = unknown

MACRO SAS	The program which allows a search of either file depending on variables of interest. Look on listing for more detail (search of Priority File costs $1.36)
PLOT SETUP	A program to create a plot within an outline of the spatial distribution created by choice from 'MACRO SAS'. Plot of search from above costs approximately $ .43.
SELECT EXAMPLE	A combination of the two programs above. For a search involving <u>complete</u> master file, cost will vary from $ 5.36 to $ 11.00. A selection example which chooses lakes in Bonner County under 2400' elevation and larger than 50 acres is displayed.
CHARTS MASTER	A SAS setup showing to to request printer output of frequency bar charts.
PURPLE LOOK	Two listings produced by MACRO SAS search routine.
SASGRAPH CHARTS	A SAS GRAPH setup for producing bar charts, pie charts, and scatter plots on the plotter.

In the Appendix are listings of setups, data files, and program explanations. The SAS setups will suggest further inquiries to future researchers using this data file. The Appendix should assist researchers in formulating decisions about certain aspects of variables wtthin the LAKES MASTER file by describing the SAS statements to produce selected examples. Finally the GRASP procedures to obtain a plot of the spatial distribution of chosen lakes within the state or specific bounty outline is included.

The Appendix follows. It is a mixture of annotated program setups, source program files, output and instructions.

APPENDIX

THIS IS THE WAY TO ADD SOURCE PROGRAMS TO
THE PROGRAM PDS (PARTITIONED DATA SET),
WHICH HOLDS LOAD MODULES (OBJECT PROGRAMS)

ALSO, THE PROGRAM LISTED HERE IS THE ONE
USED TO READ THE COUNTY COORDINATES,
COMBINE THEM WITH THE LAKE COORDINATES,
AND PRODUCE A PLOT OF THE SELECTION
OCCURRING IN THE 'MACRO SAS' PART.

```
//JADDPGM JOB (XXXXXXX,XXX-XX-XXXX,13),'LASTNAME'
//* PASSWORD=XXXXX
//  EXEC  FORTGCL,LIB1='SYS1.PLOTLIB'
//FORT.SYSIN  DD  *
      DIMENSION X(900),Y(900),X2(900),Y2(900),TITLE(20),
     *IBCD(2),KOUNTY(2)
      DATA BLANK/'    '/
C  ===> OUTPUT IS TO PLOT TAPE ONLY
C  ===> INPUT FILE 05 IS COUNTY COORDINATES. HEADER = SCALE FACTOR,
C-------------HEADER --2 CARDS
C-------------  1ST:   NAME OF COUNTY (8 CHARS),NUMBER OF COORDS (I3)
C-------------  2ND:   SCALE FACTOR,OFFSET X, OFFSET Y  (3F10.2)
C  ===> INPUT FILE 07 IS LAKES COORDINATES AND ACRONYMS (8 LETTERS MAX)
C  ===> INPUT FILE 08 IS TITLE TO BE PRINTED ON TOP OF MAP
      READ (8,100) TITLE
C OPTIONAL TITLE READ IN ON UNIT 8
100   FORMAT(20A4)
      READ (5,30) KOUNTY,N
   30 FORMAT(2A4,I3)
      READ (5,1) FAC,OFSX,OFSY
C COUNTY COORDS COMING IN OFF PDS
1     FORMAT( 3F10.2  )
      A=1.0
      B=9.5
      HT=.07
      ISYM=1
      Z=0.
      NZ=0
      DO 20 I=1,N
20    READ (5,2,) X(I),Y(I)
2     FORMAT (10X,2F10.0)
      CALL PLOTS (0,0,13)
      CALL PLOT (0.0,0.0,-3)
      X(N+1)=0.
      X(N+2)=1.
      Y(N+1)=0.
      Y(N+2)=1.
      CALL LINE (X,Y,N,1,NZ,NZ)
C MUST ALLOW FOR K TO COME IN FROM THE FIRST CARD ON LAKES FILE
```

```
      READ (7,31) K
31    FORMAT (I3)
      DO 40 I=1,K
      READ(7,3)  (IBCD(J),J=1,2), X2(I),Y2(I)
3     FORMAT(2A4,2F5.0)
      X2(I)=(X2(I)-OFSX) * FAC
      Y2(I)=(Y2(I)-OFSY) * FAC
      X2(I)=X2(I)+.17
      NC = 8
      CALL SYMBOL(X2(I),Y2(I),HT,IBCD,Z,NC)
      X2(I)=X2(I)-.17
40    CONTINUE
      X2(K+1)=0.
      X2(K+2)=1.
      Y2(K+1)=0.
      Y2(K+2)=1.
      CALL LINE(X2,Y2,K,1,-1,ISYM)
      CALL PLOT(Z,Z,3)
      CALL SYMBOL(A,B,.21,TITLE,Z,80)
223   CALL PLOT (Z,Z,999)
      STOP
      END
/*
//LKED.SYSLMOD DD DSN=PURPLE.PROGRAMS,UNIT=DISK,DISP=OLD
 NAME CNPLCTS(R)
```

THIS IS THE WAY TO ORIGINATE THE PLACE TO LOAD PROGRAMS
(OBJECT DECKS OF SOURCE PROGRAMS)

```
//JPGMPDS JOB (XXXXXX,XXX-XX-XXXX,13),'LASTNAME'
//* PASSWORD=XXXXX
//  EXEC  PGM=IEFBR14
//DD1 DD DSN=PURPLE.PROGRAMS,SPACE=(CYL,(1,1,10)),
// DISP=(NEW,CATLG,DELETE),UNIT=DISK
```

THIS PROGRAM SETUP WAS USED TO INITIATE OUTLINES TO BE ADDED TO THE COUNTY FILES RESIDING ON THE PARTIONED DATA SET, PURPLE.COUNTY.

THE SECOND CARD IN EACH COUNTY CONTAINS THE FACTOR, OFFSET X, AND OFFSET Y TO APPLY TO EACH COORDINATE SET OF THE COUNTY WHEN PLOTTING INDIVIDUALLY, SO THE PLOT WILL BE READABLE. LAKE COORDINATES ARE THE SAME FACTORS WITHIN THE PLOT PROGRAM, CNPLOTS FORTRAN.

ALL 44 COUNTIES OF IDAHO AND THE STATE OUTLINE WERE ADDED IN THIS FASHION. MOST HAVE BEEN ELIMINATED HERE TO SAVE SPACE IN THIS REPORT.

NOTE: SINCE THE DATA FILE HAS NOW BEEN CREATED, TO MAKE ADDITIONS, ONE NEEDS TO REMOVE THE CARDS BELOW WHICH OPEN THE FILE...CARDS 3-6

```
//JDATADS JOB (XXXXXXX,XXX-XX-XXXX,13),'LASTNAME'
//* PASSWORD=XXXXXXX
//  EXEC  PGM=IEFBR14
//DD1 DD DSN=PURPLE.COUNTY,SPACE=(CYL,(1,1,10)),
// DISP=(NEW,CATLG,DELETE),UNIT=DISK,
// DCB=(LRECL=80,RECFM=FB,BLKSIZE=6400)
// EXEC PGM=IEBUPDTE,PARM=MOD
//SYSPRINT DD SYSOUT=A
//SYSUT1 DD DSN=PURPLE.COUNTY,DISP=SHR
//SYSUT2 DD DSN=PURPLE.COUNTY,DISP=SHR
//SYSIN DD *
./ ADD NAME=ADA
ADA       8
     8.74        2.52       1.68
   1             0.0        9.00
   2             2.53       9.00
   3             5.33       6.03
   4             5.33       0.0
   5             2.88       0.0
   6             0.96       2.18
   7             0.0        2.45
   8             0.0        9.00
./ ADD NAME=ADAMS
ADAMS     15
     7.20        2.10       3.68
   1             1.44       9.00
   2             4.46       9.00
   3             5.11       7.42
   4             6.05       7.42
```

```
    5           6.26        5.90
    6           5.62        4.10
    7           5.83        2.95
    8           5.83        0.50
    9           4.68        0.0
   10           2.88        0.94
   11           2.88        1.80
   12           2.02        2.74
   13           2.02        4.54
   14           0.0         4.54
   15           1.44        9.00
./ ADD NAME=BANNOCK
BANNOCK  15
      7.38      6.88        0.46
    1           0.0         8.11
    2           1.84        9.00
    3           3.69        9.00
    4           3.69        5.31
    5           5.31        5.31
    6           6.20        2.14
    7           6.20        0.0
    8           4.57        0.0
    9           2.29        1.40
   10           2.73        2.14
   11           1.84        2.58
   12           1.84        3.98
   13           0.89        6.27
   14           0.89        7.16
   15           0.0         8.11
./ ADD NAME=BEARLAKE
BEARLAKE 11
      9.00      8.00        0.06
    1           0.0         9.00
    2           3.96        9.00
    3           3.96        7.29
    4           6.21        7.29
    5           6.21        0.0
    6           1.35        0.0
    7           1.17        1.71
    8           0.0         3.06
    9           1.17        5.58
   10           0.0         6.21
   11           0.0         9.00
./ ADD NAME=BENEWAH
BENEWAH    8
     14.29      2.00        7.62
    1           0.0         8.00
    2           5.86        8.00
    3           5.86        9.00
    4          10.71        9.00
    5          10.71        0.0
    6           2.71        0.0
    7           0.0         2.71
    8           0.0         8.00
./ ADD NAME=BINGHAM
```

A PROGRAM USED IN PRODUCING THE LAKES MASTER FILE, TO:

(1) CREATE COUNTY NAMES TO GO WITH CODE NUMBERS (CORRECTING ORIGINAL KEYPUNCHING ERRORS INCLUDING THOSE RESULTING FROM IMPROPER ALPHABETIZING OF COUNTIES WHEN CODES ASSIGNED AT START.

(2) CREATE UNIQUE FIRST THREE CHARACTERS IN NAME TO BE USED IN ABBREVIATED AND UNIQUE KODE FOR LAKES.

