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Design and Evaluation of a Fisheries Information Storage and Retrieval System (FISARS) for the State of South Dakota

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DESIGN AND EVALUATION OF A FISHERIES INFORMATION STORAGE

AND RETRIEVAL SYSTEM (FISARS) FOR THE STATE OF SOUTH DAKOTA

BY

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AND RETRIEVAL SYSTEM (FISARS) FOR THE STATE CF SOUTH DAKOTA

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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ABSTRACT

Extensive data collected each year from the streams and lakes of South Dakota necessitates a computerized system with which to efficiently utilize the large amount of material. A fisheries related data storage and retrieval system (FISARS) was developed sufficiently to provide cost estimates in creating and maintaining such a system. Detailed descriptions were made to provide information in implementing and utilizing the retrieval system.

A survey was made of state fish and game agencies currently operating storage and retrieval systems. This information along with comments provided by the fisheries personnel in the state of South Dakota was used as a guideline in developing the FISARS System.

The FISARS System is composed of two data bases. One data base contains bibliographic reference material related to fisheries work within the state of South Dakota. The other data base contains specific data about individual bodies of water. The two data bases can operate together or individually.

Estimates were made concerning the cost of coding and transferring data, keypunching and verifying, and building of both data bases. Two computer facilities are available with which the storage and retrieval systems could be used, therefore, estimates of costs in operating the system were made for each facility.

The programs used to build and manipulate the bibliographic data bases were written in COBOL language and access of the data base utilized the VSAM (Virtual Storage Access Method) method. Only the computer programs providing the actual retrievals of the data base containing lake and stream survey information need to be written to make the storage and retrieval system functional.

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INTRODUCTION

The importance and usefulness of computers in the field of fisheries has been well documented. Lackey (1975) enumerated current and potential applications of computers in fisheries science. These range from relatively simple programs which analyse specific data such as age and growth (Gerking 1965) to rather sophisticated data analysis (Hesse 1977); modeling systems (Patten 1969; O'Heeron and Ellis 1975); and extensive storage and retrieval systems (Nixon 1971; Brogden et al 1974; Natch and Weber 1976).

Lake surveys are often an important part of managing a fisheries resource. After years of collecting baseline material and making continuous additions, manual filing systems have become large and inefficient to use. Because of this, along with the need to have quick and accurate access to this material, many states have begun or have in operation computerized data storage and retrieval systems (Clark et al. 1977). These systems may also contain packages for performing various data analyses.

State fish and wildlife agencies often have different needs depending on the quality and quantity of their fisheries resources, money available and human populations. This necessitates designing individual storage systems for each state's particular needs. Large amounts of fisheries data are collected each year in South Dakota. Raw data collected in past years and publications are reports concerning projects and studies on various South Dakota waters are on file. Pursuing these files to compile specific information or to determine the extent of

studies on a particular body of water often requires many hours of searching. A fast and efficient system is needed to handle stored data for maximum benefit. Such a system could save time, money and manpower in performing complicated or tedious data manipulations.

With these criteria, the objectives for this project were:

1. Test and sufficiently develop a storage and retrieval system in order to provide an estimate of cost of such a system including building, yearly operation and updating.

2. Outline the capabilities of the system and project its future use.

MATERIALS AND METHODS

The Fisheries Information Storage and Retrieval System (FISARS) is comprised of two separate data bases, GIVEFISH and BIBFISH. GIVEFISH provides detailed information about individual lakes or rivers in South Dakota and BIBFISH is a bibliographic storage and retrieval system which contains bibliographic references of published and unpublished material concerning the lakes and streams of South Dakota. Both data bases work in conjunction with each other or separately to form the mother system, FISARS.

The computer programs designed to manipulate the two data bases, GIVEFISH and BIBFISH, are similar in theory; therefore only the programs manipulating BIBFISH were completely written and tested. Test data for GIVEFISH was compiled and a data base was built to provide further information concerning cost estimates.

Test data for GIVEFISH was taken from a 13 county area, Region IV, north and east of Beadle County and bounded by North Dakota on the north and Minnesota on the east. This area was ideal for testing a retrieval system because it is near the computer facilities and it has numerous lake and stream records which were on file at Webster, South Dakota, 144 km (90 mi) north of Brookings, South Dakota. Region IV contains 15 permanent (never winterkills or summerkills), 22 semi-permanent (winterkills or summerkills once every ten years), and 97 marginal (winterkills or summerkills once every five years) lakes. As of 1 July 1978, the South Dakota Department of Game, Fish and Parks (GFP) reorganization reduced the number of management regions in the state

from five to four. Although this did not alter the testing of data it must be noted that the Region IV referred to in this text no longer includes the counties of Beadle, Kingsbury and Brookings, but now includes McPherson, Edmunds and Faulk counties. BIBFISH was tested by utilizing references from a collection of North Central Reservoir Investigation studies (1976 Unpublished, North Central Reservoir Investigation, U.S. Fish and Wildlife Service, Pierre, South Dakota).

COMPUTER FACILITIES AND ACCESS METHODS

An IBM 370-148 computer was used to store and retrieve data at South Dakota State University, Brookings, South Dakota. The computer runs on OS/VS1 with one megabyte of storage and six 3340 disc drives.

The data was accessed with VSAM (Virtual Storage Access Method) (IBM 1975). VSAM was chosen because of its efficiency in using files on a disc pac. Files can be accessed both sequentially and randomly. VSAM also utilizes alternate indexes, which provides a unique way to gain access to a related data base set, so it is not necessary to keep multiple copies of the same information organized in different ways for different applications.

BIBFISH DATA BASE DESCRIPTION

Data Base Organization

The problems in maintaining and updating a reference file are numerous. There have been many manual methods devised to handle small reprint libraries (Burns and Mosby 1971), but these become difficult to manipulate on a large scale. Lee, et al. (1971) developed a computerized

system using key words from the title to be used as retrieval categories.

The BIBFISH programs (Appendix A) were developed to coincide with the GIVEFISH data base. The header cards (Columns 6-9) of most GIVEFISH data sheets (Appendix B) provide space for a four digit identification number. This is used when any of the data from each page is taken from a publication and not from a GFP survey. Publications are given numbers sequentially and stored in the BIBFISH data base. Therefore when a FISARS printout indicates that data was obtained from other than GFP surveys, a BIBFISH retrieval will provide a complete listing of the references.

BIBFISH can also be used to retrieve references centering around a specific subject or a specific lake by using the subject index (Appendix C), river codes (Appendix D) or lake codes (Appendix E).

The subject index (Appendix C) was designed to contain all areas expected to be found in the field of fisheries. These were listed in alphabetical order by subject and the sub-headings under each subject were assigned a five digit code number. This index was used to create a key word format (alternate keys) for each bibliographic reference.

Alternate indexes provide a method for organizing a file of references under more than one subject key. In this case the principle key is the individual number given to each bibliographic reference and the ten alternate keys are those describing the content of the reference.

The data base was designed to store up to 5000 (560 characters) references or records and not more than 500 subject replicates. This

means that of the 5000 records, no more than 500 may be of the same subject. Core space allotted for these parameters can be set according to need and can be increased whenever needed. Test data was punched on cards and then read on tape to provide a printout for verification. The corrected tape was then read on disc and the VSAM File built.

Each reference is coded on a date sheet (Fig. 1) and given a five digit bibliographic code (Card 1, Columns 1-5) sequentially as new references are added. This is the primary key for retrieval. The following ten, five digit columns are the alternate indexes. Here the subject codes are placed pertaining to the reference. These spaces can also be used to indicate the code number for a particular body of water. A zero is added to the lake and river codes in order to complete the five digit space. This enables the retrieval of studies from only a specific body of water. Figure 1 presents an example of how these subject codes (Appendix C) would be used. On card one, columns 21-25, the number 16170 is written. This is the code for Lewis and Clark Lake (Appendix E).

The final five cards on the data sheet contain specific information about the reference itself. Column 80 of card three and four are used as stoppers. Should the title fill only one card, a "1" is punched in "stop-1" indicating only one card was used and the remaining two cards are not added to the deck. If two cards are used, then a "2" is placed in "stop-2". This eliminates placing blank cards in the deck to fill the seven card record.

BIBLIOGRAPHY RETRIEVAL

BIBLIOGRAPHY
CODE

SUBJECT   CODES

```
| | | | |        | | | | |        | | | | |        | | | | |        | | | | |        | | | | |
   1-5            6-10             11-15            16-20            21-25            26-30

                 | | | | |        | | | | |        | | | | |        | | | | |        | | | | |
                  31-35            36-40            41-45            46-50            51-55
```

BIBLIOGRAPHY
CODE

AUTHOR

```
| | | | |        | | | | | | | | | | | | | | | | | | | | | | | | |
   1-5                             6-30
```

YEAR

```
                 | | | | | | | | | | | | | | | | | | | | | | | | |        | | | | |
                                   31-55                                    56-59
```

BIBLIOGRAPHY
CODE

TITLE

```
| | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
   1-5                                  6-40
```

STOP 1

```
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
                                        41-79
```

☐
80

```
| | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
   1-5                                  6-40
```

STOP 2

```
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
                                        41-79
```

☐
80

```
| | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
   1-5                                  6-40
```

```
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
                                        41-79
```

JOURNAL

```
| | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
   1-5                                  6-40
```

```
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
                                        41-79
```

BIB
CODE

VOLUME

NUMBER

PAGES

```
| | | | |        | | | | | | | | | |        | | | | | | | | | |        | | | | | | | | | |
   1-5              6-15                    16-25                      26-35
```

Figure 1.   Data sheet for Bibliographies.

BIBFISH Retrievals and Programs

Four COBOL programs were written to set up and use the BIBFISH data base (Appendix A). Both programs 1 and 2 are used to build the data base. Program 1 will read the card file and record it on tape. A printout provides an opportunity to correct any errors before the VSAM disc file is built. Program 2 reads the tape file after all errors have been removed and builds the VSAM file. It does not provide a printout.

The actual retrievals are provided by program 3. BIBFISH retrievals are made by punching the first five columns of a card or on a terminal with the subject code desired to be searched. There is no limit to the number of retrievals per run. The printout (Fig. 2) indicates what is being searched and the accompanying bibliographies. In this example, the first retrieval was for bibliography number "3" or record "3". Immediately following is record number "3". The third search, code number 12001, is for references related to crustaceans. Four references were retrieved.

The final search code '47040' was used as a lake search. In the subject index (Appendix C) number 47040 does not appear, therefore, number 47040 or 4704 relates to Lake Wetonka in McPherson county (Appendix E). Since the data base does not contain any references relating to Lake Wetonka, there were no retrievals.

Program 4 is used to add or correct records. Correcting a record is a matter of reprocessing the complete record with its corrected identification code and the corrected reference. Adding a record is accomplished in the same manner except the identification code must be

```
RECORD CODE        3


     3     17002 17004 17005 10023  0000  0000  0000  0000  0000  0000
NELSON W R   N R HINES AND L G BECKMAN                          1956
ARTIFIAL PROPAGATION OF SAUGERS AND HYBRIDIZATION WITH WALLEYES
```

	VOLUME	NUMBER	PAGES
PROGRESSIVE FISH - CULT	27	4	216-218

```
RECORD CODE       14


    14     24003  0000 25001 12002 12000 23003 12000  0000  0000  0000
SWANSON G A                                            1967
FACTORS INFLUENCING THE DISTRIBUTION AND ABUNDANCE OF HEXAGENIA NYPHS (EPH
EMEROPTERA) IN A MISSOURI RIVER RESERVOIR
```

	VOLUME	NUMBER	PAGES
ECOLOGY	48	2	216-225

```
SEARCH CODE      12001


     7     24003 25005  0000 30004 23003 12001 12000  0000  0000  0000
HUDSON P L AND B C COWELL                              1966
DISTRIBUTION AND ABUNDANCE OF PHYTOPLANKTON AND ROTIFERS IN A MAIN STEM MI
SSOURI RIVER RESERVOIR
```

	VOLUME	NUMBER	PAGES
PROC SOUTH DAKOTA ACAD SCI	45		84-106

```
     9      0000 25007 25000 24003 23003 12001 12000  0000  0000  0000
TASH J C   G A SWANSON AND R E SIEFERT                 1966
REPORT O  THE OCCURENCE AND DISTRIBUTION OF CLADOCERA AND COPEPODA IN LEWI
S AND CLARK LAKE SOUTH DAKOTA
```

	VOLUME	NUMBER	PAGES
UNIV OF KANSAS SCI BULL	46	11	425-432

```
    10      0000 10020 10010 23003 12000 12001  0000  0000  0000  0000
WALBURG C H AND W R NELSON                             1956
CARP  RIVER CARP SUCKER  SMALLMOUTH BUFFALO AND BIGMOUTH BUFFALO IN LEWIS
AND CLARK LAKE MISSOURI RIVER
```

	VOLUME	NUMBER	PAGES
U S BUREAU OF SPORT FISHERIES AND WILDLIFE RES REP		69	30

```
    11     25007 25000  0000 30004 23003 12000 12001  0000  0000  0000
COWELL B C                                             1967
THE COPEPODA AND CLADOCERA OF A MISSOURI RIVER RESERVOIR A COMPARISON OF
SAMPLING IN THE RESERVOIR AND THE DISCHARGE
```

	VOLUME	NUMBER	PAGES
LIMNOL OCEANOG	12	1	125-136

```
SEARCH CODE      47040
```

Figure 2.   Sample BIBFISH Retrieval.

a number that sequentially follows the last identification code in the file. Adding and deleting should be done only after a back log of corrections and additions are available because this process utilizes a quantity of computer time and is therefore expensive. Adding and deleting should be done on a yearly basis as new material becomes available.