(3) CREATE 'HEIGHT' CODE TO CLASSIFY LAKES FOR USE IN KODE

(4) CREATE 'SIZE' CODE TO CLASSIFY LAKES FOR USE IN KODE

(5) TO CREATE AN 11-DIGIT KODE WHICH IS A SHORTHAND DESCRIPTION OF LAKE'S NAME, LOCATION, AND SIZE

```
DATA MASTER;
LENGTH KODE $11;
LENGTH HEIG $1 SIZE $1;
LENGTH COUNTY  $ 10;
INPUT S1 2. LAKE $21. SEC $2. P $2.TOWNSHIP $5. RANGE $5. LONGITUD $10.
LATITUDE $10. FILL 3. BASIN $2. FIL2 3. CTY $2. ELEV 5. ACREAGE 8.1
#2 S2 2. LAKE $21. SEC $2. P $2. BASIN1 $15. BASIN2 $15. BASIN3 $15.
#3 S3 2. LAKE $21. SEC $2. P $2. QUADSHEE $25. OWNERS $5. NAFOREST $10.;
IF CTY = '1 ' THEN CTY = ' 1';
IF CTY = '2 ' THEN CTY = ' 2';
IF CTY = '3 ' THEN CTY = ' 3';
IF CTY = '4 ' THEN CTY = ' 4';
IF CTY = '5 ' THEN CTY = ' 5';
IF CTY = '6 ' THEN CTY = ' 6';
IF CTY = '7 ' THEN CTY = ' 7';
IF CTY = '8 ' THEN CTY = ' 8';
IF CTY = '9 ' THEN CTY = ' 9';
IF BASIN='1 ' THEN BASIN=' 1';
IF BASIN='2 ' THEN BASIN=' 2';
IF BASIN='3 ' THEN BASIN=' 3';
IF BASIN='4 ' THEN BASIN=' 4';
IF BASIN='5 ' THEN BASIN=' 5';
IF BASIN='6 ' THEN BASIN=' 6';
IF BASIN='7 ' THEN BASIN=' 7';
IF BASIN='8 ' THEN BASIN=' 8';
IF BASIN='9 ' THEN BASIN=' 9';
IF CTY = ' 9' THEN CTY = '45';
IF CTY = '10' THEN CTY = ' 9';
IF CTY = '45' THEN CTY = '10';
```

```
IF CTY = '41' THEN CTY = '46';
IF CTY = '42' THEN CTY = '41';
IF CTY = '46' THEN CTY = '42';
IF CTY = ' 1' THEN COUNTY = 'ADA '          ;
IF CTY = ' 2' THEN COUNTY = 'ADM-ADAMS'   ;
IF CTY = ' 3' THEN COUNTY = 'BANNOCK'       ;
IF CTY = ' 4' THEN COUNTY = 'BEAR LAKE'     ;
IF CTY = ' 5' THEN COUNTY = 'BENEWAH'       ;
IF CTY = ' 6' THEN COUNTY = 'BINGHAM'       ;
IF CTY = ' 7' THEN COUNTY = 'BLAINE'        ;
IF CTY = ' 8' THEN COUNTY = 'BOISE'         ;
IF CTY = ' 9' THEN COUNTY = 'BNR-BONNER';
IF CTY ='10' THEN COUNTY = 'BNL-BONNEV';
IF CTY ='11' THEN COUNTY = 'BOUNDARY'     ;
IF CTY ='12' THEN COUNTY = 'BUTTE'        ;
IF CTY ='13' THEN COUNTY = 'CAMAS'          ;
IF CTY ='14' THEN COUNTY = 'CANYON'         ;
IF CTY ='15' THEN COUNTY = 'CARIBOU'        ;
IF CTY ='16' THEN COUNTY = 'CASSIA'         ;
IF CTY ='17' THEN COUNTY = 'CLARK'          ;
IF CTY ='18' THEN COUNTY = 'CLEARWATER'     ;
IF CTY ='19' THEN COUNTY = 'CUSTER'         ;
IF CTY ='20' THEN COUNTY = 'ELMORE'         ;
IF CTY ='21' THEN COUNTY = 'FRANKLIN'       ;
IF CTY ='22' THEN COUNTY = 'FREMONT'        ;
IF CTY ='23' THEN COUNTY = 'GEM'            ;
IF CTY ='24' THEN COUNTY = 'GOODING'        ;
IF CTY ='25' THEN COUNTY = 'IDAHO'          ;
IF CTY ='26' THEN COUNTY = 'JEFFERSON'      ;
IF CTY ='27' THEN COUNTY = 'JEROME'         ;
IF CTY ='28' THEN COUNTY = 'KOOTENAI'       ;
IF CTY ='29' THEN COUNTY = 'LATAH'          ;
IF CTY ='30' THEN COUNTY = 'LEMHI'          ;
IF CTY ='31' THEN COUNTY = 'LEWIS'          ;
IF CTY ='32' THEN COUNTY = 'LINCOLN'        ;
IF CTY ='33' THEN COUNTY = 'MADISON'        ;
IF CTY ='34' THEN COUNTY = 'MINIDOKA'       ;
IF CTY ='35' THEN COUNTY = 'NEZ PERCE'    ;
IF CTY ='36' THEN COUNTY = 'ONEIDA'       ;
IF CTY ='37' THEN COUNTY = 'OWYHEE'       ;
IF CTY ='38' THEN COUNTY = 'PAYETTE'      ;
IF CTY ='39' THEN COUNTY = 'POWER'        ;
IF CTY ='40' THEN COUNTY = 'SHOSHONE'     ;
IF CTY ='41' THEN COUNTY = 'TETON'        ;
IF CTY ='42' THEN COUNTY = 'TWIN FALLS'   ;
IF CTY ='43' THEN COUNTY = 'VALLEY'       ;
IF CTY ='44' THEN COUNTY = 'WASHINGTON'   ;
IF ELEV LT 1000                   THEN HEIG='0';
IF ELEV GE 1000 AND ELEV LT 2000 THEN HEIG='1';
IF ELEV GE 2000 AND ELEV LT 3000 THEN HEIG='2';
IF ELEV GE 3000 AND ELEV LT 4000 THEN HEIG='3';
IF ELEV GE 4000 AND ELEV LT 5000 THEN HEIG='4';
IF ELEV GE 5000 AND ELEV LT 6000 THEN HEIG='5';
IF ELEV GE 6000 AND ELEV LT 7000 THEN HEIG='6';
IF ELEV GE 7000 AND ELEV LT 8000 THEN HEIG='7';
```

```
IF ELEV GE 8000 AND ELEV LT 9000 THEN HEIG='8';
IF ELEV GE 9000                  THEN HEIG='9';
IF ACREAGE LT 50 THEN SIZE = '1';
IF ACREAGE GE 50 AND ACREAGE LT 500 THEN SIZE ='2';
IF ACREAGE GE 500 AND ACREAGE LT 5000 THEN SIZE = '3';
IF ACREAGE GE 5000 THEN SIZE ='4';
KODE=SUBSTR(BASIN,1,2)||SUBSTR(LAKE,1,4)||SUBSTR(SIZE,1,1)||
     SUBSTR(COUNTY,1,3)||SUBSTR(HEIG,1,1);
CARDS;
```

THIS IS THE PRECEDING JOB CONTROL LANGUAGE TO RUN A BATCH JOB LISTING WHICH WILL PRODUCE MULTIPLE COPIES OF A SEARCH, SUCH AS BY BASIN

ACTUAL COSTS FOR SORTS OF LAKES MASTER FILE:

```
BY BASIN =      $10.37 (FOR PRIME TIME,CHEAPER LATE)
BY COUNTY=        7.76
ALPHABETICALLY=12.11 (RUN ALSO INCLUDED CHARTS
                      USED AS FIGURES 1 TO 4)
```

SORTS BY SAS ARE RELATIVELY EXPENSIVE

```
//JLAKES JOB (ACCTCODE,XXX-XX-XXXX,10),'LASTNAME'
//* PASSWORD=XXXXX
//  EXEC  SAS
//SAS.FT12F001 DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141),
//  COPIES=8
```

THIS IS THE INITIALIZATION OF VARIABLES WITHIN
THE LAKES MASTER FILE

IT MUST PRECEDE THE LAKES MASTER FILE, OR THE PRIORITY
LAKES FILE.

```
DATA MASTER;
INPUT S $1. KODE $11. LAKE $25. SEC $2. TOWNSHIP $4. RANGE $4.
        LONGITUD $10. LATITUDE $10. BASIN 3. CTY 3. ELEV 5.
        SIZE $1. HEIG $1.
#2 T $1. ACREAGE 7.1 BASIN1 $15. BASIN2 $15. BASIN3 $15. COUNTY $10.
        NAFOREST $3. OWNER1 $1. OWNER2 $1. OWNER3 $1. OWNER4 $1.
        OWNER5 $1.
#3 U $1. QUADSHEE $25. P $2. TROPHIC $2. LATIN 71-75 2 LONGIN 76-80 2;
CARDS;
```

THE FOLLOWING CARDS ARE REPRESENTATIVE
OF THOSE TO TRAIL THE DATA FILE IN SAS
SETUP.

THESE SPECIFY A SORT BY LAKE, TOWNSHIP, RANGE. OR,
FIRST THE SORT IS BY LAKE AND THEN TOWNSHIP RANGE
WITHIN LAKES HAVING THE SAME NAME.

THE PROC PRINT; VAR ...
SPECIFIES THE DESIRED ORDER OF DATA VARIABLES
ON THE PRINTOUT. ALL LAKES IN THE FILE WILL BE
LISTED IN THE SORTED VERSION.

```
PROC SORT; BY LAKE TOWNSHIP RANGE;
PROC PRINT;
VAR KODE LAKE SEC TOWNSHIP RANGE CTY LATITUDE LONGITUD BASIN ELEV
ACREAGE QUADSHEE OWNERS NAFOREST;
PROC PRINT;
VAR KODE LAKE SEC TOWNSHIP RANGE BASIN BASIN1 BASIN2 BASIN3 COUNTY ELEV
ACREAGE;
```

THIS SAS SETUP IS USED AS THE FIRST PART OF ANY LIST TO PROVIDE A KEY TO THE CODES USED IN THE LAKES FILE.

NOTE: WHEN SEARCHES ARE MADE BY COUNTY (REFERRING TO THE ALPHABETIC NAME), THE FOLLOWING 3 COUNTIES MUST BE NAMED THUSLY, OR SEARCH FAILS FOR LACK OF A MATCH):

ADM-ADAMS
BNR-BONNER
BNL-BONNEVILLE

```
DATA NAMELIST;
INPUT  CTY $9-10 COUNTY $24-38 FACRON $40-42 FOREST $44-53 BASNUM $
57-58 BASI  $60-71  OWNCODE $77-78 #2 OWNERS $1-23;
CARDS;
COUNTY=  1 CTYNAME =  'ADA              'BIT BITTERROOT   01 KOOTENAI
NATIONAL FOREST
COUNTY=  2 CTYNAME =  'ADM-ADAMS        'BOI BOISE        02 PEND OREILLE
BUREAU OF LAND MGT
COUNTY=  3 CTYNAME =  'BANNOCK          'CAR CARIBOU      03 SPOKANE
STATE
COUNTY=  4 CTYNAME =  'BEAR LAKE        'CHA CHALLIS      04 PALOUSE
INDIAN RESERVATION
COUNTY=  5 CTYNAME =  'BENEWAH          'CLE CLEARWATER   05 CLEARWATER
RESERVES,ENCOURAGE USE
COUNTY=  6 CTYNAME =  'BINGHAM          'CDN COEUR D'ALENE06 SALMON
RESERVES,DISCOURAGE USE
COUNTY=  7 CTYNAME =  'BLAINE           'KAN KANIKSU      07 BORDER SNAKE
PRIVATE
COUNTY=  8 CTYNAME =  'BOISE            'KOO KOOTENAI     08 LOWER SNAKE

COUNTY=  9 CTYNAME =  'BNR-BONNER       'NEZ NEZ PERCE    09 MIDDLE SNAKE

COUNTY= 10 CTYNAME =  'BNL-BONNEVILLE   'PAY PAYETTE      10 UPPER SNAKE

COUNTY= 11 CTYNAME =  'BOUNDARY         'SAL SALMON       11 BEAR RIVER

COUNTY= 12 CTYNAME =  'BUTTE            'SAW SAWTOOTH

COUNTY= 13 CTYNAME =  'CAMAS            'STJ ST JOE

COUNTY= 14 CTYNAME =  'CANYON           'TAR TARGHEE

COUNTY= 15 CTYNAME =  'CARIBOU          'YNP YELLOWSTONE

COUNTY= 16 CTYNAME =  'CASSIA           '

COUNTY= 17 CTYNAME =  'CLARK            '

COUNTY= 18 CTYNAME =  'CLEARWATER       '
```

```
COUNTY= 19 CTYNAME = 'CUSTER         '
COUNTY= 20 CTYNAME = 'ELMORE         '
COUNTY= 21 CTYNAME = 'FRANKLIN       '
COUNTY= 22 CTYNAME = 'FREMONT        '
COUNTY= 23 CTYNAME = 'GEM            '
COUNTY= 24 CTYNAME = 'GOODING        '
COUNTY= 25 CTYNAME = 'IDAHO          '
COUNTY= 26 CTYNAME = 'JEFFERSON      '
COUNTY= 27 CTYNAME = 'JEROME         '
COUNTY= 28 CTYNAME = 'KOOTENAI       '
COUNTY= 29 CTYNAME = 'LATAH          '
COUNTY= 30 CTYNAME = 'LEMHI          '
COUNTY= 31 CTYNAME = 'LEWIS          '
COUNTY= 32 CTYNAME = 'LINCOLN        '
COUNTY= 33 CTYNAME = 'MADISON        '
COUNTY= 34 CTYNAME = 'MINIDOKA       '
COUNTY= 35 CTYNAME = 'NEZ PERCE      '
COUNTY= 36 CTYNAME = 'ONEIDA         '
COUNTY= 37 CTYNAME = 'OWYHEE         '
COUNTY= 38 CTYNAME = 'PAYETTE        '
COUNTY= 39 CTYNAME = 'POWER          '
COUNTY= 40 CTYNAME = 'SHOSHONE       '
COUNTY= 41 CTYNAME = 'TETON          '
COUNTY= 42 CTYNAME = 'TWIN FALLS     '
COUNTY= 43 CTYNAME = 'VALLEY         '
COUNTY= 44 CTYNAME = 'WASHINGTON     '
PROC PRINT; VAR CTY COUNTY FACRCN FOREST BASNUM BASI OWNCODE OWNERS;
```

THIS IS A SETUP OF A SAS RUN TO OBTAIN MULTIPLE LISTINGS SORTED AND PRINTED BY BASIN, WITH EACH BASIN BEGINNING ON A NEW PAGE AND SORTED WITHIN BY COUNTY AND THEN BY LAKE.

```
//JBASALP JOB (ACCTKOD,XXX-XX-XXXX,10),'LASTNAME',CLASS=A,TIME=5
//* PASSWORD=XXXXX
//  EXEC  SAS
//SAS.FT12F001 DD SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141),
//  COPIES=8

............PUT IN NAMELIST HEADER HERE ...........

DATA MASTER;
INPUT S $1. KODE $11. LAKE $25. SEC $2. TOWNSHIP $4. RANGE $4.
      LONGITUD $10. LATITUDE $10. BASIN 3. CTY 3. ELEV 5.
      SIZE $1. HEIG $1.
#2 T $1. ACREAGE 7.1 BASIN1 $15. BASIN2 $15. BASIN3 $15. COUNTY $10.
      NAFOREST $3. OWNER1 $1. OWNER2 $1. OWNER3 $1. OWNER4 $1.
      OWNER5 $1.
#3 U $1. QUADSHEE $25. P $2 LATIN 71-75 2 LONGIN 76-80 2;
CARDS;

...........PUT IN THE DATA FILE HERE...........
...........(LAKES MASTER OR PRIORITY LAKES) ..........

PROC SORT; BY BASIN COUNTY LAKE TOWNSHIP RANGE;
PROC PRINT PAGE; BY BASIN;
VAR KODE LAKE SEC TOWNSHIP RANGE COUNTY LONGITUD LATITUDE BASIN ELEV
ACREAGE QUADSHEE OWNERS NAFOREST;
PROC PRINT PAGE; BY BASIN;
VAR KODE LAKE SEC TOWNSHIP RANGE BASIN1 BASIN2 BASIN3 CTY ELEV
ACREAGE;
```

THE PL-1 PROGRAM USED TC CONVERT LAT-LONGITUDE
COORDINATES OF LAKES TO AN X - Y COORDINATE
SYSTEM COMPATIBLE WITH EXISTING COUNTY OUTLINES
IN IDAHO AVAILABLE FOR PLOTTER USAGE.

```
SASPLOT: PROC OPTIONS (MAIN);
   DCL SAS FILE RECORD INPUT ENV(FB,RECSIZE(80)),
       MOD FILE RECORD OUTPUT ENV(FB,RECSIZE(80));
   OPEN FILE (SAS) INPUT;
   OPEN FILE (MOD) OUTPUT;
   ON ENDFILE (SAS) GOTO EOF1;
   DCL 1 SASIN,
       2 LINE CHAR(80);
   DCL 1 SASOUT,
       2 LINEO CHAR(70),
       2 LONGCHAR PIC'99V.99',
       2 LATCHAR PIC'99V.99';
   DCL NAME CHAR(25);
   DCL (LATDEG,LATMIN,LONGDEG,LONGMIN,LAT,LONG) FIXED(9,2),
       (LATSEC,LONGSEC) FIXED(9,2),
       SIXTY FIXED(9,2) INIT(60.),
       THREE_SIXTY FIXED(9,2) INIT(360.),
       MAXLAT FIXED(9,2) INIT(49.38),
       MAXLONG FIXED(9,2) INIT(118.71),
       LATFACT FIXED(9,2) INIT(1.6),
       LONGFACT FIXED(9,2) INIT(1.2);
   DCL (LATDECIMAL,LONGDECIMAL,TLAT) FIXED(9,2);
   DCL MAXY FIXED(9,2) INIT(11.31);
       DO WHILE('1'B);
       READ FILE (SAS) INTO (SASIN);
       NAME=SUBSTR(LINE,13,25);
       LATDEG=SUBSTR(LINE,58,2);
       LATMIN=SUBSTR(LINE,61,2);
       LATSEC=SUBSTR(LINE,64,2);
       LONGDEG=SUBSTR(LINE,48,3);
       LONGMIN=SUBSTR(LINE,52,2);
       LONGSEC=SUBSTR(LINE,55,2);
       LAT=LATDEG+(LATMIN/SIXTY)+(LATSEC/THREE_SIXTY);
       LONG=LONGDEG+(LONGMIN/SIXTY)+(LONGSEC/THREE_SIXTY);
       LATDECIMAL=(MAXLAT-LAT)*LATFACT;
       LONGDECIMAL=(MAXLONG-LONG)*LONGFACT;
 PUT SKIP LIST ('SYMAP Y, X =',NAME,LATDECIMAL,LONGDECIMAL);
 /*   NOW IN SYMAP Y  &  X  IDAHO STATE COORDINATES    */
 /*             MOVE ORIGIN AND FLIP AXIS              */
          LATDECIMAL=MAXY-LATDECIMAL;
      LATCHAR=LATDECIMAL;
```

```
        LONGCHAR=LONGDECIMAL;
        WRITE FILE (MOD) FROM (SASIN);
        READ FILE (SAS) INTO (SASIN);
        WRITE FILE (MOD) FROM (SASIN);
        READ FILE (SAS) INTO (SASIN);
        LINEO=SUBSTR(LINE,1,62);
        WRITE FILE (MOD) FROM (SASOUT);
        END;
 EOF1: CLOSE FILE (SAS),
              FILE (MOD);
 END;
```

THIS SETUP IS A SAMPLE OF SEARCHING THE FILE
FOR COMBINATIONS OF ONE OR MORE VARIABLES.

THE SELECTION TAKES PLACE BETWEEN THE CARD
(11TH DOWN IN THE LISTING) MACRO SELECT
AND THE % SYMBOL %

NO SYMBOLS, PERIODS, OR SEMICOLONS SHOULD APPEAR
IN THE STATEMENTS. SAMPLE STATEMENTS FOLLOW:

```
CTY EQ 25 AND ACREAGE GT 50
BASIN EQ 7 AND ELEV GT 3000
COUNTY EQ 'BNR-BONNER' AND SIZE GT '2' AND ELEV LT 4500
```

THE FOLLOWING EXAMPLE SIMPLY SEARCHES FOR BONNER COUNTY
BUT NOTICE THE REQUEST IS SPECIFICALLY FOR 'BNR-BONNER'

```
//JBONNER JOB (XXXXXX,XXX-XX-XXXX,13),'LASTNAME'
//* PASSWORD=XXXXXX
//JOBLIB DD DSN=PURPLE.PROGRAMS,DISP=SHR
//   EXEC  IEFBR14
//ERASE DD DSN=PURPLE.PLOTDD,DISP=(OLD,DELETE)
//  EXEC SAS
//FT12F001 DD SYSOUT=A,
//    DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//PURPLE DD DSN=PURPLE.PLOTDD,UNIT=DISK,SPACE=(TRK,(50,10),RLSE),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=6400),DISP=(NEW,CATLG,DELETE)
MACRO SELECT
COUNTY EQ 'BNR-BONNER'
%
DATA MASTER;
INFILE CARDS END=EOF;
INPUT S $1 KODE $11. LAKE $25. SEC $2. TOWNSHIP $4. RANGE $4.
      LONGITUD $10. LATITUDE $10. BASIN 3. CTY 3. ELEV 5.
      SIZE $1. HEIG $1.
#2    T $1 ACREAGE 7.1 BASIN1 $15. BASIN2 $15. BASIN3 $15. COUNTY $10.
      NAFCREST $3. OWNER1 $1. OWNER2 $1. OWNER3 $1. OWNER4 $1.
      OWNER5 $1.
#3    U $1 QUADSHEE $25.  LATIN 71-75 2  LONGIN 76-80 2;
IF SELECT THEN DO;
N+1; OUTPUT; END;
IF EOF THEN DO;
   LAKE=' '; LATIN=N; LONGIN=.;
   OUTPUT;END;
CARDS;

...........PUT LAKES MASTER OR PRIORITY LAKES FILE HERE
```

```
PROC SORT; BY LAKE;
DATA _NULL_; SET;
FILE PURPLE;
     IF LAKE = ' ' THEN PUT LATIN 3.;
     ELSE PUT LAKE $8. LATIN 5.2 LONGIN 5.2;
//  EXEC  IEBGENER
//SYSUT1 DD DSN=PURPLE.PLOTDO,DISP=SHR
//SYSUT2 DD SYSOUT=A
```

THIS IS A SETUP OF A TCTAL PLOT RUN CN LATAH CCUNTY, AFTER 'MACRC SAS' HAS BEEN RUN TC SELECT CERTAIN LAKES AND CREATEC A FILE (PURPLE.SELECT) WITH THE NECESSARY INFCRMATION INCLUDEC TC BE USED AS INPUT TO 'LATAH PLCT'

NCTE: A VALID ACCCUNT CCDE MUST BE SUBSTITUTED FOR 'PURPLE' IN ALL INSTANCES BELOW

CURRENTLY, THE PRCCEDURE IS OPERATING "IN-STREAM", BUT EVERYTHING IN THE PRCCEDURE LISTING BETWEEN THE CARDS

```
        //IDPLCT PROC CCUNTY=
 AND
        //          PEND
```

CAN BE STORED CN THE MAIN SYSTEM SC THAT THOSE CARDS COULD BE ELIMINATED WITH EACH RUN AND THE ONLY CARD NECESSARY WCULD BE:

```
 //  EXEC IDPLCT,COUNTY=LATAH
```

THE FILE 'LATAH PLOT' FCLLCWS AND PRCDUCES A PLCT OF THE COUNTY REQUESTEC ANC A PLCT CF THE LAKES SELECTED BY THE 'MACRC SAS' PRCGRAM PREVIOUSLY RUN.

THE ONLY CHANGES NECESSARY ARE TC MAKE THE LAST CARD AND 2NC CARD FROM LAST CARD MATCH THE SEARCH REQUESTEC IN 'MACRC SAS'

THE LAST CARD CCNTAINS TITLE INFCRMATICN TC BE PRINTED AT THE TOP OF THE PLCT. THE 2ND TC LAST CARC MUST CCNTAIN THE CCUNTY NAME.

```
//JLATAH JOB (PURPLE,XXX-XX-XXXX),'LASTNAME'
//* PASSWCRC=XXXXXX
//JOBLIB DD DSN=PURPLE.PROGRAMS,DISP=SHR
//IDPLCT PROC COUNTY=
//       EXEC PGM=CNPLCTS
//FT05F001 DD DSN=PURPLE.CCUNTY(&CCUNTY),LABEL=(,,,IN),DISP=SHR
//FT06F001 DC SYSCUT=A
//FT07F001 DD DSN=PURPLE.SELECT,DISP=SHR
//FT13F001 DD DSN=LAKES,UNIT=TAPE,DCB=(RECFM=U,DEN=2,BLKSIZE=512),
//            LABEL=(,NL),DISP=(NEW,KEEP)
//FT08F001 DC DUMMY
//      PEND
//  EXEC IDPLCT,CCUNTY=LATAH
//FT08F001 DD *
THIS INFCRMATICN APPEARS TCP OF PLCT---FILL IN APPROPRIATELY
```

THIS IS A SAMPLE SELECTION FROM THE PRIORITY LAKES FILE FOR BONNER COUNTY FOR LAKES LESS THAN OR EQUAL TO 2400 FEET ELEVATION AND GREATER THAN OR EQUAL TO 50 ACRES

ALSO, THIS EXAMPLE IS OF BOTH SEARCH AND PLOT AS ONE PROGRAM

OUTPUT IS ON NEXT PAGE AND COST $5.36, PLUS PLOT TIME

```
//JSELECT JOB (GEOGMAP,HUL-TQ-UIST,13),HULTQUIST
//JOBLIB DD DSN=PURPLE.PROGRAMS,DISP=SHR
/* DEST=TS
//IDPLOT PROC COUNTY=
//        EXEC PGM=LARGER
//FT05F001 DD DSN=PURPLE.COUNTY(&COUNTY),LABEL=(,,,IN),DISP=SHR
//FT06F001 DD SYSOUT=A
//FT07F001 DD DSN=PURPLE.PLOTDD,DISP=SHR
//FT13F001 DD DSN=LAKES,UNIT=TAPE,DCB=(RECFM=U,DEN=2,BLKSIZE=512),
//             LABEL=(,NL),DISP=(NEW,KEEP)
//FT08F001 DD DUMMY
//        PEND
//   EXEC  IEFBR14
//ERASE DD DSN=PURPLE.PLOTDD,DISP=(OLD,DELETE)
//  EXEC SAS
//FT12F001 DD SYSOUT=A,
//    DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
//PURPLE DD DSN=PURPLE.PLOTDD,UNIT=DISK,SPACE=(TRK,(50,10),RLSE),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=6400),DISP=(NEW,CATLG,DELETE)
MACRO SELECT
COUNTY EQ 'BNR-BONNER' ELEV LE 2400 ACREAGE GE 50
%
DATA MASTER;
INFILE CARDS END=EOF;
INPUT S $1 KODE $11. LAKE $25. SEC $2. TOWNSHIP $4. RANGE $4.
        LONGITUD $10. LATITUDE $10. BASIN 3. CTY 3. ELEV 5.
        SIZE $1. HEIG $1.
#2     T $1 ACREAGE 7.1 BASIN1 $15. BASIN2 $15. BASIN3 $15. COUNTY $10.
        NAFOREST $3. OWNER1 $1. OWNER2 $1. OWNER3 $1. OWNER4 $1.
        OWNER5 $1.
#3     U $1 QUADSHEE $25.  LATIN 71-75 2  LONGIN 76-80 2;
IF SELECT THEN DO;
N+1; OUTPUT; END;
IF EOF THEN DO;
    LAKE=' '; LATIN=N; LONGIN=.;
    OUTPUT;END;
CARDS;
```

......DATA FILE FOR PRIORITY LAKES OR LAKES MASTER GOES HERE....

```
PROC SORT; BY LAKE;
DATA _NULL_; SET;
FILE PURPLE;
    IF LAKE = ' ' THEN PUT LATIN 3.;
    ELSE PUT LAKE $8. LATIN 5.2 LONGIN 5.2;
//  EXEC  IEBGENER
//SYSUT1 DD DSN=PURPLE.PLOTDO,DISP=SHR
//SYSUT2 DD SYSOUT=A
//  EXEC IDPLOT,COUNTY=BONNER
//FT08F001 DD *
SELECT BONNER LAKES ELEV LE 2400 ACREAGE GE 50
```