GIVEFISH DATA BASE DESCRIPTION

Data Base Organization

In order to obtain an accurate estimate of costs for building and maintaining a large data base such as GIVEFISH, the test data from Region IV was used to create a trial data base. GIVEFISH was also orgainzed according to the VSAM access method as was BIGFISH. The data records were organized with the lakes or streams numbered sequentially as the primary key. Five alternate - index clusters were established to more efficiently utilize related data sets.

The first alternate index is the lake or river codes (Appendix D and E). The alternate key provides access to each record by this code. The second alternate index is the ecological classification. The alternate keys are Trout, Walleye - Panfish - Bass, Game Fish - Rough Fish, Bullhead and Panfish - Bass. The third alternate index is water description and the alternate keys are Lake, River and Large Reservoirs. The fourth alternate index is status with alternate keys of Permanent, Semi-permanent, Marginal and Waterfowl. Description of these parameters is given in the GFP Lake Survey Manual (1971 Unpublished, South Dakota

Department of Game, Fish and Parks, Pierre, South Dakota). The final alternate index is region. As of 1 July 1978, there were four geographical regions or areas managed by GFP which serve as the alternate keys. The use of these alternate indexes will enable, for example, the accessing of the records of permanent waters under status or only rivers under water description.

To reduce the amount of disc space utilized, information from each water is only the most recent. Older data contained in Forms D, F, G, H, I, J, K, L, N (Appendix B) would be kept on a storage tape. Information on Forms A, B, C, E, M (Appendix B) will only be updated or deleted when needed.

Storage and retrieval programs and data analysis programs are to be written in COBOL. Data will be stored and accessed on a disc with tapes and cards providing a security duplicate of records.

Estimate of Cost

In order to create a retrieval system in which its usefullness would be retroactive, it is necessary to store previously collected data. Data was stored from 1970 to 1976 for several reasons. This was a period in which the South Dakota Department of Game, Fish and Parks (GFP) did their most intensive survey work and recorded data in a form closely resembling the structure of the data sheets prepared for this study.

Choosing these years also guaranteed that at least two years of test netting data was obtained from each water. On lakes where no test

netting was done during this period of time previously collected data was stored. Although this older data could not be considered valuable as a recent population indicator, it was considered useful in relating a lakes possible potential even though more recent information was not available.

To derive an estimate of the cost of storing this backlog of information the time spent transferring the records to the data sheets was recorded. Since Region IV contained the most extensive files of lakes and streams this provided an accurated estimate of the average time needed to record a typical lake. This was then expanded for the entire state.

Coded data, after being checked for errors, was keypunched on 80 column computer cards. Time and cost were recorded for keypunching. Data was then transferred to a VSAM disc for storage. Computer cost was recorded. With these costs calculated and using the total number of lakes and streams managed by GFP, the total cost for storing seven years of data statewide was estimated.

Parameter Selection and Design of Coding Sheets

Lagler (1952) outlined the methods and purposes of lake and stream surveys. This information could be used as the basic data with which a storage and retrieval system could be set up.

Several methods were detailed to ensure that all parameters needed for storage were used. A survey was sent to state wildlife agencies known to have storage and retrieval systems (Clark et al. 1977). These

states were asked for data sheets, costs of operation and uses of their systems. This information was used as a guideline in designing the coding sheets, along with data sheets from the U.S. Environmental Protection Agency's STORET (Nixon 1971) and BIO-STORET (Natch and Weber 1976).

A tentative parameter list was assembled using the GFP Lake Survey manual with necessary additions and deletions. This list was sent to all fisheries personnel and those involved in lake surveys for their comments. Changes were then made to the list and preliminary coding sheets were drawn up. These sheets were to be the basis for the storage and retrieval system. Two meetings were arranged with fisheries personnel to explain and discuss the retrieval system and coding sheets in detail. With information collected at these meetings the final coding sheets were prepared (Appendix B).

Description of Coding Sheets

All data sheets (Appendix B) were organized for information to be coded on 80 column computer cards. The following text provides instructions for completing each coding sheet.

The field map of Lake Kampeska (Fig. 3) gives an example of the form in which all field maps should be prepared. These will be used to locate sampling sites, access areas, dams and other points of interest to coincide with coding sheets using a letter by number designation. A river field map will contain a river mile index rather than letter by number to locate different areas. These maps will help standardize

sampling sites along with locating other important sites for field crews.

Form A - Legal Classification

Each coding sheet contains a similar header card (Card 1 - Columns 1-16) to provide necessary organization of information for storage. Each card contains a lake code and a card code to help with organization, prevent mix ups and card losses.

Form A contains the water name (Card 1, Columns 17-36) and legal classification of that water. Space is provided to contain only the legal classification of waters smaller than the mainstem reservoirs. Room for description of larger waters was left out due to the large amount of space required to create a much larger record with questionable benefit.

The header card (Card 1) contains a lake or stream code (Columns 1-4), which is unique for that water (Appendix D and E). Column 5 is a space provided for an agency code. This enables information other than that collected by GFP to be stored. Since all data in this study was collected by GFP, a number '1' is used to identify that agency. Columns 6-9 are used for an identification number of any data if it was obtained from published material. References are given a five digit code sequentially and are stored and retrieved by BIBFISH. Column 10 is provided for the 'Data Code' (DC), which indicates whether the data is new (N), to be deleted (D) or to be corrected (C). Columns 11-16 are for dates.
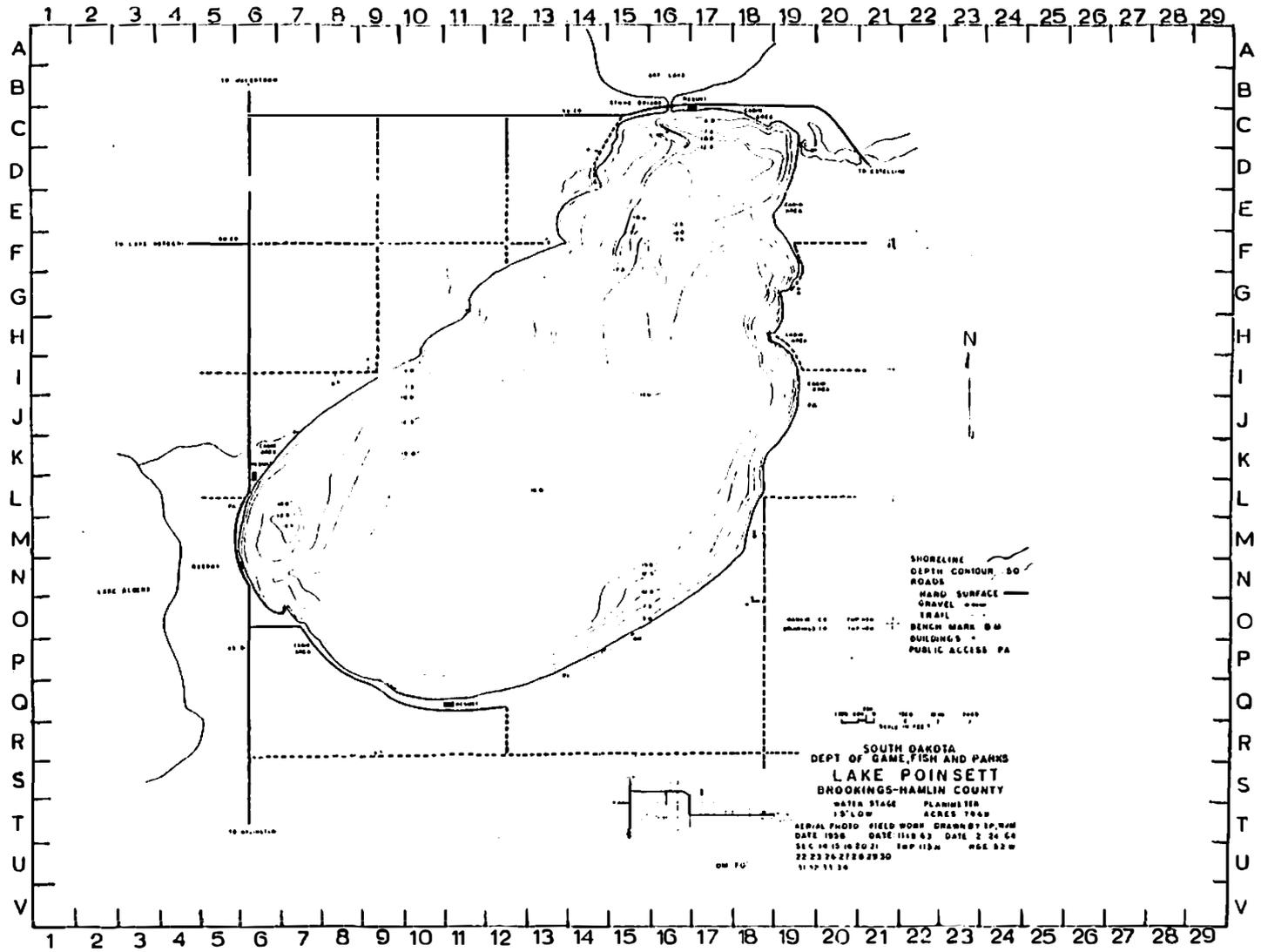
Figure 3.   Sample Field Map.

Form B - General Water Descriptions

Form B contains basic information as to water classification, population of surrounding areas, dam or outlet control and physical parameters. Data on this sheet is entered only once and items can be deleted or corrected.

The header card (Card 3) contains additional information not contained on Form A. "Units" (Column 10) will indicate whether data is metric (M) or English (E) units. Retrievals could be obtained in either English or metric units by personal choice. "River Index" (Columns 12-17) will be used to code a specific sampling site or a general area if the data is from a river. Columns 40-51 represent the sequence of water ways where river codes (Appendix D) of a lake drainage can be entered. The first two (four digit) codes are for the immediate waterways and the third indicates the major waterway into which it flows.

Form C - General Water Description

Form C contains several different categories of information. Parameters listed under "River Classification" were used to classify trout streams in the Black Hills of South Dakota (Glover 1975). Other parameters under "Water Resource Use and Development" and "Inlets and Outlets" are described in the GFP Lake Survey Manual. Information on this form is entered once with periodic updates and deletions.

Form D - Water Chemistry

GFP currently takes the listed water quality data during four periods of the year. Therefore, four sheets of Form D can be stored per year. Old data would be kept on tape.

Form E - Organism Abundance and Spawning Habitat

Form E contains relative abundance information of aquatic plants, fishes and other organisms (Appendix F). Card 12 can be repeated four times, enabling up to 72 fish species to be listed.

Evaluation of spawning area (Card 13) contains information on five managed or important species and the locations of their spawning beds. This page will be recorded once with subsequent deletion or update of items.

Form F - Fish Stocking and Removal

Fish stocking information is recorded on Form F (Card 14). This card may be repeated twice to contain up to eight stocked species per year. Cards 15 and 16 may be repeated up to four times each per year to contain all commercial fishing information. Note that commercial species are recorded by total weight removed per year and that game species are recorded by total number. Old data would be stored on tape.

Form G - Natural Reproduction Summary

Form G contains data indicating the success of natural reproduction. This information is usually collected during late summer

or early fall and only the totals of up to 25 species will be recorded. Old data would be stored on tape.

Form H - Netting Summary Sheet

Test netting data provides a rough estimate of the abundance and species composition of fishes present in a water. Form H used to record old data which was recorded in this manner. This form can be duplicated twice per year and old data stored on tape. New data will be recorded on Form N and a program could provide the analysis. Description of sampling methods is discussed in the GFP Lake Survey Manual.