THIS IS A SAS SETUP FOR OBTAINING PRINTER
FREQUENCY BAR CHARTS OF DATA WITHIN THE
LAKES FILES, TO BE OUTPUT ON SPECIAL FORMS
(WHITE PAPER-LARGE)

```
//JCHARTS JOB (ACCTCODE,XXX-XX-XXXX,13),'LASTNAME'
//* PASSWORD=XXXXXX
//  EXEC  SAS
//FT12F001 DD SYSOUT=(S,,EL00),
//    DCB=(RECFM=VBA,LRECL=137,BLKSIZE=141)
OPTIONS NODATE;
DATA MASTER;
INPUT S $1. KODE $11. LAKE $25. SEC $2. TOWNSHIP $4. RANGE $4.
      LONGITUD $10. LATITUDE $10. BASIN 3. CTY 3. ELEV 5.
      SIZE $1. HEIG $1.
#2 T $1. ACREAGE 7.1 BASIN1 $15. BASIN2 $15. BASIN3 $15. COUNTY $10.
      NAFOREST $3. OWNER1 $1. OWNER2 $1. OWNER3 $1. OWNER4 $1.
      OWNER5 $1.
#3 U $1. QUADSHEE $25. P $2;
CARDS;
PROC CHART; VBAR NAFOREST;
PROC CHART; HBAR NAFOREST;
PROC CHART; VBAR BASIN;
PROC CHART; HBAR BASIN;
PROC CHART; VBAR HEIG;
PROC CHART; HBAR HEIG;
PROC CHART; VBAR SIZE;
PROC CHART; HBAR SIZE;
```

THIS IS THE OUTPUT OF 'MACRO SAS' WITH THE SELECT STATUS OF ELEV GT 5279', OR ALL MILE HIGH LAKES IN IDAHO.

THERE ARE 1017 LAKES IN THIS LIST...WARNING, DON'T REQUEST PLOTS INDISCRIMINATELY.

EITHER THERE MAY BE LOTS, OR THERE MAY BE AN OVERLAP OF ADJACENT LAKES AS ON THE PLOT FOLLOWING THIS LIST

```
AIRPLANE 4.86 4.55
ALDOUS L 8.23 3.59
ALICE LA 4.53 2.72
ALIDADE  4.26 2.77
ALLAN LA 5.52 5.23
ALPINE L 4.27 2.83
ALPINE L 4.27 3.14
ALPINE L 4.92 4.53
ALTURAS  4.52 2.56
AMBER LA 5.05 2.56
ANDERSON 3.33 4.11
ANDYS LA 3.78 6.15
ANGEL LA 5.47 2.39
ANNS LAK 3.30 4.72
APPENDIX 2.54 5.01
ARCADIA  8.50 2.91
ARCADIA  8.41 3.11
ARDETH L 4.44 2.82
ARROWHEA 5.46 2.47
ARROWHEA 4.32 2.77
ARTILLER 4.10 3.76
AZURE LA 4.16 2.64
BACON LA 4.14 7.44
BAKER LA 4.76 2.32
BALD MTN 4.20 6.75
BALDY LA 2.53 4.80
BALL LAK 2.4210.48
BAPTIE L 5.50 2.53
BARKING  4.78 4.69
BARON LA 4.41 2.83
BARON LA 4.24 2.90
BARON LA 4.41 3.01
BARTLETT 8.67 0.15
BASIN LA 5.83 4.16
BASIN LA 2.49 5.03
BASIN LA 4.62 4.80
BASIN LA 4.62 3.23
BASS LAK 4.45 2.40
BATTLE L 4.86 6.24
BAYHORSE 5.17 3.54
BAYHORSE 5.19 3.54
BEAD LAK 4.39 2.93
BEAR CRE 6.15 2.80
BEAR CRE 3.73 3.79
```

BEAR LAK	8.98	2.95
BEAR LAK	4.74	2.98
BEAR LAK	8.85	0.37
BEAR LAK	4.11	4.48
BEAR LAK	3.60	4.56
BEAR LAK	3.57	5.41
BEAR LAK	4.50	2.47
BEAR LAK	5.00	6.19
BEAR LAK	5.10	6.07
BEAR PET	3.21	4.91
BEAR VAL	5.73	3.99
BEAVER L	5.13	6.91
BEAVER P	8.94	3.04
BEEHIVE	2.47	10.15
BELL LAK	5.05	6.15
BELLAS L	5.67	2.35
BELVIDER	4.02	4.39
BENCH LA	4.41	2.99
BENEDICT	4.29	2.82
BENNETT	2.38	0.56
BERNARD	3.70	3.49
BERNARD	2.48	4.88
BERRY LA	4.00	7.43
BETTY LA	5.05	2.42
BIG BOUL	4.92	2.87
BIG CLEA	4.88	4.56
BIG FALL	5.24	2.59
BIG FISH	2.48	10.50
BIG FOG	4.10	6.24
BIG FOOT	4.95	5.92
BIG LAKE	5.77	2.45
BIG LOST	4.72	2.40
BIG ROAR	3.91	2.15
BIG SAND	5.00	6.51
BIG TALK	3.48	7.47
BILK LAK	4.27	5.79
BILLS LA	3.39	4.08
BILLS LA	4.86	5.91
BIRDBILL	4.95	4.71
BISHOP L	8.46	3.31
BITCH LA	4.46	6.08
BLACK LA	3.90	4.11
BLACK LA	2.44	4.72
BLACK LA	3.01	4.87
BLACK LA	4.65	4.83
BLACK LA	3.72	7.41
BLACKFOO	8.53	0.96
BLACKMAR	3.49	3.92
BLACKTAI	3.13	9.67
BLACKWEL	3.25	4.31
BLEAK CR	4.39	5.36
BLOOMING	8.52	0.29
BLUE CRE	8.52	3.04
BLUE CRE	3.03	0.11
BLUE CRE	3.12	0.15

THESE ARE THE LAKES RESULTING FROM THE SEARCH OF
THE MASTER FILE FOR LAKES A MILE HIGH AND LARGER
THAN 49 ACRES.

91

ALICE LA	4.53	2.72
ALTURAS	4.52	2.56
ARCADIA	8.50	2.91
ARDETH L	4.44	2.82
BEAR LAK	8.85	0.37
BEAVER P	8.94	3.04
BENCH LA	4.41	2.99
BIG BOUL	4.92	2.87
BIG SAND	5.00	6.51
BLACKFOO	8.53	0.96
BLUE CRE	3.03	0.11
BLUE CRE	3.12	0.15
BOULDER	4.95	2.93
BOULDER	3.28	4.26
BOX LAKE	3.20	4.45
BRUNDAGE	3.02	4.53
BUCKHORN	3.20	0.32
BULL TRO	4.10	3.35
BYBEE RE	2.94	0.09
CAMPBELL	5.65	1.97
CANYON L	5.16	5.68
COWAN RE	3.78	0.24
CRAG LAK	8.43	0.83
DEADWOOD	3.66	3.33
DEVILS C	7.86	0.08
DRY CREE	6.12	2.98
DRY CREE	2.82	0.35
EDNA LAK	4.33	2.88
ENOS LAK	3.24	4.47
FISH CRE	5.88	1.79
FISH LAK	4.39	6.43
FISH LAK	4.56	7.20
GOAT LAK	4.82	6.31
GOOSE LA	3.02	4.43
GRACE RE	8.24	0.56
GRANITE	3.08	4.47
GRAYS LA	8.76	1.23
HAZARD L	3.00	4.69
HAZARD L	3.00	4.64
HELL ROA	4.53	2.85
HENRY'S	8.72	3.81
HIDDEN L	5.04	6.47
ICEHOUSE	8.53	3.49
IMOGENE	4.51	2.87
INDIAN L	9.19	2.98
ISLAND P	8.65	3.35

JARVIS L	2.97	0.33
JIMMY SM	5.10	2.96
KNAPP LA	4.53	3.49
LITTLE V	8.64	1.23
LIZARD L	4.27	6.24
LOON LAK	3.45	4.56
MACKAY R	6.01	2.63
MCHAN RE	4.86	1.47
MONTPELI	9.06	0.07
MOORES L	3.30	5.35
MOUNTAIN	3.07	0.32
MUD LAKE	8.89	0.24
OTTER RE	3.30	0.25
PALISADE	9.02	1.92
PALISADE	9.09	1.55
PAYETTE	3.14	4.61
PAYNE CR	3.15	0.03
PERKINS	4.56	2.59
PETTIT L	4.52	2.85
PORTNEUF	6.90	0.95
REDFISH	4.53	2.88
REDFISH	4.42	3.14
RIORDAN	3.93	4.07
ROUGH LA	4.69	3.12
SAGEHEN	3.03	3.23
SAND CRE	8.42	3.09
SAWTOOTH	4.29	1.49
SHERIDAN	8.41	3.55
SHIP ISL	4.82	4.56
SHOOFLY	2.89	0.08
SILVER L	8.70	3.23
SODA CRE	8.52	0.59
SODA POI	8.46	0.55
SQUAW CR	3.15	0.08
STANLEY	4.39	1.60
SUBLETT	6.72	0.13
SUMMIT R	6.24	3.31
THORN CR	4.86	1.43
TOXAWAY	4.36	2.75
TWENTY M	3.31	4.61
TWIN LAK	4.41	2.59
WARM LAK	3.66	3.84
WESTON C	7.82	0.19
WHITE CA	5.11	5.76
YELLOW B	4.52	2.71

THIS IS THE SETUP ON SAS-GRAPH TO OBTAIN
BAR CHARTS, PIE CHARTS, AND SCATTER DIAGRAMS

```
GOPTIONS DEVICE=TEK4662 BAUD=1200;
...SAS DATA FILE GOES HERE
TITLE1 .F=TRIPLEX IDAHO LAKE DISTRIBUTION;
PROC GCHART;
  VBAR NAFOREST SIZE HEIG BASIN;
TITLE1 .F=TRIPLEX IDAHO LAKE DISTRIBUTION;
PROC GCHART;
  PIE SIZE HEIG BASIN NAFOREST;
  PATTERN1 C=BLACK V=E;
  PATTERN2 V=R3;
  PATTERN3 V=X4;
  PATTERN4 V=X2;
...DATA PRIORITY GOES HERE..
TITLE1 .F=TRIPLEX PRIORITY LAKE SCATTERPLOT;
TITLE2 .F=SIMPLEX TROPHIC STATUS VS. ELEVATION;
PROC GPLOT;
  PLOT TROPHIC * ELEV;
```

On the next page is the first page of an alphabetized listing of the LAKES MASTER file; following that is another part of the listing with different variables displayed. On a subsequent page is a listing sorted by county, this example being only for Shoshone County.

The choice of what is listed is accomplished either through MASTER TRAILER or through a choice selection through MACRO SAS.

Following the listings are sample plots occurring from PLOT SETUP in conjunction with MACRO SAS to choose specific lakes for plotting.

Finally, the last section is a description of how to use STAMPEDE to attain a pen plot of data for contours. When data become available, bathymetric maps can be produced. Negative contours are possible as well.

WARNING: On one map there is a lake totally off the county outline. The entire file's latitudes and longitudes need to be checked. There may be a few slight errors which when multiplied by a factor to plot an entire county on a page, will result in a graver error and put the lake outside the boundary. If this happens in the north-south direction, the program blows up. This was realized after funds for the project were spent and we were displaying the data we had.

S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

OBS	KCODE	LAKE	SEC	TOWNSHIP	RANGE	CTY	LONGITUD	LATITUDE	BASIN	ELEV
1	6AIRPILEM8	AIRPLANE LAKE	09	T21N	R16E	30	114 35 30	45 09 00	6	8402
2	9ALDOICLA7	ALDOUS LAKE	22	T14N	R39E	17	111 51 00	44 31 15	9	7480
3	2ALGOIBNR2	ALGOMA LAKE	29	T56N	R02W	9	116 36 00	48 11 00	2	2167
4	6ALIC2BLA8	ALICE LAKE	16	T07N	R13E	7	114 56 00	43 56 30	6	8596
5	8ALIDIELM7	ALIDADE LAKE	10	T07N	R11E	20	115 10 00	43 57 35	8	7936
6	6ALLAILEM7	ALLAN LAKE	13	T26N	R20E	30	114 02 30	45 35 00	6	7810
7	6ALPIICUS8	ALPINE LAKE	02	T08N	R12E	19	115 02 45	44 04 05	6	8332
8	6ALPIICUS7	ALPINE LAKE	22	T10N	R12E	19	115 02 45	44 10 40	6	7823
9	6ALPIILEM8	ALPINE LAKE	06	T20N	R16E	30	114 37 00	45 04 30	6	8416
10	6ALTU3BLA7	ALTURAS LAKE	20	T07N	R14E	7	114 51 35	43 55 00	6	7016
11	9AMBEIBLA9	AMBER LAKES (3)	20	T06N	R17E	7	114 28 15	43 50 30	9	9028
12	9AMER4PCW4	AMERICAN FALLS RES	30	T07S	R31E	39	112 50 00	42 50 00	9	4354
13	5AMERIICA4	AMERICAN HILL LAKE	35	T29N	R08E	25	115 26 00	45 48 00	5	4030
14	8ANDEIVAL7	ANDERSON LAKE	23	T18N	R04E	43	115 56 00	44 53 00	8	7306
15	3ANDE2KOO2	ANDERSON LAKE	32	T43N	R03W	28	116 45 00	47 27 30	3	2125
16	8ANDE3ELM4	ANDERSON RANCH RES	31	T01S	R08E	20	115 25 00	43 23 30	8	4196
17	8ANDE2OWY5	ANDERSON RES	17	T09S	R05W	37	116 57 00	42 39 00	8	5230
18	5ANDYIIDA5	ANDYS LAKES (3)	32	T33N	R08E	25	115 29 30	46 09 00	5	5620
19	9ANGEICUS9	ANGEL LAKE	35	T06N	R20E	19	114 02 45	43 48 00	9	10278
20	6ANNSIVAL7	ANNS LAKE	06	T21N	R05E	43	115 53 30	45 11 30	6	7300
21	2ANTEIBNR2	ANTELOPE LAKE	12	T55N	R02E	9	116 09 00	48 08 00	2	2740
22	7APPEIIDA7	APPENDIX LAKE	14	T23N	R02W	25	116 33 15	45 19 45	7	7910
23	9ARCA2FRE5	ARCADIA RES, LOWER	02	T09N	R41E	22	111 35 15	44 08 00	9	5358
24	9ARCAIFRE5	ARCADIA RES, UPPER	02	T10N	R41E	22	111 35 45	44 08 45	9	5430
25	8ARDE2BOI8	ARDETH LAKE	12	T07N	R12E	8	115 01 00	43 57 45	8	8228
26	9ARROICUS9	ARROWHEAD LAKE	21	T05N	R20E	19	114 05 30	43 44 45	9	9895
27	8ARROIELM8	ARROWHEAD LAKE	06	T07N	R11E	20	115 07 00	43 58 30	8	8770
28	8ARRO3ELM3	ARROWROCK RES	18	T03N	R04E	20	115 52 30	43 35 30	8	3216
29	6ARTIIVAL7	ARTILLERY LAKE	03	T15N	R10E	43	115 13 30	44 40 00	6	7900
30	9ASHT2FRE5	ASHTON RES	27	T09N	R42E	22	111 29 30	44 06 00	9	5154
31	5ATWAILAT2	ATWATER LAKE	25	T39N	R03W	29	116 38 30	46 41 30	5	2200
32	3AVON2KOO2	AVONDALE LAKE	07	T51N	R03W	28	116 45 15	47 46 30	3	2288
33	8AZURIELM8	AZURE LAKE	12	T07N	R11E	20	115 07 45	43 58 00	8	8265
34	3BACOISHO5	BACON LAKE	24	T42N	R09E	40	115 16 00	46 58 00	3	5870
35	9BAKEIBLA8	BAKER LAKE	09	T04N	R15E	7	114 40 30	43 41 30	9	8796
36	5BALDIICA5	BALD MTN LAKE	16	T36N	R10E	25	115 13 00	46 27 30	5	5732
37	7BALDIIDA7	BALDY LAKE	22	T23N	R02W	25	116 34 15	45 19 00	7	7190
38	1BALLIBCU6	BALL LAKES	20	T63N	R02W	11	116 37 30	48 47 30	1	6705
39	9BAPTICUS9	BAPTIE LAKE	17	T05N	R21E	19	114 00 45	43 46 45	9	10170
40	8BARB2ADA2	BARBER POND	29	T03N	R03E	1	116 07 00	43 33 30	8	2767
41	6BARKILEM8	BARKING FOX LAKE	20	T21N	R16E	30	114 36 45	45 07 45	6	8335
42	8BAROIBOI8	BARON LAKE	26	T09N	R12E	8	115 02 00	44 05 00	8	8312
43	8BAROIBOI8	BARON LAKE, LITTLE	27	T09N	R12E	8	115 02 50	44 05 15	8	8141
44	8BAROIBOI8	BARON LAKE, UPPER	35	T09N	R12E	8	115 02 00	44 04 45	8	8505
45	11BARTIBEA7	BARTLETT LAKE	06	T12S	R43E	4	111 29 00	42 24 00	11	7093
46	8BARTIWAS2	BARTON RES	03	T11N	R05W	44	116 55 00	44 19 00	8	2300
47	6BASIILEM8	BASIN LAKE	33	T18N	R22E	30	113 51 00	44 50 30	6	8890
48	7BASIIIDA7	BASIN LAKE	11	T23N	R02W	25	116 33 30	45 20 45	7	7700
49	6BASIIIDA7	BASIN LAKE	19	T23N	R14E	25	114 47 30	45 19 00	6	7688
50	6BASIICUS8	BASIN LAKE, EAST	35	T12N	R14E	19	114 47 30	44 20 00	6	8020
51	8BASSICAM7	BASS LAKES (2)	25	T05N	R12E	13	115 00 00	43 44 30	8	7970
52	5BATTIICA6	BATTLE LAKE	09	T33N	R15E	25	114 35 30	46 13 00	5	6625
53	6BAYHICUS8	BAYHORSE LAKE	36	T13N	R17E	19	114 24 00	44 24 45	6	8584
54	6BAYHICUS8	BAYHORSE LAKE, LITTLE	31	T13N	R18E	19	114 23 00	44 24 45	6	8338
55	8BEECIGEM3	BEECH LAKE	25	T11N	R01E	23	116 17 00	44 15 30	8	3470