Form I - Length Frequency

Form I coincides with Form H. Test netting information is also utilized on this form by recording length-frequencies of individual fish. Two pages can be used to record up to 12 species. Species lengths can be recorded in either 0.5 inch increments or 1 inch increments. Groups of fish under 12 inches utilize the 0.5 distribution in order to show a smoother length frequency. A duplicate form could be made to code lengths in metric with the appropriate metric increments. Larger fish use the 1 inch distribution. To indicate this, column 8 of card 22 is used to show the distribution chosen. Columns 9-40 are used to indicate the length increment and columns 41-72 are used to record the number of fish in the corresponding increment above. This form is used for old data and can be repeated twice to store up to 12

species' length-frequency distributions per year. New data would
be recorded on Form N.

Form J - Age and Growth Distribution

Calculations of age and growth data can be recorded on Form J.
Two pages can be recorded to provide information on 16 species.
Data is recorded similar to that in the GFP Lake Survey Manual.
Card 24 contains the species, total size of sample (Columns 8-11),
the size of the subsample taken (Columns 12-13) and the back
calculated lengths of fish up to seven years of age. Card 24 will
contain the total number of fish in each age-group and the number
of fish from which back calculations were actually made. Old
data would be recorded on tape.

Form K - Pollution and Survey Data

Card 26 of Form K contains pollution and fish kill estimates.
Data can be entered yearly and old data will be stored on tape.
Cards 27 through 29 contain information on creel survey and
recreational survey data. Column 5 of card 27 and 29 are headed
"AC"; this is to indicate how accurate the survey information is.

Only a limited amount of survey information is stored. When
more complete information is needed the source of the data, if
published, can be located using the "Source I.D." in columns 6-9
of cards 27 and 29. Old data would be stored on tape.

Form L - Water Resource Improvements, Recommendations and Finances

In an effort to provide information for planning future improve-
ments and budgets Form L was created. Specific management and access

recommendations (Appendix G) are listed on this sheet. Columns 17-24 of card 30 will keep track of recommendations that have been completed each year. Card 31 lists new management recommendations, species of fish they will affect, benefit in man-days, year to be completed and an estimate of cost. Card 32 contains access recommendations and information similar to the management recommendations.

Card 33, at the bottom of Form L, was left for any additional information. It was used in the testing to record winterkill dates and management policies. Form L may be repeated twice and old data would be stored on tape.

Form M - Access Facilities

Form M allows a listing to be made of all access areas for each water as well as facilities available. Columns 48-77 of card 35 provide an estimate of the cost of maintenance, facilities and investment at each access site. This information will be used in planning of GFP budgets. Card 35 may be repeated up to 35 times.

Form N - Test Netting Field Sheet

Form N would replace Forms H and I, which were used to transfer old data to the system. All new test netting data would use this form. The header card (36) is the same as in forms H and I. One sheet is used for each species. Data acquired from up to 25 nets can be placed on this sheet. Total weights, numbers and location of each net are recorded on the lower left side of the page, excluding the length and weight of individual fishes. The right

hand side would be used to record the length and weights of up to 100 fishes from a random sample to obtain average length and weight information and length frequencies. Description of the data stored and analysed from this form will be given in the GIVEFISH Retrievals and Programs Section.

Coding Paramenters

Fish

Bailey and Allum (1962) listed 93 species of fish occurring in South Dakota, but several exotics have been introduced since then. Future introductions had to be taken into consideration when creating a coding list; empty spaces were left in families where possible additions were anticipated. Fish were listed in phylogenetic order by family and given a code number starting at 1 and ending at 138 (Appendix F).

Aquatic Plants

The abundance of aquatic plants indicated on Form E (Columns 23-69) is only a subjective listing due to identification difficulties and lack of time needed to obtain a more accurate estimate of aquatic plant abundance.

Van Bruggen (1974) recorded over 190 marsh and aquatic plant species in South Dakota. In order to simplify identification and listing, codes were arranged by general families of aquatic plants and given a number (Appendix F). In some cases, when groups of plants could be easily identified within families, these groups

were assigned more than one code per family; such as the rushes (Cyperaceae) and the pondweeds (Najadaceae).

Management and Access Recommendations

Standard methods used to manage water resources were given codes (Appendix G) to be used on Form L. To simplify this list it was separated into three categories: fish management, habitat management and shore management. Access recommendations used a similar method. Recommendations may be added to the list as they become needed.

Lake and River Codes

Lake and river codes are four digits. The lake codes used were already organized by GFP (Appendix E). In these codes the first two digits signify the county number and the last two digits were given sequentially to the lakes in that county. Rivers and streams were given code numbers beyond the range of the lakes: 0100 thru 6799 (Appendix D).

GIVEFISH Retrievals and Programs

The program building the GIVEFISH data base (Appendix H) was completed to provide estimates of the size and cost of creating the data base. The complete development of the BIBFISH data base and programs has facilitated in making cost estimates for the FISARS System and has acted as an example of how GIVEFISH retrievals could be programmed. Therefore, no further programs were completed to

manipulate the GIVEFISH data base. This section will investigate the possible retrieval programs with which to manipulate the GIVEFISH data base.

The simplest retrieval will be the standard retrieval. This program would simply research for a record and provide a printout. With the use of VSAM different related data sets could be accessed separately. Further refinement of the program would enable only certain segments of each record to be retrieved. Therefore, the use of a partial retrieval would enable, for example, the recovery of all stocking records of the lakes in Region II. The various forms and combinations in which retrievals could be made would be limitless.

One other essential program is for correction and deletions. It is necessary to be able to make corrections or deletions within each record and new records would eventually be added. These operations could be handled in one program such as with the BIBFISH data base.

Several additional sub-programs could be added to the GIVEFISH data base which would perform time saving procedures. Form N (Appendix B) was created to replace the use of Forms H and I after the initial test netting data was stored. Form N would be used to compile the test netting raw data and the sub-program would eliminate the need for additional computations and would store the information in the form of data sheets H and I.

The construction of an additional coding sheet to contain only fish stocking records could be utilized by each region. These coding sheets would take the place of the present stocking record sheets. At the end

of the season, this data would be keypunched and the sub-program would compile all stocking information and store it in the data base. This data could then be used to print out an annual stocking report.

Another sub-program could help maintain the quality of the data base. During the recording of the initial data for testing, it was noted that many areas of the lake records were incomplete or not up to date. This sub-program would search for incomplete sections of each record and provide a print out. It could also retrieve all data older than a preselected date. This would provide information for managers in planning for the upcoming field season and enable them to complete unfinished water records and keep them up to date.

Since all old data would not be stored on a VSAM disc file, access to this data would require a separate program. In all probability this information would not be needed frequently, therefore, it would be most economical to store it on tape. This program, in order to keep it simple, would only provide retrievals of individual records or parts of records.

The complexity and length of programs necessary to manipulate the GIVEFISH data base would only be limited by the needs of the state and by its budget. The use of standard retrievals only, would be the simplest and most economical.

DISCUSSION

COSTS OF DEVELOPING AND OPERATING THE FISARS SYSTEM

The FISARS System could be designed to make use of an on-line or off-line terminal. On-line retrievals are almost instantaneous. With this capability, terminals could be placed at many locations throughout the state. Hard copy terminals cost between $2000.00 and $2500.00. Portable ones are also available which allow use of the system at almost any location that has telephone facilities. Terminals could be used with the Tie Line network throughout the state, therefore there would be no additional telephone costs. GFP at the present time has a terminal at their main office in Pierre.

There are at least two computer facilities available which could potentially use the FISARS System. Both the state facility at Pierre and the facility at South Dakota State University in Brookings utilize VSAM accessing. Each facility offers its functions at varying rates (Table 1).

The Pierre facility utilizes an IBM 370-155 computer with 6 megabytes of storage. They have 3350 and 3330 double density disc drives which have 317 million and 200 million bytes of storage space respectively. Rental is presently $.07 a track (13,000 bytes) per month for on-line storage. The SDSU computer center utilizes 3340 disc drives which will hold 70 million bytes of storage. Current on-line storage cost is $.02 per 1000 bytes per month, but in the near future it will be lowered to $.01.

Table 1. Summary of cost estimates for creating and operating GIVEFISH and BIBFISH data bases at the computer facilities at Pierre, South Dakota and Brookings, South Dakota.

GIVEFISH - Creating (1000 records or 10,000,000 bytes)

Transferral of data	$5187.00
Keypunching and verifying	$1591.00
Building VSAM file	$ 100.00

GIVEFISH - Operation	Pierre	Brookings
On-line	$646.00/yr	$1200.00/yr
Off-line	$360.00/yr*	$ 600.00/yr*
CPU Minute	$13-$17/min	$ 7.00/min
Updating	$100.00/yr	$100.00/yr

BIBFISH - Creating (5000 records or 5,000,000 bytes)

Transferral of data	No estimate
Keypunching and verifying	No estimate
Building VSAM file	$ 25.00

BIBFISH - Operation		
On-line	$325.00/yr	$603.00/yr
Updating	$ 25.00/yr	$ 25.00/yr

---

*Includes cost for BIBFISH and GIVEFISH

Cost of Building the BIBFISH Data Base

The cost of recording the BIBFISH reference material onto coding sheets is difficult to estimate because it is impossible to determine the quantity of reference material available. Much of the cost would depend on how actively old and new material was added to the data base. It would probably be much less than the cost of recording data for the GIVEFISH data base (Table 1) because the volume would be much less.

The projected 5000 records will occupy about 5,030,000 bytes (one byte is equal to one character). Storage costs would be about $132.00 per year at $.07 per tract at the Pierre facility, and $360.00 per year at SDSU (Table 1). A dummy 3000 records were tested and cost of building the VSAM file was less than $20.00. Projected costs of building a VSAM file of 5000 records at either computer facility would be $25.00 (Table 1).

Cost of Building the GIVEFISH Data Base

Storing Old Data

In the testing of the GIVEFISH data base, seven years of data was stored from Region IV for each water. The data for each record varied in completeness due to the classification of each lake (permanent, semi-permanent, marginal and waterfowl) with permanent waters having the most complete information and waterfowl having the least. A total of 15 permanent, 22 semi-permanent, 91 marginal, 30 waterfowl and 7 unclassified lakes were recorded along with 5 streams. This gave a total of 170 water records stored. Time to

transfer this data to coding sheets was 27.6 days or 226.9 man-hours. At a rate of $3.57 per hour, cost of transferring this data to coding sheets was $773.15. This data was keypunched and verified, requiring 63 man-hours. At $4.15 per hour for keypunching and verifying this job amounted to $261.45.

There are 792 lakes in South Dakota (GFP Lake Inventory 1972, Unpublished, South Dakota Department of Game, Fish and Parks, Pierre, South Dakota) which potentially have records, but 237 are classified as "waterfowl lakes". Because "waterfowl lakes" typically have little or no information, the number of lakes having records may be less. In the Region IV test data, of the 103 waterfowl lakes, only 30 had records. Most of these waterfowl lakes do have accesses, therefore, they may warrant a record even though detailed information is not available.

Estimating the potential lotic environments which may have records is difficult because surveys have not been undertaken for many streams other than trout streams. An estimate of 124 was calculated by counting the rivers and streams with a substantial fisheries resource from the Stream Evaluation Map of South Dakota (U.S. Fish and Wildlife Service 1978). The lakes plus the rivers give 916 potential records or approximately 1000.

Using 1000 as an estimate of the total number of water records the statewide cost was extrapolated for transferring and keypunching the test data. It will take approximately 1300 man-hours to code 1000 records. At $4.50 per hour (hourly rate was increased

to account for inflation) this would total $5187.00 minus the
$662.94 already spent (Table 1).

Keypunching and verifying would total 370.59 man-hours. At
$5.00 per hour (hourly rate was increased to account for inflation)
the cost would be $1591.00 minus the $261.45 already spent. The
estimated total cost of building a data base would be approximately
$6778.00.

There are several bias's in this estimate. Regions with less
water may spend more time in completing their lake surveys, there-
fore the average transferal time may be higher for some regions.
Regions having more permanent or wildlife waters would affect the
estimate since it requires more time to code permanent water than
waterfowl waters. Bias may also occur in areas that have large
quantities of stream data such as the Black Hills area. Since the
test area (Region IV) was predominantly lakes and ponds with only
5 streams, no accurate estimate could be made for stream transferal
time.