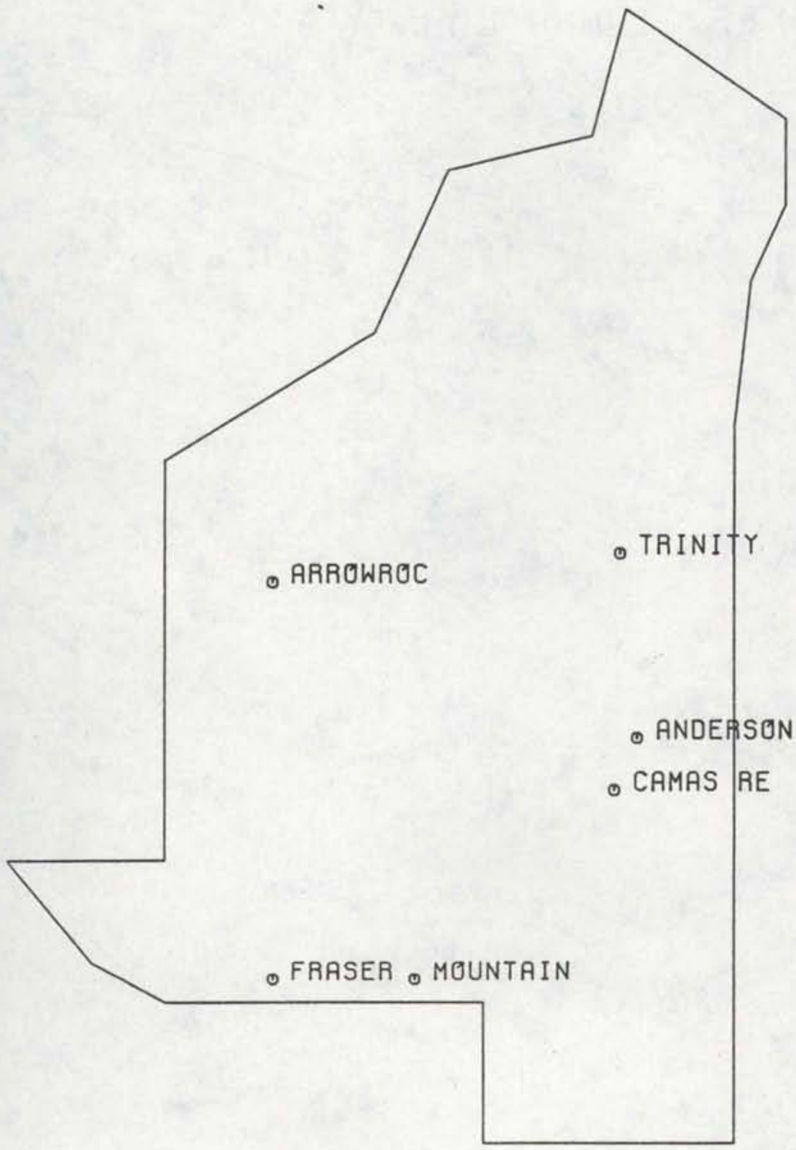
STATISTICAL ANALYSIS SYSTEM

OBS	KODE	LAKE	BASIN1	BASIN2	BASIN3	OWNER1	OWNER2	ACREAGE	QUADSHEE	NAFOREST	COUNTY
49	6BASI1IDA7	BASIN LAKE	SALMON R	COTTONWOOD	BASIN CK	1		8.0	COTTONWOOD BUTTE, ID	SAL	IDAHO
50	6BASI1CUS8	BASIN LAKE, EAST	SALMON R	BASIN CK	E BASIN CK	1		4.0	EAST BASIN CREEK, ID	CHA	CUSTER
51	8BASS1CAM7	BASS LAKES (2)	SFK BOISE R	ROSS FORK CK	BASS CK	1		8.0	ROSS PEAK, ID	BOI	CAMAS
52	5BATT1IDA6	BATTLE LAKE	MFK CLEARW	SELWAY R	EFK MOOSE C	1		25.0	SADDLE MTN., ID	NEZ	IDAHO
53	6BAYH1CUS8	BAYHORSE LAKE	SNAKE R	SPOKANE R	BAYHORSE CK	1		24.0	BAYHORSE LAKE, ID	CHA	CUSTER
54	6BAYH1CUS8	BAYHORSE LAKE, LITTLE	SNAKE R	SPOKANE R	BAYHORSE CK	1		15.0	BAYHORSE LAKE, ID	CHA	CUSTER
55	8BEEC1GEM3	BEECH LAKE	PAYETTE R	SQUAW CK	PINE CK	2		3.0	DODSON PASS, ID		GEM
56	8BEAD1BOI8	BEAD LAKES (2)				1		.	WARBONNET PEAK, ID	SAW	BOISE
57	9BEAR1CUS8	BEAR CREEK LAKE	BIG LOST R	PASS CK	BEAR CK	1		5.0	MACKAY, ID.	CHA	CUSTER
58	6BEAR1VAL7	BEAR CREEK LAKE	SALMON R	SFK SALMON R	BEAR CK	1		1.0	WARM LAKE, ID	BOI	VALLEY
59	9BEAR1FRE6	BEAR LAKE	HENRYS FORK	WARM R	ROBINSON CK	1		21.0	WARM RIVER BUTTE, ID-	TAR	FREMONT
60	6BEAR1CUS8	BEAR LAKE	SALMON R	WARM SPRING CK	BEAR LAKE CK	1		2.0	ROBINSON BAR, ID	CHA	CUSTER
61	11BEAR4BEA5	BEAR LAKE	BEAR R			7	2	70400.0	*BEAR LAKE NO, ID		BEAR LAKE
62	6BEAR1VAL7	BEAR LAKE	MFK SALMON	BIG CK	MONUMENTAL CK	1		15.0	EDWARDSBURG, ID	PAY	VALLEY
63	6BEAR1VAL7	BEAR LAKE	SNAKE R	SFK SALMON R	BEAR CK	1		10.0	PONY MEADOWS, ID	PAY	VALLEY
64	6BEAR1IDA4	BEAR LAKE	SNAKE R	SALMON R	BEAR CK	2		2.0	BURGDORF, ID		IDAHO
65	6BEAR1IDA7	BEAR LAKE	SALMON R	CROOKED CK	LAKE CK	1		12.0	BUFFALO HUMP, ID	NEZ	IDAHO
66	8BEAR1CAM8	BEAR LAKE, LITTLE	SFK BOISE R	ROSS FORK CK	L BEAR CK	1		3.0	NEWMAN PEAK, ID	SAW	CAMAS
67	5BEAR1IDA6	BEAR LAKE, LOWER	MFK CLEARWATER	SELWAY R	BEAR CK	1		2.0	EL CAPITAN MONT-ID	NEZ	IDAHO
68	5BEAR1IDA6	BEAR LAKE, UPPER	SELWAY R	BEAR CK		1		15.0	EL CAPITAN MONT-ID	NEZ	IDAHO
69	6BEAR1IDA6	BEAR PETE LAKE	SFK SALMON R	SECESH R	LAKE CK	1		3.0	BURGDORF, ID	PAY	IDAHO
70	6BEAR1LEM9	BEAR VALLEY LAKE (3)	LEMHI R	HAYDEN CK	BEAR VALLEY	1		35.0	LEM PEAK, ID	SAL	LEMHI
71	5BEAV1IDA6	BEAVER LAKES (3)	LOCHSA R	WHITE SAND CK	SHOOT CK	1		7.0	RANGER PEAK, ID-MONT	CLE	IDAHO
72	2BEAV1BNR2	BEAVER LAKE	PEND O R R	HOODOO CK	KELSO L	1		15.0	CAREYWOOD, ID	KAN	BNR-BONNER
73	2BEAV1BNR2	BEAVER LAKE	PEND O R R	PEND O R L		1		9.0	PACKSADDLE MTN, ID	KAN	BNR-BONNER
74	2BEAV1BOU3	BEAVER LAKE	PACK R	GROUSE CK	JAY CK	1		5.0	TWENTY MILE CR, ID	KAN	BOUNDARY
75	9BEAV2FRE5	BEAVER POND (E)	SNAKE R	HENRYS R	WARM R	1		63.0	SNAKE RIVER BUTTE, I	TAR	FREMONT
76	8BEAV1ADM4	BEAVER POND	SNAKE R	WEISER R	GOODRICH CK	1		7.4	CAMBRIDGE	PAY	ADM-ADAMS
77	2BEEH1BOU6	BEEHIVE LAKES (4)	PEND O R R	PACK R	BEEHIVE	1		11.0	THE WIGWAMS, ID	KAN	BOUNDARY
78	5BELL1IDA6	BELL LAKE	SELWAY R	BEAR CK		1		15.0	EL CAPITAN MONT-ID	NEZ	IDAHO
79	9BELL1CUS9	BELLAS LAKES (4)	BIG LOST R	STAR HOPE CK		1		5.0	COPPER BASIN	CHA	CUSTER
80	3BELL1BEN2	BELLS LAKE	SPOKANE R	ST JOE R		7		10.0	ST MARIES, IDAHO		BENEWAH
81	6BELV1VAL8	BELVIDERE LAKES	MFK SALMON	BIG CK	BELVIDERE	1		12.0	EDWARDSBURG, ID	PAY	VALLEY
82	6BENC2CUS8	BENCH LAKES (5)	SALMON R	L REDFISH	REDFISH L	1		58.0	MT CRAMER, ID	SAW	CUSTER
83	8BENE1BOI8	BENEDICT LAKE	PAYETTE R	SFK PAYETTE R	BENEDICT C	1		12.0	MOUNT EVERLY, ID	BOI	BOISE
84	3BENE2BEN2	BENEWAH LAKE	SPOKANE R	ST JOE R		5		341.0	ST MARIES, ID		BENEWAH
85	8BENN1OWY5	BENNETT RES	OWYHEE R	DEEP CK	HURRY BACK	2		5.0	WAGON BOX BASIN		OWYHEE
86	6BERN1VAL7	BERNARD LAKE	MFK SALMON R	BEAR VALLEY	PORTER CK	1		11.0	DEADWOOD RES, ID.	BOI	VALLEY
87	7BERN1IDA7	BERNARD LAKES (3)	SNAKE R	BERNARD CK		1		7.5	HE DEVIL, ID-OR	NEZ	IDAHO
88	5BERR1SHO6	BERRY LAKE	SNAKE R	MFK CLEARWATER	MEADOW CK	1		0.9	BACON PEAK, ID	CLE	SHOSHONE
89	9BETT1CUS9	BETTY LAKE	BIG LOST R	EFK BIG LOST	STAR HOPE CK	1		13.0	STANDHOPE PEAK, ID	CHA	CUSTER
90	6BIG 2CUS9	BIG BOULDER LAKES(12)	SALMON R	EFK SALMON R	BIG BOULDER CK	1		70.0	BOULDER CHAIN L, IDA	CHA	CUSTER
91	6BIG 1LEM8	BIG CLEAR LAKE	SALMON R	PANTHER CK	CLEAR CK	1		21.0	MT. MCGUIRE, ID.	SAL	LEMHI
92	9BIG 1CUS9	BIG FALL CK LAKE	NFK BIG LOST	SUMMIT CK	BIG FALL CK	1		3.0	PHI KAPPA MTN	CHA	CUSTER
93	1BIG 1BOU6	BIG FISHER LAKE	KOOTENAI R	PARKER CK		1		8.0	PYRAMID PEAK, ID	KAN	BOUNDARY
94	5BIG 1IDA6	BIG FOG LAKE	SELWAY R	3 LINKS CK	WFK 3 LINKS CK	1		2.0	FENN MTN, ID	NEZ	IDAHO
95	5BIG 1IDA6	BIG FOOT LAKE	MFK BOISE R	SELWAY R	BEAR CK	1		25.0	HUNTER PEAK, ID	NEZ	IDAHO
96	9BIG 1CUS9	BIG LAKE	EFK BIG LOST	STAR HOPE CK	LAKE CK	1		16.8	MULDOON CANYON	CHA	CUSTER

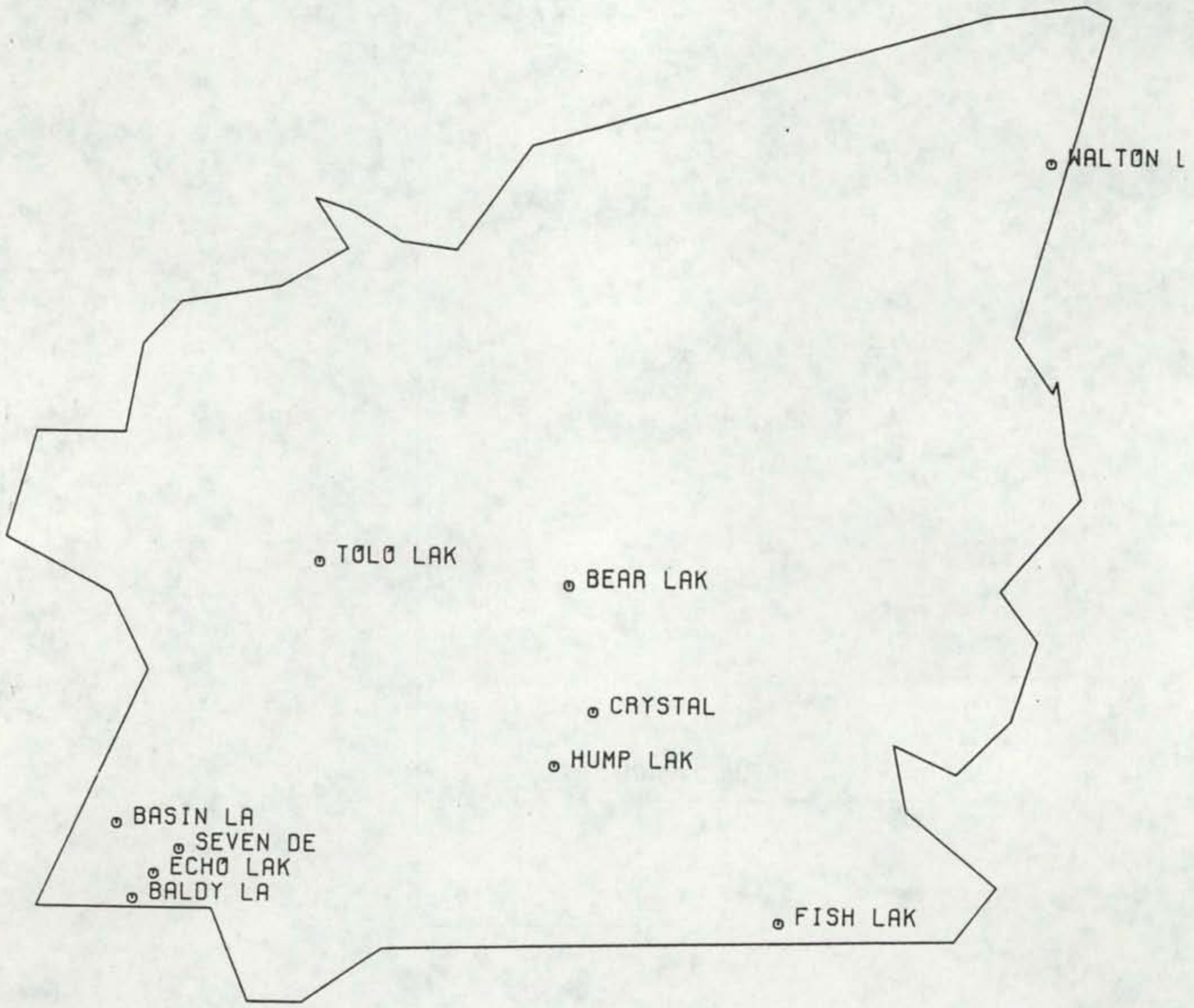
COUNTY=SHOSHONE

OBS	LAKE	CTY	LONGITUD	LATITUDE	SEC	TOWNSHIP	RANGE	BASIN	ELEV	ACREAGE	QUADSHEE	OWNER1	NAFCREST
1308	BACCN LAKE	40	115 16 00	46 58 00	24	T42N	R05E	3	5870	5.0	BACCN PEAK, IC	1	ST
1309	BERRY LAKE	40	115 15 45	46 57 00	25	T42N	R05E	5	6140	0.9	BACCN PEAK, IC	1	CLE
1310	BIG TALK LAKE	40	115 49 00	46 55 00	15	T42N	RC5E	5	5430	6.0	BCEHLS BUTTE	1	ST
1311	BLUE LAKE	40	115 37 00	46 57 30	30	T42N	R07E	5	5450	1.0	MALLARD PEAK, IC	1	ST
1312	CEDAR LAKE	40	115 45 45	47 20 00		T46N	R05E	3	5580	1.0	WALLACE	1	ST
1313	CCPPER LAKE	40	115 16 10	46 55 50	36	T42N	RC9E	5	5740	3.4	BACCN PEAK, IC	1	CLE
1314	CRAG LAKE	40	115 35 15	46 57 00	28	T42N	RC7E	5	5890	10.0	MALLARD PEAK, IC	1	ST
1315	CRATER LAKE	40	115 59 00	47 02 00	29	T43N	RC4E	3	5750	5.0	WIDCW MTN, ID	1	ST
1316	CROW LAKE	40	115 55 30	47 06 50	35	T44N	RC4E	3	5750	2.0	WIDCW MTN, ID	1	ST
1317	DEVILS LAKE	40	115 38 00	46 57 30	25	T42N	RC6E	5	5175	2.0	BUZZARD RCCST ID	1	ST
1318	DISMAL LAKE	40	115 38 00	47 07 00	31	T44N	RC7E	3	5350	7.0	MCNTANA PEAK	1	ST
1319	ELSIE LAKE	40	116 01 00	47 26 00	13	T47N	RC3E	3	5100	12.0	CALDER, IDAHO	1	CDN
1320	FAWN LAKE	40	115 31 00	46 57 30	25	T42N	R07E	5	5912	12.0	MALLARD PEAK, ID	1	ST
1321	FISH LAKE	40	115 57 30	47 06 00	04	T43N	RC4E	5	5457	5.0	WIDOW MTN, ID	1	ST
1322	FORAGE LAKE	40	115 16 00	46 53 30	13	T42N	RC9E	3	5760	6.0	BACON PEAK, ID	1	ST
1323	FROG LAKE	40	115 09 30	47 05 30	11	T43N	R10E	3	6300	4.0	ILLINCIS PEAK, MT-ID	1	ST
1324	GLIDDEN L, LOWER	40	115 43 45	47 31 00	18	T48N	RC6E	3	5616	6.0	CCCPER GULCH, IC	1	CDN
1325	GLIDDEN L, UPPER	40	115 43 00	43 31 00	08	T48N	R06E	3	5935	5.0	COOPER GULCH, ID	1	CDN
1326	GNAT LAKE	40	115 35 30	46 57 45	21	T42N	RC7E	5	5845	3.0	MALLARD PEAK, ID	1	ST
1327	GOLD LAKE	40	115 16 30	46 56 40	36	T42N	RC9E	5	6100	3.3	BACON PEAK, ID	1	CLE
1328	HALO LAKE	40	115 15 30	46 58 30	13	T42N	RC9E	3	6150	10.0	BACCN CREEK	1	ST
1329	HEART LAKE	40	115 35 00	46 56 30	33	T42N	RC7E	5	5990	33.0	MALLARD PEAK, ID	1	ST
1330	HEATHER LAKE	40	115 16 00	46 57 15	25	T42N	R09E	5	6160	6.0	BACON PEAK, ID	1	ST
1331	HERO LAKE	40	115 35 30	46 58 00	21	T42N	RC7E	5	5190	5.0	MALLARD PEAK, IC	1	ST
1332	LARKINS LAKE	40	115 36 36	45 57 00	29	T42N	R07E	5	5580	11.0	MALLARD PEAK, ID	1	ST
1333	LONG LAKE	40	115 43 45	47 26 00	12	T47N	R05E	3	5598	1.0	WALLACE ID-MONT	1	CDN
1334	LOST LAKE	40	115 57 30	47 04 30	16	T43N	RC4E	5	5536	20.0	WIDOW MTN., IC	1	ST
1335	LOST LAKE	40	116 00 00	47 27 00	31	T48N	RC4E	3	5040	5.0	WALLACE, ID	1	CDN
1336	LOST LAKE, LITTLE	40	115 56 30	47 04 00	15	T43N	RC4E	5	5765	2.0	WIDOW MTN., IC	1	ST
1337	MALLARD LAKE	40	115 30 45	45 56 15	36	T42N	RC7E	5	5750	1.0	MALLARD PEAK, IC	1	ST
1338	MUD LAKE	40	115 36 15	45 57 15	29	T42N	R07E	5	5850	4.0	MALLARC PEAK, ID	1	ST
1339	NO SEE UM LAKE	40	115 46 30	47 01 15	36	T43N	RC5E	5	5500	4.0	MONUMENTAL BUTTES	1	ST
1340	NORTHBOUND LAKE	40	115 34 30	45 56 15	34	T42N	RC7E	5	5436	11.0	MALLARD PEAK, ID	1	ST
1341	POND PEAK LAKE	40	116 03 00	47 41 00	14	T52N	R04E	3	6000	1.0	POND PEAK, ID		CCE
1342	REVETT LAKE	40	115 45 00	47 33 30	25	T49N	RC5E	3	6750	11.0	BURKE, ID	1	CDN
1343	SILVER LAKE	40	115 16 10	46 56 00	36	T42N	RC9E	5	5920	6.0	BACON PEAK, IC	1	ST
1344	SKYLAND LAKE	40	115 31 30	45 57 00	26	T42N	RC7E	5	4779	13.0	MALLARD PEAK, IC	1	ST
1345	ST JOE LAKE	40	115 05 00	47 01 00	04	T42N	R11E	3	6450	18.0	ILLINCIS PEAK MONT-ID	1	ST
1346	STEAMBOAT LAKE	40	115 47 30	47 01 15	35	T43N	R05E	5	5900	7.0	MONUMENTAL BUTTES	1	ST
1347	STEVENS L, LOWER	40	115 45 30	47 26 00	12	T47N	RC5E	3	5553	10.0	WALLACE ID-MONT	1	CDN
1348	STEVENS L, UPPER	40	115 45 30	47 26 00	12	T47N	R05E	3	5700	7.0	WALLACE ID-MONT	1	CDN
1349	THERIAULT LAKE	40	116 02 00	47 09 00	13	T44N	RC3E	3	5732	3.0	MARBLE MTN	1	ST
1350	TIN LAKE	40	115 16 00	46 56 30	36	T42N	RC9E	5	5740	2.0	BACON PEAK, IC	1	CLE
1351	URQUHART LAKE	40	116 19 00	47 19 00	22	T46N	R01E	3	2144	5.0	ST JOE, ID		