Cost of Building the VSAM File

With an estimated 1000 records at 10,000 bytes in size the
file would increase the files to approximately 16,004,000 bytes.
Much of the CPU (Computer Processing Unit) time and costs in
building a VSAM file lies in building the alternate indexes.
Building of the 170 test data records took 2.00 CPU minutes at a
cost of $7.00. Extrapolating this for 1000 records the cost would
be less than $100.00 (Table 1).

Updating Costs

GFP is continuously updating its records. Most of the work done involves test netting, shoreline seining and a few complete surveys. Over the past five years there has been an average of 62 water updates with a low of 58 and a high of 73.

The FISARS System will simplify this process. Transferring data to coding sheets will not be necessary since the coding sheets can be used directly. Therefore, the only additional cost will be keypunching, verifying and the rebuilding costs. This process would be done only once a year; after data for that year has been punched on computer cards. With an average of 62 record updates per year file rebuilding would be less than $100.00 per year. (Table 1).

Storage Costs

To operate on-line the GIVEFISH data base would require an estimated 10,004,000 bytes of storage space. The cost at the Pierre computer center would be about $636.00 per year, while charges at SDSU would be $100.00 per month or $1200.00 per year (Table 1).

One other alternative would be to operate the FISARS System off-line. This would require the rental of an off-line disc pack. The advantage would be economy. Off-line disc rental at Pierre is $30.00 per year at SDSU (Table 1). The disadvantage would be that retrievals would not be instantaneous but would be dependent upon how busy the computer facility was at the time a retrieval

was needed. Another disadvantage would be that there would be
wasted space on a disc on which only 16,000,000 bytes (includes
BIBFISH and GIVEFISH data bases) was stored. This extra space
could be used by other GFP projects. If retrieval time is not
the most important consideration and use of the system would not
be heavy, operating off-line may be the logical alternative.

Since only the most up-to-date data would be stored on disc,
the older information would be stored on tape. Tapes can be
purchased for about $17.50 each and can store about 46,000,000
bytes of information. There is no storage cost for tapes, the
only cost would be in actual CPU time used in retrieving.

OPERATING THE FISARS SYSTEM

Many of the problems in establishing GIVEFISH would be to acquire
a reliable data base. Cost of doing this had been discussed. Most of
this work could be done with the help of two or three summer temporaries.
This job could be completed in one summer.

Maintaining the file or data base would not require a full time
person. Since the initial keypunching and verifying could be contracted,
the time keypunching and verifying updated data would be minimal. Major
file revisions or updating would probably be done only once a year when
a collection of data has been received. A secretary that was trained
in keypunching could be in charge of file maintenance.

Cost of maintaining and developing the BIBFISH System is difficult
to access as has already been discussed. Costs would depend on how

actively and intensely this area was pursued. The more intense the
literature search, the more valuable the system would be. Large amounts
of reference material has been compiled in specific areas. All of the
Dingle-Johnson projects have been collected in a mineograph by GFP
(1978 Unpublished, South Dakota Dept. of Game, Fish and Parks, Pierre,
South Dakota). North Central Reservoirs Investigations have a _similar_
summary of their work since 1964. Other institutions which have contri-
buted work to the field of fisheries potentially have similar lists.
Much time could be spent in transferring these references to BIBFISH
coding sheets and completing the necessary subject codings. Again, use
of summer temporaries may provide an economical method for building the
initial data base. Successful maintenance of the BIBFISH System would
then depend on the cooperation of the institutions working in the areas
of fisheries to provide the person in charge of file maintenance with
copies of their publications and completion reports on a yearly basis.

Field maps play an important role in the operation of the FISARS
System (See 'Description of Coding Sheets'). GFP has been involved in
an on-going lake mapping project. Although the maps created to date
are not in a field map form, simple revisions would make them so.
Addition of letter by number coordinates or in the case of rivers, the
use of river mileage and the reduction in size to 21.5 X 28 cm ($8\frac{1}{2}$ X 11
inches) sheets would make functional field maps. Future mapping should
include these requirements. Smaller or shallower lakes, not proposed
for contour mapping, should have maps drawn from aerial photos or U.S.
Geological Survey topographic maps in order to provide descriptions of

important points of reference such as access areas, bench marks, and test net locations.

Only a minimal amount of additional work would be required of field people and managers to keep the FISARS System operational, and in many cases time would be saved. Most lake survey information has been completed and follow up work is routine such as testnetting and shoreline seining. This work would merely require the use of FISARS coding sheets instead of the present lake survey forms. These coding sheets could be kept in a file much as the lake survey forms are kept today.

The ability to retrieve from a record, areas that are not complete, would upgrade the present system and insure that water records are up to date and complete. At the present time there is little effort to complete lake survey information that was not completed in the initial surveys. A scan of the printout would reveal problem areas and these can be concentrated on and completed. Incomplete records would only degrade the efficiency and effectiveness of the FISARS System. It must be noted that each water record would occupy 10,000 bytes or characters whether all the information is there or not, therefore incomplete records are only wasting the space allotted for them.

Additional work would be required in certain other areas of the FISARS System. Field personal responsible for the lakes in a certain county or region must complete the following areas for yearly updates.

Knowing the species of fish occuring in a body of water can often be helpful. Often-times records list only the game species present.

Additional effort when routine shoreline siening is done could provide a specimen collection to be used in completing the section 'Fish Species Know to Occur' (Form E, Card 12).

Winterkill or summerkill is often an important factor used in lake management decision making. The frequency of kills is also essential for the classification scheme of South Dakota water, i.e. permanent, semi-permanent, marginal and waterfowl. Frequently in the test data this information was not present. A yearly record of winterkills must be made for each water and coded on Form K, Card 26. It is often difficult to estimate the severity of winterkill or summerkill in numbers or degrees of completeness but testnetting may help reinforce the estimate.

In order to provide essential information for budget planners Form L 'Water Resource Improvements, Recommendations and Finances' is to be completed yearly on waters where improvements are needed. Form M 'Access Facilities' should be completed for the same reason along with providing important information for access publications. Although information on Form L is more stable it should be checked for yearly changes or additions to keep it up to date. The GFP Lake Inventory contains much of this information but does not contain water front distance, area and cost estimates of maintenance, facilities and land investment. This information would have to be added. The GFP Lake Inventory is not complete with description of private accesses. A survey form could be sent to resort owners and other commercial facilities similar to Form M, excluding the cost estimates, to obtain this information.

Other areas that deserve special attention are water chemistry, fish stocking, commercial fishing and census data. When water samples are sent to a water analysis laboratory, results are returned in a form requiring additional transferal of data before it can be filed or stored. Asking the lab to use the prepared water chemistry sheet (Form D) would increase the efficiency and order of this process.

Fish stocking reports are published yearly by GFP but individual lake records often do not contain a complete record. Use of Form F as a fish stocking record for each water would provide a method of insuring this information is stored in the water record. This information could then be compiled and summarized at the end of each year and provide a printout which would eliminate the need for typing and hand calculating the Fish Stocking Report.

Form F also contains a yearly commercial fishing summary which is taken from the monthly commercial fishing reports. This would require transferring the totals to Form F from the monthly summaries, although this work would not be great in a county or regional basis. There is a problem using the monthly summaries when more than one capture method is used per page. It is impossible to distinquish between total poundage or numbers of a species for each method. Use of one capture method per page would alleviate this. If the work load warranted it, raw data could be analyzed by an additional computer program and compute and store all commercial fishing data, thereby eliminating all work except for the initial coding of raw data.

CAPABILITIES

The capabilities of the GIVEFISH and BIBFISH Systems are limitless. One of its most important attributes is its ability to save time. In this period of funding and personnel cuts, computers are becoming increasingly important in performing routine work more economically than hand calculating. Retrievals of a few seconds, which would take a worker several hours or even days to compile, not only saves time and money but also frees the worker to pursue other work.

This system would also create a systematic and orderly method of maintaining lake and river records. Standard retrievals of data not yet completed would ensure that records become complete and prevent unnecessary repetition of data. More efficient use could then be made of these files.

Some examples of how the system might be used are given below.

1. Currently when lake surveys are completed a full draft is typed and placed in the files. From this a Lake Survey Short Form must be completed and typed which is used in the lake management plans. Often times new surveys are not complete and data such as physical parameters are repeated, since they do not change. The FISARS System would eliminate this work and prevent the repetition of data. Standard retrievals would present this information in a printout which could be directly reproduced for these purposes. Both the complete record or a version similar to the present Lake Survey Short Form could be retrieved containing the newly compiled data

and the parameters that have not changed since the last
survey.

2.   The FISARS System could be used by management to provide
     instantaneous answers for management decisions. Retrievals
     of stocking records, test netting and shoreline seining
     result and severity of winterkill would be instrumental in
     planning next years management. Quick and easy access to
     this data for each water would relieve some of the burden of
     this work.

3.   The geographical distribution or the ecological conditions
     under which a given species of fish has been found may be
     quickly determined. Information of this nature is often
     necessary for developing and evaluating environmental impact
     statements or determining the need of endangered species.

4.   People in research often are presented with the problem
     of reviewing past data which is useful in designing or
     planning projects. The FISARS System would provide them
     with quick access to this material and allow further manipu-
     lation of the data for statistical or other analysis. The
     BIBFISH System would also provide material for a literature
     review used in planning a research project. References
     could be found concerning a particular water in the state or
     a specific subject area.

5.   Budget planning is a problem in fisheries resource management
     due to many factors. The FISARS System, by providing easier

access to the fisheries records, will simplify analysis and summaries of data necessary for budget planning, whether it be lake access improvement, population pressure or pinpointing areas needing the most attention. Although all portions of the FISARS System can be useful, Form L and M (Appendix A) may provide the most useful information for planning if correctly completed.

REDUCTION IN OPERATION COST AND COMPLETION OF THE FISARS SYSTEM

Perhaps the most costly portion of operating the GIVEFISH and BIGFISH System is on-line storage (Table 1). Therefore, the simplest method of decreasing costs would be reduction of the water record size, thereby reducing the total storage space used or by operating off-line.

One area might be that of 'Water Chemistry' (Form D). In the near future the South Dakota Department of Environmental Protection will assume the responsibility of monitoring water quality. They will utilize the STORET System (Nixon 1971) and could provide quick access to this data. Elimination of this information from the FISARS record would reduce it by 604,000 bytes for 1000 lake records.

The FISARS System, as it is designed now, reserves space for old test netting data (Form H and I - Appendix A) and for new data (Form N). Removal of old data in future years, storing this only on tape and utilizing the active file (disc storage) to contain only data analysed from Form N would reduce storage by 3,034,000 bytes.

Test data from Region IV indicated that age and growth data (Form J - Appendix A) was very limited and may not warrant the additional storage space, although much more data could be found by searching special studies done by GFP and other state institutions. Removal of this data would reduce the record size by 1,542,000 bytes.

A final area which could assist in the reduction of storage costs would be by decreasing the number of records. Careful selection of bodies of water to be stored would be one method. Water classified as waterfowl may be eliminated since little or no material is usually available on these waters. Another possibility would be to store the waterfowl lakes in a separate file utilizing a reduced record size listing only the most pertinent information such as; the physical parameters and the access descriptions.

Before the FISARS System is completely functional, several additional programs would have to be written to manipulate the GIVEFISH data base (Table 2). Only the GIVEFISH data base build program was written (Appendix H) to provide information in making cost estimates.

Should South Dakota Department of Game, Fish, and Parks decide to utilize the FISARS System these programs would have to be completed and debugged by a computer programmer. The cost of writing these programs would depend upon the extent of which the data base is to be manipulated as described in 'GIVEFISH Retrievals and Programs' (page 22). This would be a one time expenditure, therefore there would be no additional yearly expenditures other than those already discussed.

Table 2. Work to be completed before FISARS System is functional.

BIBFISH Data Base.

Compile and code reference material to produce a workable data base.

GIVEFISH Data Base

Complete coding and compiling of lake and stream survey data to produce a workable data base.

Write computer program from which retrievals can be made from data base.

Write computer program which would add, delete and update records to the data base.

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APPENDIX A

BIBFISH Programs

```
/*KRAMER        711635736,'DICK KRAMER',MSGLEVEL=1,TIME=1,CLASS=B
//JOBCAT DD DSN=VSAM.CATALOG.TEMP.FILES,DISP=OLD
//STEPA EXEC  COBUCLG
//COB.SYSIN DO   *
       IDENTIFICATION DIVISION.
       PROGRAM-ID. BIBLOGRAPHY-1.
       AUTHOR - KRAMER.
       REMARKS. THIS PROGRAM READS BIBLIOGRAPHIC CITATIONS FROM CARDS
           AND WRITES THEM ON A TAPE FILE.
       REMARKS. LENGTH OF CARD RECORDS CAN BE SHORTENED BY THE
           FOLLOWING METHODS --
           IF THE TITLE OCCUPIES ONLY ONE CARD THEN 'STOP-1'
           (SEE DATA SHEET) IS PUNCHED '1' --  IF THE TITLE OCCUPIES
           2 CARDS, STOP-2 IS PUNCHED '2' -- IF THE TITLE OCCUPIES 3
           CARDS, NOTHING IS PUNCHED -- THIS ELIMINATES THE NEED OF
           ADDING BLANK CARDS TO THE CARD DECK.
       *************************************************************
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       SOURCE-COMPUTER. IBM-370.
       OBJECT-COMPUTER. IBM-370.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT CARD-FILE ASSIGN TO UR-2540R-S-CARDIN.
           SELECT TAPE-FILE ASSIGN TO UT-2400-S-TAPEO1.
           SELECT NTAP-FILE ASSIGN TO UT-2400-S-TAPEO2.
           SELECT NEWWTAPE    ASSIGN TO UR-2400-S-TAPEO3.
       *************************************************************
       DATA DIVISION.
       FILE SECTION.
       FD  NEWWTAPE
           RECORDING MODE F, LABEL RECORDS ARE OMITTED, RECORD CONTAINS
            560 CHARACTERS, BLOCK CONTAINS 1 RECORDS, DATA RECORD IS
           TAPE-OUT.
       01  TAPE-OUT PIC X(560).
       FD  NTAP-FILE
           RECORDING MODE F, LABEL RECORDS ARE OMITTED, RECORD CONTAINS
            560 CHARACTERS, BLOCK CONTAINS 1 RECORDS, DATA RECORD IS
           NTAP.
       01  NTAP PIC X(560).
       FD  CARD-FILE
           LABEL RECORDS ARE OMITTED, RECORDING MODE F, DATA RECORDS
           IS CARD-REC.
       01  CARD-REC.
           04 F-PART PIC X(79).
           04 STOP-1 PIC X(1).
       FD  TAPE-FILE RECORDING MODE F, LABEL RECORDS ARE OMITTED, RECORD
                   CONTAINS 80  CHARACTERS, BLOCK CONTAINS 7 RECORDS, DATA
           RECORD IS TAPE-RECORD.
       01  TAPE-RECORD PIC X(80).
       WORKING-STORAGE SECTION.
       77  INCRO PIC 99.
       77  BLANK-COUNTER PIC S99999 VALUE IS 1.
       ********
       * FORMAT OF THE RECORD
       ********
       01  TAPE-REC.
           04 BIB-CODE PIC 9(5).
           04 SUB-CODED.
           05 SUB-CODE OCCURS 10 TIMES PIC X(5).
```

```
    04 FILLER PIC X(25) VALUE SPACES.
    04 B-CODE-2 PIC 9(5).
    04 AU-THOR PIC X(50).
    04 YR PIC 9999.
       04 FILLER PIC X(21) VALUE SPACES.
    04 B-CODE-3 PIC 9(5).
    04 TITLE-1 PIC X(74).
    04 STOPPER-1 PIC X(1).
    04 B-CODE-4 PIC 9(5).
    04 TITLE-2 PIC X(74).
    04 STOPPER-2 PIC X(1).
    04 B-CODE-5 PIC 9(5).
    04 TITLE-3 PIC X(74).
    04 FILLER PIC X(1) VALUE SPACES.
    04 B-CODE-6 PIC 9(5).
    04 JOURNAL PIC X(75).
    04 B-CODE-7 PIC 9(5).
       04 VOLUME PIC X(10).
       04 NUMB PIC X(10).
       04 PAGES PIC X(10).
    04 FILLER PIC X(45) VALUE SPACES.
**********************************************************************
 PROCEDURE DIVISION.
 BEGIN.
     OPEN  INPUT CARD-FILE, OUTPUT TAPE-FILE.
 READ-1. MOVE SPACES TO TAPE-RECORD.
********
* DETERMINING TITLE SIZE
********
     READ CARD-FILE AT END GO TO READ-2.
     IF STOP-1 = 2 GO TO WRIT-2
     ELSE
     IF STOP-1 = 1 GO TO WRIT-1
     ELSE
     WRITE TAPE-RECORD FROM CARD-REC.
       GO TO READ-1.
********
: CHANGING 80 CHARACTER RECORDS TO 560 CHARACTER RECORDS
********
 READ-2. CLOSE TAPE-FILE, OPEN INPUT NTAP-FILE,
     OUTPUT NEWWTAPE.
 READ-3. READ NTAP-FILE INTO TAPE-REC AT END GO TO EOJ.
     IF BLANK-COUNTER   500 SUBTRACT 499 FROM BLANK-COUNTER.
********
  FILLING BLANK ALTERNATE INDEXES WITH BINARY NUMBERS
********
     PERFORM FILL-BLANK VARYING INCRO FROM 1 BY 1 UNTIL
     INCRO = 11.
     WRITE TAPE-OUT FROM TAPE-REC.
     GO TO READ-3.
 FILL-BLANK. IF SUB-CODE(INCRO)  = SPACES MOVE BLANK-COUNTER TO
     SUB-CODE(INCRO).
     ADD 1 TO BLANK-COUNTER.
 WRIT-2. WRITE TAPE-RECORD FROM CARD-REC.
     MOVE SPACES TO TAPE-RECORD.
     WRITE TAPE-RECORD.
     GO TO READ-1.
 WRIT-1. WRITE TAPE-RECORD FROM CARD-REC.
     MOVE SPACES TO TAPE-RECORD.
     WRITE TAPE-RECORD.
```

```
                MOVE SPACES TO TAPE-RECORD.
                WRITE TAPE-RECORD.
                GO TO READ-1.
            EOJ. CLOSE CARD-FILE, NTAP-FILE, NEWWTAPE.
                STOP RUN.
/*
//GO.SYSOBOUT DD SYSOUT=A
//GO.TAPEO1 DD UNIT=TAPE,DISP=(NEW,PASS),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=560),
// DSNAME=&&TAPEO1,
// LABEL=(,NL),VOL=SER=MOE
//GO.TAPEO2  DD UNIT=TAPE,DISP=(OLD,PASS),
// DCB=(RECFM=FB,LRECL=560,BLKSIZE=560),
// DSNAME=&&TAPEO1,
// LABEL=(,NL),VOL=SER=MOE
//GO.TAPEO3  DD UNIT=TAPE,DISP=(OLD,PASS),
// DCB=(RECFM=FB,LRECL=560,BLKSIZE=560),
// DSNAME=&&TAPEO3,
// LABEL=(,NL),VOL=SER=SHEP
//GO.PRINT    DD SYSOUT=A
//GO.CARDIN      DD *
/*
```

```
// EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//XCRTCH DD VOL=SER=XCRTCH,UNIT=3340,DISP=OLD
//SYSIN DD *
   /*   ****************************************************************-
        * BIBLIOGRAPHY-2                                               -
        * AUTHOR - JOHNSON                                             -
        * THIS PROGRAM WILL READ RECORDS FROM A TAPE (BIBLIOGRAPHY-1) AND-
        * CREATE A VSAM DISK FILE                                      -
        ****************************************************************/
 DEFINE CLUSTER -
   (NAME(VSAM.CLUSTER.FISH)  -
   FILE(XCRTCH) -
   RECORDSIZE(560 560) -
   VOLUME(XCRTCH) -
   KEYS(5 0) -
   UNIQUE) -
 DATA(NAME(VSAM.DATA.FISH) -
   RECORDS (5000))-
 INDEX(NAME(VSAM.INDEX.FISH))
// EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//XCRTCH DD VOL=SER=XCRTCH,UNIT=3340,DISP=OLD
//VSAMOUT DD DSN=VSAM.CLUSTER.FISH,DISP=OLD
//NEWWTAPE DD UNIT=TAPE,DISP=OLD,
// DCB=(RECFM=FB,LRECL=560,BLKSIZE=560),
// DSNAME=TAPE03,
// LABEL=(,NL),VOL=SER=MOE
//SYSIN DD *
 REPRO INFILE(NEWWTAPE) -
   OUTFILE(VSAMOUT)
 DEFINE ALTERNATEINDEX -
 (NAME(VSAM.ACLUSTER.FISH1) -
   RELATE(VSAM.CLUSTER.FISH) -
            RECORDSIZE(35 510) -
   FILE(XCRTCH) -
   VOLUME(XCRTCH) -
   KEYS(5 5) -
   UNIQUE)-
 DATA (NAME(VSAM.ADATA.FISH1) -
   RECORDS(5000)) -
 INDEX(NAME(VSAM.AINDEX.FISH1))
   DEFINE PATH -
   (NAME(VSAM.PATH.FISH1) -
   PATHENTRY(VSAM.ACLUSTER.FISH1))
 DEFINE ALTERNATEINDEX -
   (NAME(VSAM.ACLUSTER.FISH2) -
   RELATE(VSAM.CLUSTER.FISH) -
   MODEL(VSAM.ACLUSTER.FISH1) -
   FILE(XCRTCH) -
   KEYS(5 10)) -
   DATA (NAME(VSAM.ADATA.FISH2)) -
   INDEX(NAME(VSAM.AINDEX.FISH2))
   DEFINE PATH -
   (NAME(VSAM.PATH.FISH2) -
   PATHENTRY(VSAM.ACLUSTER.FISH2))
 DEFINE ALTERNATEINDEX -
   (NAME(VSAM.ACLUSTER.FISH3) -
   RELATE(VSAM.CLUSTER.FISH) -
   MODEL(VSAM.ACLUSTER.FISH1) -
```

```
      FILE(XCRTCH) -
      KEYS(5 15)) -
      DATA (NAME(VSAM.ADATA.FISH3)) -
      INDEX(NAME(VSAM.AINDEX.FISH3))
      DEFINE PATH -
      (NAME(VSAM.PATH.FISH3) -
      PATHENTRY(VSAM.ACLUSTER.FISH3))
  DEFINE ALTERNATEINDEX -
      (NAME(VSAM.ACLUSTER.FISH4) -
      RELATE(VSAM.CLUSTER.FISH) -
      MODEL(VSAM.ACLUSTER.FISH1) -
      FILE(XCRTCH) -
      KEYS(5 20)) -
      DATA (NAME(VSAM.ADATA.FISH4)) -
      INDEX(NAME(VSAM.AINDEX.FISH4))
      DEFINE PATH -
      (NAME(VSAM.PATH.FISH4) -
      PATHENTRY(VSAM.ACLUSTER.FISH4))
  DEFINE ALTERNATEINDEX -
      (NAME(VSAM.ACLUSTER.FISH5) -
      RELATE(VSAM.CLUSTER.FISH) -
      MODEL(VSAM.ACLUSTER.FISH1) -
      FILE(XCRTCH) -
      KEYS(5 25)) -
      DATA (NAME(VSAM.ADATA.FISH5)) -
      INDEX(NAME(VSAM.AINDEX.FISH5))
      DEFINE PATH -
      (NAME(VSAM.PATH.FISH5) -
      PATHENTRY(VSAM.ACLUSTER.FISH5))
  DEFINE ALTERNATEINDEX -
      (NAME(VSAM.ACLUSTER.FISH6) -
      RELATE(VSAM.CLUSTER.FISH) -
      MODEL(VSAM.ACLUSTER.FISH1) -
      FILE(XCRTCH) -
      KEYS(5 30)) -
      DATA (NAME(VSAM.ADATA.FISH6)) -
      INDEX(NAME(VSAM.AINDEX.FISH6))
      DEFINE PATH -
      (NAME(VSAM.PATH.FISH6) -
      PATHENTRY(VSAM.ACLUSTER.FISH6))
  DEFINE ALTERNATEINDEX -
      (NAME(VSAM.ACLUSTER.FISH7) -
      RELATE(VSAM.CLUSTER.FISH) -
      MODEL(VSAM.ACLUSTER.FISH1) -
      FILE(XCRTCH) -
      KEYS(5 35)) -
      DATA (NAME(VSAM.ADATA.FISH7)) -
      INDEX(NAME(VSAM.AINDEX.FISH7))
      DEFINE PATH -
      (NAME(VSAM.PATH.FISH7) -
      PATHENTRY(VSAM.ACLUSTER.FISH7))
  DEFINE ALTERNATEINDEX -
      (NAME(VSAM.ACLUSTER.FISH8) -
      RELATE(VSAM.CLUSTER.FISH) -
      MODEL(VSAM.ACLUSTER.FISH1) -
      FILE(XCRTCH) -
      KEYS(5 40)) -
      DATA (NAME(VSAM.ADATA.FISH8)) -
      INDEX(NAME(VSAM.AINDEX.FISH8))
      DEFINE PATH -
```

```
    (NAME(VSAM.PATH.FISH8) -
    PATHENTRY(VSAM.ACLUSTER.FISH8))