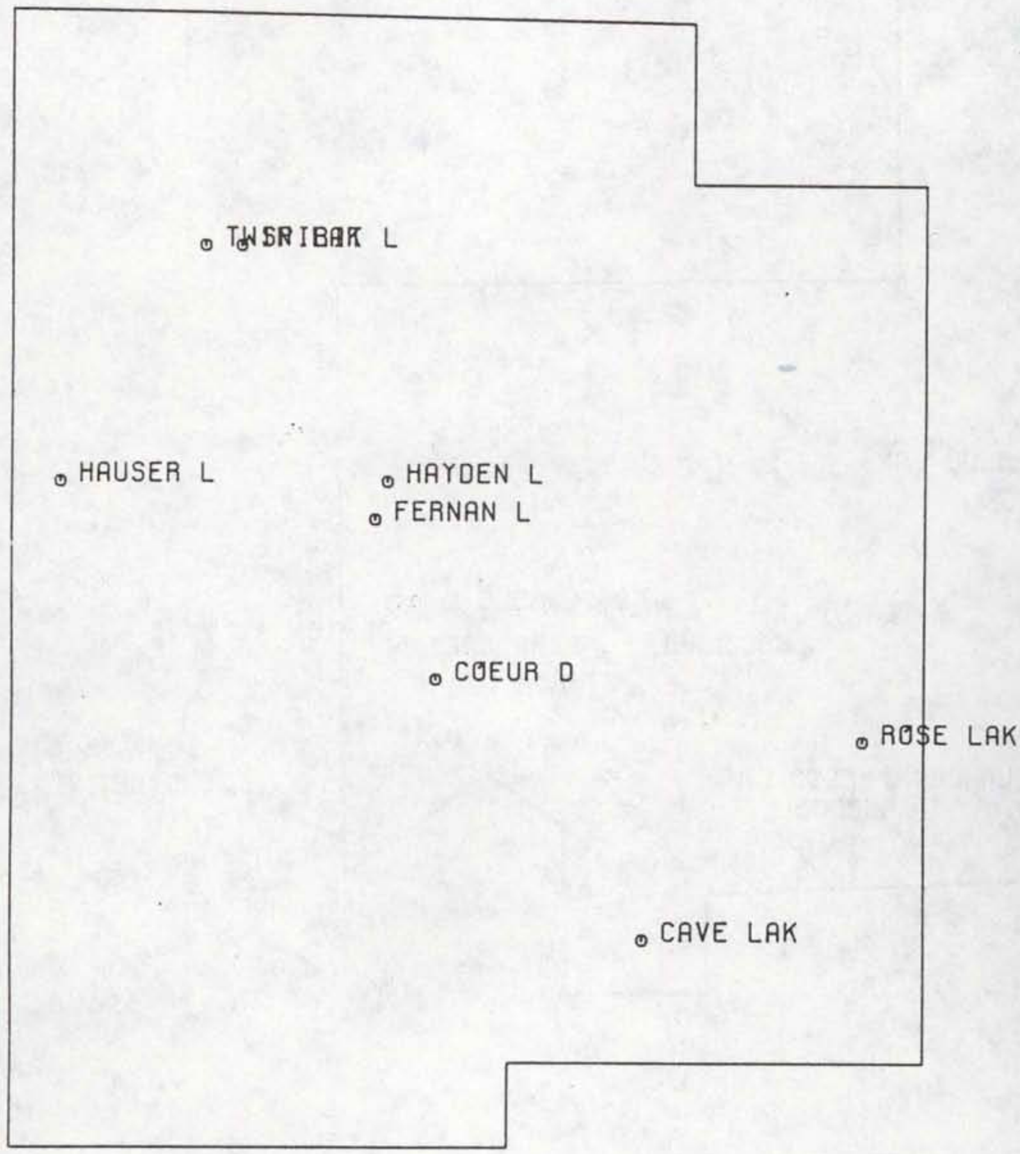
PRIORITY LAKES, ELMORE COUNTY



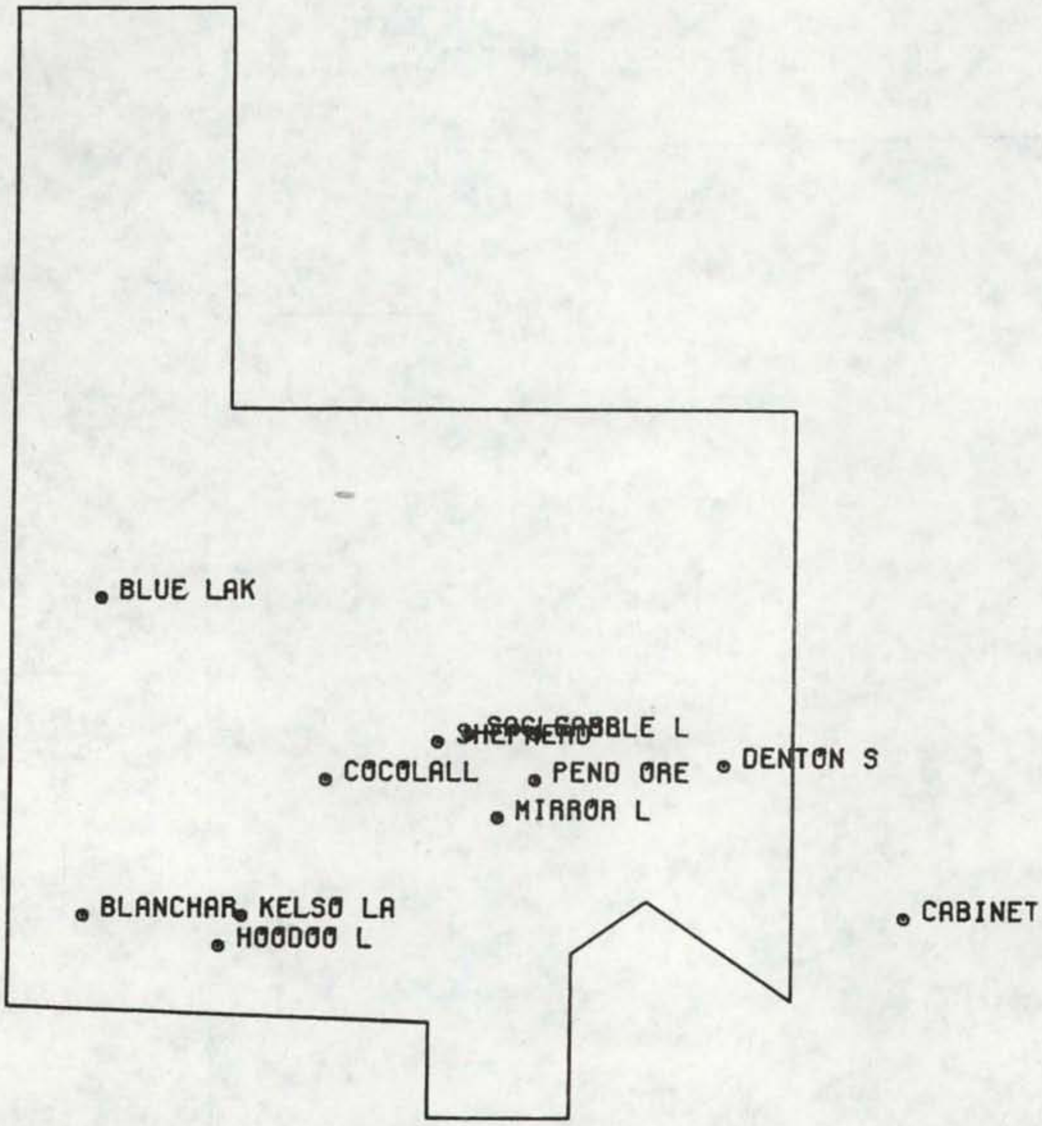
PRIØRITY LAKES, IDAHØ CØUNTY



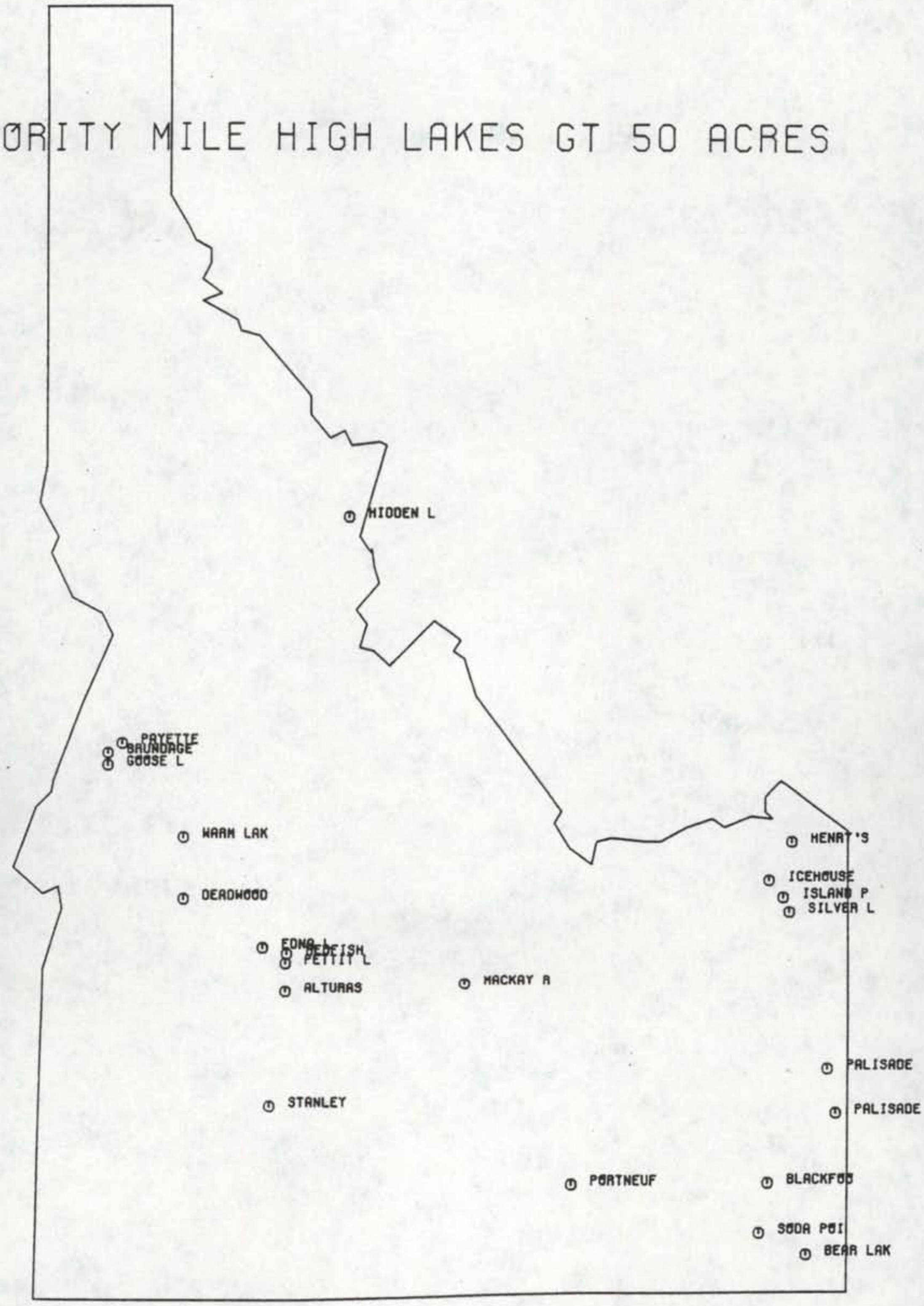
PRIORITY LAKES, KOOTENAI COUNTY



MASTER FILE: BØNNER ELEV LE 2400 ACREAGE GE 50



PRIORITY MILE HIGH LAKES GT 50 ACRES



STAMPEDE

Abbreviated Instructions

for

Producing Annotated Contour Maps

set up for GRASP Project

by

David E. Hall

November, 1981

EDITOR'S NOTE: STAMPEDE is a program originally written by the Geological Survey which has been available at the University of Idaho for several years. The program is not maintained or supported by the Computer Center, except that it is residing in overlay load modules on the user.proglib (the library of programs available at large to the university). It is on the system for use by those that are able. No one in User Services currently is familiar with the system.

STAMPEDE can be used to get a contour plot of lake depths or other spatial data. It has many other capabilities as well, but we shall focus on the plotting facilities. The data to be input must be in the form of scattered X and Y values with associated depth or other data. STAMPEDE will generate an interpolated depth for each intersection of an imaginary grid placed over the area to be plotted. This is accomplished by using STAMPEDE's MAKEFILE and NUMAPRCX functions. The actual plot is created through CONTOURS.

The useful options for each function are explained below, followed by an example run.

MAKEFILE

MAKEFILE reads the X, Y, Z coordinates from cards (or a card-image data file), one triple per card. A typical MAKEFILE function call follows, with an explanation of what the program has been told.

An entire MAKEFILE operation might look like:

```
FUNCTION MAKEFILE
INPUT INFILE=10,FIELD=X(1,10,1),Y(11,20,1),ZO(21,30,10)
OUTPUT OUTFILE=11
OPTIONS TERMINATE=$(1,2)
END
```

This specifies that the X values will be found in columns 1 through 10, the Y-values in columns 11 through 20, and the Z-values in columns 21 through 30 of the data cards to be entered later in the program file. Each X and Y value are to be multiplied by 1 when read, and each Z value will be multiplied by 10. Any card with dollar signs in columns 1 and 2 will indicate the last data card. Input data will be expected on unit 10, and the output from MAKEFILE will be stored on unit 11. This output will be used in the NUMAPROX function.

NUMAPROX

NUMAPROX interpolates depth values between those supplied to MAKEFILE. It requires the desired input and output unit numbers (input=11, the output file from MAKEFILE), the field, or Z values to be considered (Z0 when only one piece of data is recorded for each point), and a grid spacing. The grid spacing is specified by the size of each grid cell, and the minimum and maximum X and Y values, such as:

```
GRID=2(0,0,16,24)
```

where '2' specifies 2 X units per grid cell; the minimum X and Y values to be considered are 0, the maximum X is 16, and the maximum Y is 24.

An entire NUMAPROX request might be represented as follows:

```
FUNCTION NUMAPROX
INPUT INFILE=11,FIELD=Z0
OUTPUT OUTFILE=12,GRID=2(0,0,24,26)
END
```

CONTOURS

The CONTOURS function takes the gridded data created by NUMAPROX, and creates a contour map from them. It can be told the desired contour interval, what elevation to not draw below, what contour not to draw above, contour annotation frequency (the annotation can only have integer values), and the plot scale, among others.

An example CONTOURS function call and an explanation follows:

```
FUNCTION CONTOURS
INPUT INFILE=12
OUTPUT OUTFILE=13
PLOT SCALE=8,MAPLIMIT=(0,0,16,24),PLOTDIM=11
```

```
OPTIONS LINES=SINGLE,INTERVAL=100,ANNCTATE=NO,STLINE=15,LOCON=0
END
```

This tells the program to look in unit number 12 (the output unit from NUMAPRCX) for its grid data, and that a contour map of the section frcm X=0, Y=0 to X=16, Y=24 with a scale of eight X-units per inch, and a contour interval of 100 Z-units. The limiting dimension of the plotter has been indicated at 11 inches. No negative contours will be drawn (LOCON=0), and curved lines will be represented by straight-line segments no longer than 15% of one grid side. Each contour line will be drawn with a single line, and none will be annotated. If the ANNCTATE statement above were replaced by

```
ANNOTATE=(2,1)
```

then every other contour would have been annotated, with no more than one inch between annotations across the map.

GENERAL CONSIDERATIONS

The unit numbers are determined by the FORTRAN unit numbers specified in the JCL section of the STAMPEDE program. As the JCL (Job Control Language) is given here, the unit numbers given in the examples work correctly.

The order in which the steps are entered in the program is important; the functicns are executed in the order they are encountered, and the X,Y,Z data must be read (MAKEFILE) before the numerical approximation (NUMAPROX) can be run, etc.

Also, each function call ends with an "END" statement, except for the last function call in the job -- which ends with an "END ALL".

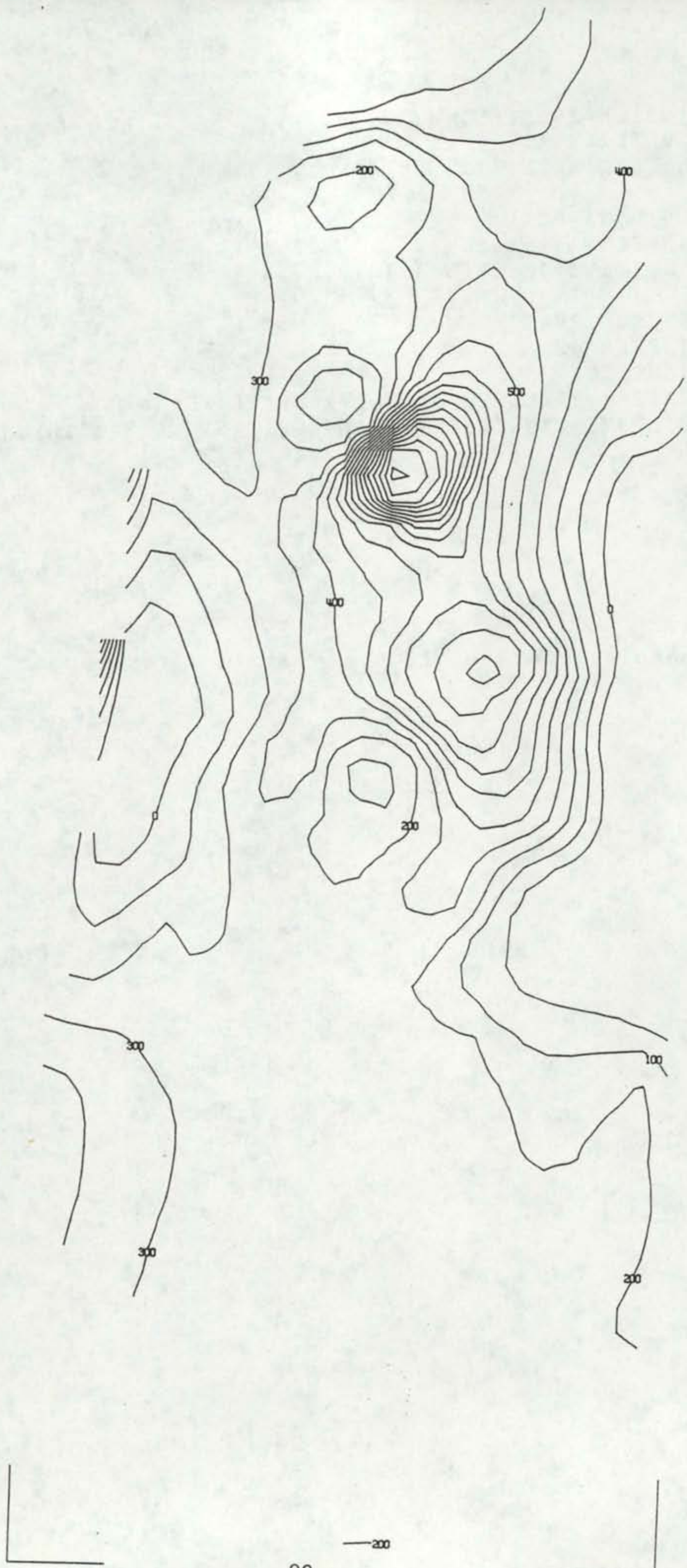
The origin for digitizing X,Y,Z coordinates should be at the lower left- hand corner; preferably with the X-axis going along the shorter side, since the X-axis is plotted across the limiting direction (11") of the plotter.

An entire jcb, JCL and all, is set up below:

```
//JNAME  JOB (ACCTCODE,123-45-6789),NAME,TIME=3,CLASS=A
//   EXEC PGM=STAMPEDE
//FT06F001 DD SYSOUT=A
//FT08F001 DD DSN=&&NUMWRK,DISP=(NEW,PASS),SPACE=(1600,(400)),
//   DCB=(RECFM=F,LRECL=1600,BLKSIZE=1600,DSORG=DA),UNIT=DISK
//FT11F001 DD DSN=&&MAKFIL,DISP=(NEW,PASS),SPACE=(TRK,(10,2)),
//   UNIT=DISK
//FT12F001 DD DSN=&&NUMFIL,DISP=(NEW,PASS),SPACE=(TRK,(10,2)),
//   UNIT=DISK
//FT13F001 DD DSN=MYPLOT,UNIT=TAPE,DISP=(,KEEP),LABEL=(,NL),
//   DCB=(RECFM=U,BLKSIZE=512,DEN=2)
//FT10F001 DD *
     .5     14.5  195.
     7.3    25.8  287.
    10.5    26.5  159.
    12.5    24.8  230.
    10.9    9.2   293.
    14.5    23.0  265.
    17.8    18.2  280.
    12.8    5.6   299.
    15.7      .3  465.
    18.       21.3 187.
    20.8      18.0 223.
    23.5      10.5 203.
    25.6      19.0  59.
    27.1      17.8 295.
    29.5      13.8 187.
    31.7      16.2 213.
    32.1      15.3  86.
    33.1      9.8  292.
    35.       8.6  100.
    36.9      17.8 862.
    41.8      14.8 582.
    44.       23.7  24.
    44.3      20.6 380.
    45.1      15.21610.
    47.9      13.9 119.
    49.2      26.5 117.
    50.5      8.9  321.
    51.9      13.2 230.
    52.3      19.  430.
    52.3      5.7  314.
    56.4    14.6   212.
    56.5    21.3   469.
    60.4    16.7   578.
    61.1    23.7   454.
    64.8    19.2   656.
    67.9    20.9   551.
    9999
//FT05F001 DD *
 FUNCTION MAKEFILE
```

```
 INPUT INFILE=10,FIELD=X(10,16,1),Y(05,09,1),Z0(17,22,1)
 OUTPUT OUTFILE=11
 OPTIONS TERMINATE=9(05,08)
 END
 FUNCTION NUMAPROX
 INPUT INFILE=11,FIELD=Z0
 OUTPUT OUTFILE=12,GRID=1.(0,0,27,68)
 END
 FUNCTION CONTOURS
 INPUT INFILE=12
 OUTPUT OUTFILE=13
 PLOT SCALE=4,MAPLIMIT=(0,0,27,68),PLOTDIM=11
 OPTIONS LINES=SINGLE,INTERVAL=100.,ANNOTATE=(1,2),STLINE=5,LOCON=0
 END ALL
/*
//
```

Sample output generated from the above setup appears on the next page.


200
400
300
500
400
0
0
200
300
100
300
200
-200