 DEFINE ALTERNATEINDEX -
   (NAME(VSAM.ACLUSTER.FISH9) -
   RELATE(VSAM.CLUSTER.FISH) -
   MODEL(VSAM.ACLUSTER.FISH1) -
   FILE(XCRTCH) -
   KEYS(5 45)) -
   DATA (NAME(VSAM.ADATA.FISH9)) -
   INDEX(NAME(VSAM.AINDEX.FISH9))
   DEFINE PATH -
   (NAME(VSAM.PATH.FISH9) -
   PATHENTRY(VSAM.ACLUSTER.FISH9))
 DEFINE ALTERNATEINDEX -
   (NAME(VSAM.ACLUSTER.FISH10) -
   RELATE(VSAM.CLUSTER.FISH) -
   MODEL(VSAM.ACLUSTER.FISH1) -
   FILE(XCRTCH) -
   KEYS(5 50)) -
   DATA (NAME(VSAM.ADATA.FISH10)) -
   INDEX(NAME(VSAM.AINDEX.FISH10))
   DEFINE PATH -
   (NAME(VSAM.PATH.FISH10) -
   PATHENTRY(VSAM.ACLUSTER.FISH10))
// EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//XCRTCH DD VOL=SER=XCRTCH,UNIT=3340,DISP=OLD
//VSAMOUT DD DSN=VSAM.CLUSTER.FISH,DISP=OLD
//FISH1   DD DSN=VSAM.ACLUSTER.FISH1,DISP=OLD
//FISH2   DD DSN=VSAM.ACLUSTER.FISH2,DISP=OLD
//FISH3   DD DSN=VSAM.ACLUSTER.FISH3,DISP=OLD
//FISH4   DD DSN=VSAM.ACLUSTER.FISH4,DISP=OLD
//FISH5   DD DSN=VSAM.ACLUSTER.FISH5,DISP=OLD
//FISH6   DD DSN=VSAM.ACLUSTER.FISH6,DISP=OLD
//FISH7   DD DSN=VSAM.ACLUSTER.FISH7,DISP=OLD
//FISH8   DD DSN=VSAM.ACLUSTER.FISH8,DISP=OLD
//FISH9   DD DSN=VSAM.ACLUSTER.FISH9,DISP=OLD
//FISH10 DD DSN=VSAM.ACLUSTER.FISH10,DISP=OLD
//SYSIN DD *
 BLDINDEX -
   INFILE(VSAMOUT) -
   OUTFILE(FISH1 FISH2 FISH3 FISH4 FISH5 FISH6 FISH7 FISH8 FISH9 -
           FISH10)
/*
```

```
/*KRAMER          711635736,'DICK KRAMER',MSGLEVEL=1,TIME=1,CLASS=B
//JOBCAT DO OSN=VSAM.CATALOG.TEMP.FILES,DISP=OLD
//     EXEC   COBUCLG
//COB.SYSIN    DO    *
       IDENTIFICATION DIVISION.
       PROGRAM-ID. BIBLOGRAPHY-3.
       AUTHOR. KRAMER.
       REMARKS. THIS  PROGRAM WILL RETRIEVE REFERENCES BY REQUESTING
           A SUBJECT CODE OR A RECORD CODE.
       REMARKS. REQUESTS FOR REFERENCES CONCERNING A CERTAIN SUBJECT
           MAY BE RETRIEVED BY PUNCHING THE SUBJECT DESIRED IN THE
           FIRST 5 COLUMNS OF A CARD -- AN INDIVIDUAL RECORD RECORD
           CAN BE  RETRIEVED IN A SIMILAR MANNER EXCEPT 'RECORD' MUST
           BE PUNCHED IN COLUMN 6 TO 11.
       **********************************************************************
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       SOURCE-COMPUTER. IBM-370.
       OBJECT-COMPUTER. IBM-370.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT CARD-FILE ASSIGN TO UR-2540R-S-CARDIN.
           SELECT PRINT-FILE ASSIGN TO UR-1403-S-PRINT.
           SELECT FISH ASSIGN TO FISHBIB
             ORGANIZATION IS INDEXED  ACCESS IS DYNAMIC
               RECORD KEY IS BIB-CODE
               ALTERNATE RECORD KEY IS BIB1 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB2 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB3 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB4 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB5 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB6 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB7 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB8 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB9 WITH DUPLICATES
               ALTERNATE RECORD KEY IS BIB10 WITH DUPLICATES
               FILE STATUS IS ERRAT.
       **********************************************************************
       DATA DIVISION.
       FILE SECTION.
       FD  FISH
           RECORD CONTAINS 560 CHARACTERS
           LABEL RECORDS ARE STANDARD
           DATA RECORD IS REF.
       01  REF.
           04 BIB-CODE PIC 9(5).
           04  BIB1 PIC 9(5).
           04  BIB2 PIC 9(5).
           04  BIB3 PIC 9(5).
           04  BIB4 PIC 9(5).
           04  BIB5 PIC 9(5).
           04  BIB6 PIC 9(5).
           04  BIB7 PIC 9(5).
           04  BIB8 PIC 9(5).
           04  BIB9 PIC 9(5).
           04  BIB10 PIC 9(5).
           04 FILLER PIC X(25).
           04 B-COOE-2 PIC 9(5).
           04 AU-THOR PIC X(50).
           04 YR PIC 9999.
```

```
            04 FILLER PIC X(21).
        04 B-COOE-3 PIC 9(5).
        04 TITLE-1 PIC X(74).
        04 STOPPER-1 PIC X(1).
        04 B-COOE-4 PIC 9(5).
        04 TITLE-2 PIC X(74).
        04 STOPPER-2 PIC X(1).
        04 B-COOE-5 PIC 9(5).
        04 TITLE-3 PIC X(74).
        04 FILLER PIC X(1).
        04 B-COOE-6 PIC 9(5).
        04 JOURNAL PIC X(75).
        04 B-CODE-7 PIC 9(5).
            04 VOLUME PIC X(10).
            04 NUMB PIC X(10).
            04 PAGES PIC X(10).
        04 FILLER PIC X(45).
   FD  CARD-FILE
       LABEL RECORDS ARE OMITTED, RECORDING MODE F, DATA RECORDS
       IS CARD-REC.
   01   CARD-REC.
       04 SUB-SEARCH PIC  9(5).
       04 BIB-SEARCH PIC X(6).
       04  FILLER PIC X(69).
   FD  PRINT-FILE
       LABEL RECORDS ARE OMITTED, RECORDING MODE F, DATA RECORDS
       IS PRINT-AREA.
   01  PRINT-AREA PIC X(133).
   WORKING-STORAGE SECTION.
   77      ERRAT  PIC 99   VALUE ZERO.
   ********
   * PRINTOUT FORMAT
   ********
   01   PRINT-REC.
            04 FILLER PIC X(5) VALUE SPACES.
            04 BIBG PIC 9(5).
            04 FILLER PIC X(5) VALUE SPACES.
        04   SUB1 PIC ZZ9999.
        04   SUB2 PIC ZZ9999.
        04   SUB3 PIC ZZ9999.
        04   SUB4 PIC ZZ9999.
        04   SUB5 PIC ZZ9999.
        04   SUB6 PIC ZZ9999.
        04   SUB7 PIC ZZ9999.
        04   SUB8 PIC ZZ9999.
        04   SUB9 PIC ZZ9999.
        04   SUB10 PIC ZZ9999.
            04 FILLER PIC X(57) VALUE SPACES.
   01   PRINT-REC-2.
            04 FILLER PIC X(5) VALUE SPACES.
            04 THOR PIC X(50).
            04 FILLER PIC X(10) VALUE SPACES.
            04 YEAR PIC 9(4).
            04 FILLER PIC X(63) VALUE SPACES.
   01   PRINT-REC-3.
            04 FILLER PIC X(5) VALUE SPACES.
            04 TITL-1 PIC X(74).
            04 FILLER PIC X(53) VALUE SPACES.
   01   PRINT-REC-4.
            04 FILLER PIC X(5) VALUE SPACES.
```

```
        04 TITL-2 PIC X(74).
        04 FILLER PIC X(53) VALUE SPACES.
)1   PRINT-REC-6.
        04 FILLER PIC X(5) VALUE SPACES.
        04 TITL-3 PIC X(74).
   04  FILLER PIC X(18) VALUE '              VOLUME'.
   04 FILLER PIC X(15) VALUE '          NUMBER'.
   04 FILLER PIC X(12) VALUE '       PAGES'.
   04 FILLER PIC X(8) VALUE SPACES.
)1   PRINT-REC-5.
        04 FILLER PIC X(5) VALUE SPACES.
        04 JOUR PIC X(75).
        04  FILLER PIC X(5) VALUE SPACES.
        04 VOL PIC X(10).
        04 FILLER PIC X(5) VALUE SPACES.
        04 NUM PIC X(10).
        04 FILLER PIC X(5) VALUE SPACES.
        04 PAG  PIC X(10).
        04 FILLER PIC X(7) VALUE SPACES.
)1   HEAD-1.
   04 FILLER PIC X(5) VALUE SPACES.
   04 FILLER PIC X(16) VALUE 'SEARCH CODE      '.
   04 SEARCH-1 PIC 9(5).
   04 FILLER PIC X(106) VALUE  SPACES.
 1   HEAD-2.
   04 FILLER PIC X(5) VALUE SPACES.
   04 FILLER PIC X(16) VALUE 'RECORD CODE      '.
   04 SEARCH-2 PIC 9(5).
   04 FILLER PIC X(106) VALUE SPACES.
****************************************************************
ROCEDURE DIVISION.
   OPEN INPUT FISH, CARD-FILE, OUTPUT PRINT-FILE.
   IF ERRAT NOT = ZERO DISPLAY 'EROR ON OPEN' ERRAT
   GO TO EOJ.
******
DETERMINING IF SUBJECT SEARCH OR A RECORD SEARCH
******
EAD-CARD. READ CARD-FILE AT END GO TO EOJ.
   IF BIB-SEARCH = 'RECORD' GO TO FIND-RECORD ELSE
   MOVE SUB-SEARCH TO SEARCH-1.
   WRITE PRINT-AREA FROM HEAD-1 AFTER ADVANCING 5 LINES.
   MOVE SUB-SEARCH TO BIB1.
   START FISH KEY IS = BIB1
   INVALID KEY GO TO KEY-2.
******
SUBJECT SEARCH
******
EAD-DISK-1.
   READ FISH NEXT RECORD AT END GO TO  KEY-2.
   IF ERRAT = 00 PERFORM WRITO, GO   TO  KEY-2.
   IF ERRAT = 02 PERFORM WRITO, GO TO RD1.
   IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
    GO TO EOJ.
D1. READ FISH NEXT RECORD AT END GO TO KEY-2.
   IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
    GO TO EOJ.
   IF BIB1 NOT = SUB-SEARCH GO TO KEY-2
   ELSE PERFORM WRITO.
   GO TO RD1.
EY-2.
```

```
      MOVE SUB-SEARCH TO BIB2.
      START FISH KEY IS = BIB2
      INVALID KEY GO TO KEY-3.
      READ FISH NEXT RECORD AT END GO TO  KEY-3.
      IF ERRAT = 00 PERFORM WRITO, GO   TO  KEY-3.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD2.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
!D2. READ FISH NEXT RECORD AT END GO TO KEY-3.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB2 NOT = SUB-SEARCH GO TO KEY-3
      ELSE PERFORM WRITO.
      GO TO RD2.
:EY-3.
      MOVE SUB-SEARCH TO BIB3.
      START FISH KEY IS = BIB3
      INVALID KEY GO TO KEY-4.
      READ FISH NEXT RECORD AT END GO TO  KEY-4.
      IF ERRAT = 00 PERFORM WRITO, GO   TO  KEY-4.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD3.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
 D3. READ FISH NEXT RECORD AT END GO TO KEY-4.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB3 NOT = SUB-SEARCH GO TO KEY-4
      ELSE PERFORM WRITO.
      GO TO RD3.
EY-4.
      MOVE SUB-SEARCH TO BIB4.
      START FISH KEY IS = BIB4
      INVALID KEY GO TO KEY-5.
      READ FISH NEXT RECORD AT END GO TO  KEY-5.
      IF ERRAT = 00 PERFORM WRITO, GO   TO  KEY-5.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD4.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
 D4. READ FISH NEXT RECORD AT END GO TO KEY-5.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB4 NOT = SUB-SEARCH GO TO KEY-5
      ELSE PERFORM WRITO.
      GO TO RD4.
EY-5.
      MOVE SUB-SEARCH TO BIB5.
      START FISH KEY IS = BIB5
      INVALID KEY GO TO KEY-6.
      READ FISH NEXT RECORD AT END GO TO  KEY-6.
      IF ERRAT = 00 PERFORM WRITO, GO   TO  KEY-6.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD5.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
 D5. READ FISH NEXT RECORD AT END GO TO KEY-6.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB5 NOT = SUB-SEARCH GO TO KEY-6
      ELSE PERFORM WRITO.
      GO TO RD5.
EY-6.
```

```
      MOVE SUB-SEARCH TO BIB6.
      START FISH KEY IS = BIB6
      INVALID KEY GO TO KEY-7.
      READ FISH NEXT RECORD AT END GO TO  KEY-7.
      IF ERRAT = 00 PERFORM WRITO, GO    TO  KEY-7.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD6.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
06. READ FISH NEXT RECORD AT END GO TO KEY-7.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB6 NOT = SUB-SEARCH GO TO KEY-7
      ELSE PERFORM WRITO.
      GO TO RD6.
EY-7.
      MOVE SUB-SEARCH TO BIB7.
      START FISH KEY IS = BIB7
      INVALID KEY GO TO KEY-8.
      READ FISH NEXT RECORD AT END GO TO  KEY-8.
      IF ERRAT = 00 PERFORM WRITO, GO    TO  KEY-8.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD7.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
)7. READ FISH NEXT RECORD AT END GO TO KEY-8.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB7 NOT = SUB-SEARCH GO TO KEY-8
      ELSE PERFORM WRITO.
      GO TO RD7.
:Y-8.
      MOVE SUB-SEARCH TO BIB8.
      START FISH KEY IS = BIB8
      INVALID KEY GO TO KEY-9.
      READ FISH NEXT RECORD AT END GO TO  KEY-9.
      IF ERRAT = 00 PERFORM WRITO, GO    TO  KEY-9.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD8.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
'8. READ FISH NEXT RECORD AT END GO TO KEY-9.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB8 NOT = SUB-SEARCH GO TO KEY-9
      ELSE PERFORM WRITO.
      GO TO RD8.
Y-9.
      MOVE SUB-SEARCH TO BIB9.
      START FISH KEY IS = BIB9
      INVALID KEY GO TO KEY-10.
      READ FISH NEXT RECORD AT END GO TO  KEY-10.
      IF ERRAT = 00 PERFORM WRITO, GO    TO  KEY-10.
      IF ERRAT = 02 PERFORM WRITO, GO TO RD9.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
9. READ FISH NEXT RECORD AT END GO TO KEY-10.
      IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
       GO TO EOJ.
      IF BIB9 NOT = SUB-SEARCH GO TO KEY-10
      ELSE PERFORM WRITO.
      GO TO RD9.
Y-10.
```

```
            MOVE SUB-SEARCH TO BIB10.
            START FISH KEY IS = BIB10
            INVALID KEY GO TO  READ-CARD.
            READ FISH NEXT RECORD AT END GO TO EOJ.
            IF ERRAT = 00 PERFORM WRITO, GO TO READ-CARD.
            IF ERRAT = 02 PERFORM WRITO, GO TO RD10.
            IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
               GO TO EOJ.
        RD10. READ FISH NEXT RECORD AT END GO TO READ-CARD.
            IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT
               GO TO EOJ.
            IF BIB10 NOT = SUB-SEARCH GO TO RD10
            ELSE PERFORM WRITO.
            GO TO RD10.
       ********
       * RECORD SEARCH
       ********
        FIND-RECORD.
            MOVE SUB-SEARCH TO SEARCH-2.
            WRITE PRINT-AREA FROM HEAD-2 AFTER ADVANCING 5 LINES.
            MOVE SUB-SEARCH TO BIB-CODE.
            READ FISH INVALID KEY GO TO READ-CARD.
             PERFORM WRITO.
            GO TO READ-CARD.
       ********
       * RETRIEVAL PRINTOUT
       ********
        WRITO.
            MOVE BIB-CODE TO BIBG.
            MOVE BIB1 TO SUB1.
            MOVE BIB2 TO SUB2.
            MOVE BIB3 TO SUB3.
            MOVE BIB4 TO SUB4.
            MOVE BIB5 TO SUB5.
            MOVE BIB6 TO SUB6.
            MOVE BIB7 TO SUB7.
            MOVE BIB8 TO SUB8.
            MOVE BIB9 TO SUB9.
            MOVE BIB10 TO SUB10.
            WRITE PRINT-AREA FROM PRINT-REC AFTER ADVANCING 3  LINES.
             MOVE AU-THOR TO THOR.
            MOVE YR TO YEAR.
            WRITE PRINT-AREA FROM PRINT-REC-2 AFTER ADVANCING 1 LINES.
            MOVE TITLE-1 TO TITL-1.
            WRITE PRINT-AREA FROM PRINT-REC-3 AFTER ADVANCING 1 LINES.
            MOVE TITLE-2 TO TITL-2.
            WRITE PRINT-AREA FROM PRINT-REC-4 AFTER ADVANCING 1 LINES.
            MOVE TITLE-3 TO TITL-3.
            WRITE PRINT-AREA FROM PRINT-REC-6  AFTER ADVANCING 1 LINES.
            MOVE JOURNAL TO JOUR.
             MOVE VOLUME TO VOL.
            MOVE NUMB TO NUM.
              MOVE PAGES TO PAG.
            WRITE PRINT-AREA FROM PRINT-REC-5 AFTER ADVANCING 1 LINES.
       EOJ. CLOSE FISH, PRINT-FILE, CARD-FILE.
            STOP RUN.
/*
//GO.SYSDBOUT  DD   SYSOUT=A
//GO.PRINT DD SYSOUT=A
//GO.SYSOUT   DD   SYSOUT=A
```

```
//GO.FISHBIB     DD   DSN=VSAM.CLUSTER.FISH,DISP=OLD
//GO.FISHBIB1  DD   DSN=VSAM.PATH.FISH1,DISP=GLD
//GO.FISHBIB2  DD   DSN=VSAM.PATH.FISH2,DISP=OLD
//GO.FISHBIB3  DD   DSN=VSAM.PATH.FISH3,DISP=OLD
//GO.FISHBIB4  DD   DSN=VSAM.PATH.FISH4,DISP=CLD
//GO.FISHBIB5  DD   DSN=VSAM.PATH.FISH5,DISP=OLD
//GO.FISHBIB6  DD   DSN=VSAM.PATH.FISH6,DISP=CLD
//GO.FISHBIB7  DD   DSN=VSAM.PATH.FISH7,DISP=OLD
//GO.FISHBIB8  DD   DSN=VSAM.PATH.FISH8,DISP=OLD
//GO.FISHBIB9  DD   DSN=VSAM.PATH.FISH9,DISP=OLD
//GO.FISHBI10  DD   DSN=VSAM.PATH.FISH10,DISP=OLD
//GO.CARDIN DD *
/*
```

```
//     EXEC   COBUCLG
//COB.SYSIN    OD    *
       IDENTIFICATION DIVISION.
       PROGRAM-IO. BIBLIOGRAPHY-4.
       AUTHOR. KRAMER.
       REMARKS. THIS PROGRAM WILL READ REFERENCES FROM 'BIBLIOGRAPHY-1'
           AND USE THEM TO ADD OR UPDATE RECORDS ON THE
           EXISTING VSAM FILE.
       ***************************************************************
       ENVIRONMENT DIVISION.
       CONFIGURATION SECTION.
       SOURCE-COMPUTER. IBM-370.
       OBJECT-COMPUTER. IBM-370.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT NEWWTAPE ASSIGN TO UT-2400-S-TAPE03.
           SELECT FISH ASSIGN TO FISHBIB
             ORGANIZATION IS INDEXED   ACCESS IS RANDOM
                RECORD KEY IS BIB-CODE
             FILE STATUS IS ERRAT.
       ***************************************************************
       DATA DIVISION.
       FILE SECTION.
       FD  FISH
           RECORD CONTAINS 560 CHARACTERS
           LABEL RECORDS ARE STANDARD
           DATA RECORD IS REF.
       01  REF.
           04 BIB-CODE PIC 9(5).
           04 MAIN-REF PIC X(555).
       FD  NEWWTAPE
           RECORDING MODE F, LABEL RECORDS ARE OMITTED, RECORD CONTAINS
           560 CHARACTERS, BLOCK CONTAINS 1 RECORDS, DATA RECORD IS
           NTAP.
       01  CARD-REC.
           04 ID-IN PIC 9(5).
           04 NEW-REF PIC X(555).
       WORKING-STORAGE SECTION.
       77  ERRAT PIC 99 VALUE ZERO.
       77  SAVE-THE-KEY PIC 9(5).
       ********
       * INITIALIZING COUNTER FOR NUMBER OF RECORD UPDATES
       ********
       77  UPDATE-COUNTER PIC 9(3) VALUE ZERO.
       ********
       * INITIALIZING COUNTER FOR NUMBER OF RECORD ADDITIONS
       ********
       77  ADD-COUNTER PIC 9(3) VALUE ZERO.
       ***************************************************************
       PROCEDURE DIVISION.
       OPENS.
           OPEN INPUT NEWWTAPE, I-O FISH.
           IF ERRAT NOT = 0 DISPLAY 'ERROR ON OPEN'  ERRAT GO TO EOJ.
       READ-IN.
           READ NEWWTAPE,  AT END GO TO EOJ.
       READ-DSK.
           MOVE ID-IN TO BIB-CODE.
           READ FISH INVALID KEY        GO TO WRITE-NEW.
       ********
       * UPDATE OR REWRITE AN EXISTING RECORD
```

```
        ********
         REWRITE-OLD.
             MOVE CARD-REC TO REF.
             REWRITE REF INVALID KEY EXHIBIT NAMED 'INVALID REWRITE'
             CARD-REC, SAVE-THE-KEY, GO TO READ-IN.
              ADD 1 TO UPDATE-COUNTER.
             GO TO READ-IN.
        ********
        * ADD NEW RECORDS
        ********
         WRITE-NEW.
             MOVE CARD-REC TO REF.
             WRITE REF INVALID KEY EXHIBIT NAMED 'INVALID WRITE'
             CARD-REC, SAVE-THE-KEY, GO TO READ-IN.
             ADD 1 TO ADD-COUNTER.
             GO TO READ-IN.
         EOJ.
             CLOSE NEWWTAPE, FISH.
             EXHIBIT NAMED UPDATE-COUNTER, ADD-COUNTER.
             STOP RUN.
/*
//GO.SYSDBOUT  DD    SYSOUT=A
//GO.SYSOUT    DD    SYSOUT=A
//GO.FISHBIB    DD    DSN=VSAM.CLUSTER.FISH,DISP=OLD
//GO.TAPE03    DD UNIT=TAPE,DISP=(OLD,PASS),
//  DCB=(RECFM=FB,LRECL=560,BLKSIZE=560),
//  DSNAME=&&TAPE03,
//  LABEL=(,NL),VOL=SER=SHEP
/*
```

APPENDIX B

GIVEFISH Data Sheets

LAKE CODE	SOURCE I.D.
□□□□	□□□□
1-4 5	6-9

LEGAL CLASSIFICATION
FORM A

D C	DATE
	Y Y M M D D
□	□□ □□ □□
10 11 12 13 14 15 16

NAME OF WATER   REGION   Card

□□□□□□□□□□□□□□□□□□□□   □□   □□
17-36   37 38   79 80

RANGE TWN   SECTION

□□ □□□   □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□
5-6   7-9   10-39

RANGE TWN   SECTION   Card

□□ □□□   □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□   □□
40 41   42-44   45-74   79 80

RANGE TWN   SECTION

□□ □□□   □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□
5 6   7-9   10-39

RANGE TWN   SECTION   Card

□□ □□□   □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□ □□   □□
40 41   42-44   45-74   79 80

Lake_____ Co_____

LAKE CODE	SOURCE I.D.	UNITS	D C	GENERAL WATER DESCRIPTIONS FORM B	RIVER INDEX	DATE

LAKE CODE 1-4 SOURCE I.D. 5 5-9 UNITS 10 11

RIVER INDEX: km — INDEX — km 12-14 15-17
DATE: Y Y M M D D 18-19 20-21 22-23

CLASSIFICATION

STATUS
- P: Permanent
- S: Semipermanent
- M: Marginal
- W: Waterfowl

– – – – – – – – – – – – – – – – ☐ 24

MANAGEMENT
- W: Warm Water
- L: Cool Water
- C: Cold Water

– – – – – – – – – – – – – – ☐ 25

DESCRIPTION
- N: Natural
- A: Artificial

– – – – – – – – – – – – – – – – – ☐ 26

ECOLOGICAL
- T: Trout
- W: Walleye - Panfish - Bass
- G: Game fish - Rough fish
- B: Bullhead
- P: Panfish

– – – – – – – – – – – – – – – ☐ 27

PRIMARY SPECIES MANAGED – – – – – – – – – – – Sp. 28-30 Sp. 31-33 Sp. 34-36 Sp. 37-39

DRAINAGE (SEQUENCE OF WATERWAYS TO MAJOR DRAINAGE BASIN) 40-43 44-47 48-51

DATE OF MAP FIELDWORK – 52-55

POPULATION

20 MILES
40 MILES 62-67
100 MILES 68-73
Card 03 79-80

DAM OR OUTLET CONTROL

Dam Type 1: Concrete 2: Earthen	Location	Date Constructed	Spillway 1: Concrete 2: Earthen	Spillway Width (m or ft)	Ownership 1: Municipal 3: Federal 2: State 4: Private
5	6-8	9-12	13	14-18	19-20

SURFACE AREAS AND DEPTHS

Hectare or Acre = Estimated = Planimetered	Meandered (ha or ac)	Littoral (ha or ac)	% Littoral	Max Depth (m or ft)	Ave Depth (m or ft)
22-28	29-34	35-40	41-42	43-46	47-49

BENCHMARK

	Location	Annual Fluctuation (m or ft)	Longterm Fluctuation (m or ft)	Elevation (m or ft)
	50-52	53-55 56-58	59-61 62-64	65-68

WATERSHED SIZE – – – – – – – – – – – – – – km² or mi² 69-78

Card 04 79-80

Ahe _____ Co _____

GENERAL WATER DESCRIPTION FORM C

LAKE CODE	SOURCE I.D	UNITS	D C

1-4   5   6-9   10 11

RIVER INDEX km km	DATE Y Y M M D D

12-14   15-17   18 19   20 21   22 23

RIVER CLASSIFICATION

Length (km or mi)   24-29

Total Channelized (km or mi)   30-32

Mean Width (m or ft)   33-34

Mean Depth   35-37

Normal High (cms or cfs)   38-42

Mean Annual (cms or cfs)   43-47

Pool Water Classification
1   48 49
2   50 51
3   52 53
4   54 55
5   56 57

Pool Area %   58 59

Riffle Area %   60 61

Ave Gradient %   62-64

Stable Banks %   65 66

Card 0 5   79 80

BOTTOM STRATA COMPOSITION

	LEDGE ROCK	BOULDER	RUBBLE	GRAVEL	SAND	SILT	CLAY	MUCK	OTHER
SHOAL WATER SOILS	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22
LAKE BOTTOM	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40

WATER RESOURCE USE AND DEVELOPMENT

Fishing Water: Permanent and Semiperm.
20 mi (ha or ac)   41-46
40 mi   47-52
100 mi   53-58

Fishing Water: Marginal
20 mi   59-63
40 mi   64-68
100 mi

Card 0 6   79 80

Water Resource Use
1=Municipal 2=Recreational 3=Power 4=All
5=Industrial 6=Irrigation 7=Other ( )
5-8

GFP Water Right No.   9-14

No. Of Dwellings   15-17

No. Of Islands   18 19

WATERSHED DEVELOPMENT (%)

Woodland	Wetlands	Pasture	Crop	Feedlot	Ungrazed Natural	Municipal	Other ( )
20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35

SHORELINE DEVELOPMENT (%)

Cottages	Resorts	Municipal	Pasture	Crop	Feedlot	Woodland	Ungrazed Natural	Other ( )
36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 51	52 53

Card 0 7   79 80

INLETS AND OUTLETS

Type	Barrier	Name type 1=inlet 2=outlet barrier 1=present 2=absent	Location	Mean Width Depth (m or ft)	Normal High (cms or cfs)	Mean Annual (cms or cfs)	Bott Typ 1=Muck 2=Mud 3=Sand 4=Rock	Card
								0 8
								0 8
								0 8
								0 8
								0 8

5 6   7-16   17-19   20 21   22 23   24-28   29-33   34 35   79 80

Lake _____ Co _____

LAKE CODE	SOURCE I.D.
☐☐☐☐	☐☐☐☐
1-4 5	6-9

WATER CHEMISTRY
FORM D

UNITS	D C	DATE
		Y Y M M D D
10	11	12 13 14 15 16 17

Station location – ☐☐☐
18 19 20

TURBIDITY AND COLOR

(m or ft)

Secchi – ☐☐☐
21 22 23

Color (LT = Light, DK = Dark, RD = Red, OR = Orange, YL = Yellow, BL = Blue, GR = Green, BR = Brown, GR = Gray) – – – ☐☐☐☐
24-27

Cause of color – – – – – – – – – – – – – – – – – – –
| 1 = Dead organic |
| 2 = Algal |
| 3 = Pollution |
| 4 = Other ( ) |
– – – ☐
28

	Depth (m or ft)	Temp (C or F)	Diss Oxy
	☐☐☐	☐☐	☐☐☐
	29-32	33 34	35-37
	☐☐☐	☐☐	☐☐☐
	38-41	42 43	44-46
TEMPERATURE AND DISSOLVED OXYGEN PROFILE	☐☐☐	☐☐	☐☐☐
	47-50	51 52	53-55
	☐☐☐	☐☐	☐☐☐
	56-59	60 61	62-64
	☐☐☐	☐☐	☐☐☐
	65-68	69 70	71-73

Card
☐☐ 0 9
79 80

(m or ft)   (m or ft)

Limit of thermocline – ☐☐☐ to ☐☐☐
5-8   9-12

WATER QUALITY

	Total Alkalinity	PHTH Alkalinity	MO Alkalinity	pH	CO₂	Total Hardness	Conductivity
Field analysis – – –	☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐	☐☐☐☐	☐☐☐☐
	13-15	16-18	19-21	22-24	25 26	27-30	31-34

	T S Solids	T D Solids	Ortho Phos	Total Phos	Chlorophyll A (mg/m3) B	
Lab analysis – – –	☐☐☐☐	☐☐☐☐	☐☐☐	☐☐☐	☐☐☐	☐☐☐
	35-38	39-42	43-45	46-48	49-51	52-54

	Chloride Ion	Ammonia-Nitrogen	Nitrate Nitrogen	Organic N (Kjeld)	Total Nitrogen	Card
	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	☐☐☐☐	1 0
	55-58	59-62	63-66	67-70	71-74	79 80

Lake _____ Co _____

LAKE CODE	SOURCE I.D.	D C
1-4	5	6-9	10

ORGANISM ABUNDANCE AND SPAWNING HABITAT FORM E

RIVER INDEX		DATE		
KM	KM	Y Y	M M	D D
11-13	14-16	17 18	19 20	21 22

STANDING EMERGENTS

% Coverage — 23 24

Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab
25-27	28	29-31	32	33-35	36	37-39	40	41-43	44

45 46   Depth of Growth (m or ft) 47-49

SUBMERGED OR FLOATING LEAF

| 50-52 | 53 | 54-56 | 57 | 58-60 | 61 | 62-64 | 65 | 66-68 | 69 |

FLOATING PLANTS AND PHYTOPLANKTON

Duckweed 70   Filamentous 71   Non-filamentous 72

TURTLES — FROGS — SALAMANDERS

Soft 73 Mud 74 Snap 75   Bull 76 Other 77   78

Card 1 1 — 79 80

FISH SPECIES KNOWN TO OCCUR

Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab	Sp	Ab
5-7	8	9-11	12	13-15	16	17-19	20	21-23	24	25-27	28	29-31	32	33-35	36	37-39	40
41-43	44	45-47	48	49-51	52	53-55	56	57-59	60	61-63	64	65-67	58	69-71	72	73-75	76

Card 1 2 — 79 80

Abundance
0=None 1=Occasional 2=Common
3=Abundant 4=Threatened 5=Endangered

EVALUATION OF SPAWNING AREA

1=Excellent
2=Good
3=Fair
4=Poor
5=None

Sp.		Locations		
5-7	8	9-11	12-14	15-17
18-20	21	22-24	25-27	28-30
31-33	34	35-37	38-40	41-43
44-46	47	48-50	51-53	54-56
57-59	60	61-63	64-66	67-69

Card 1 3 — 79 80

ake _____ Co _____

LAKE CODE	SOURCE I.D
1 - 4	5 6 -9

FISH STOCKING
AND REMOVAL
FORM F

UNITS	D C	DATE Y Y M M D D
10	11	12 13 14 15 16 17

STOCKING

Sp.	No.	Size	Sp	No	Size	Size
18 - 20	21 - 27	28	29-31	32 - 38	39	1 = Fry
						2 = Fingerling
						3 = Yearling
40 - 42	43-49	50	51-53	54-60	61	4 = Catchable
						5 = Adult

Card 1 4
79 80

COMMERCIAL FISHING
Methods

1 = Pocket Net	5 = Gillnet
2 = Hoop Net	6 = Trap
3 = O W Seine	7 = Weir
4 = U I Seine	

COMMERCIAL SPECIES

Meth	Hauls	Sp.	(kg or lbs)	Sp	(kg or lbs)	Sp.	(kg or lbs)
5	6-8	9-11	12-17	18-20	21-26	27-29	30-35
		36-38	39-44	45-47	48-53	54-56	57-62
		5-7	8-13	14-16	17-22		

Card 1 5
79-80

GAME SPECIES

Sp.	No.	Sp.	No.	Sp.	No.	Sp.	No.	Sp.	No.
23-25	26-29	30-32	33-36	37-39	40-43	44-46	47-50	51-53	54-57
58-60	61-66						67-69	70-75	

Card 1 6
.79 80

COMMERCIAL SPECIES

Meth	Hauls	Sp.	(kg or lbs)	Sp.	(kg or lbs)	Sp	(kg or lbs)
5	6-8	9-11	12-17	18-20	21-26	27-29	30-35
		36-38	39-44	45-47	48-53	54-56	57-62
		5-7	8-13	14-16	17-22		

Card 1 5
79-80

GAME SPECIES

Sp	No.	Sp.	No.	Sp.	No.	Sp.	No.	Sp.	No.
23-25	25-29	30-32	33-36	37-39	40-43	44-46	47-50	51-53	54-57
58-60	61-66						67-69	70-75	

Card 1 6
79 80

Lake _____ Co _____

NATURAL REPRODUCTION SUMMARY
FORM G

LAKE CODE	SOURCE I.D.
1-4 5	6-9

UNITS	D C	DATE Y Y M M D D
10 11 12 13 14 15 16 17

TOTAL PULLS	METHOD 1=seine 2=trawl	TIME DURATION hr min	SEINE MEASUREMENT LENGTH m or ft	DEPTH m or ft	MESH SIZE cm or in	TOTAL DISTANCE m or ft	AREA ha or ac	CARD 1 7
18 19	20	21 22 23	24-26	27 28	29-32	33-36	37-40	79 80

SPECIES	TOTAL NUMBER	NO/AREA ha or ac	SPECIES	TOTAL NUMBER	NO/AREA ha or ac	SPECIES	TOTAL NUMBER	NO/AREA ha or ac	CARD 1 8
5-7	8-13	14-16	17-19	20-25	26-28	29-31	32-37	38-40	
41-43	44-49	50-52	53-55	56-61	62-64	65-67	68-73	74-76	79 80

									CARD 1 8
									CARD 1 8
									CARD 1 8
									CARD 1 8

LAKE _____ CO _____

66

NETTING SUMMARY SHEET FORM H

LAKE CODE	SOURCE ID	SETS OR PULLS	METHOD 1 : Seine 5 : Trapnet 2 : Trawl 6 : Babytrap 3 : Gillnet 7 : Electrogear 4 : Hoopnet 8 : Poison	MESH SIZE (mm or in) 000 : Exper	DIMENSION (m or ft) Length Height Width	TIME DURATION Days Hours Min	HA OR AC	UNITS D C	DATE Y Y MM DD	Card

1-4   5   6-9   10 11   12   13-17   18-20   21-23   24-26   27 28 29 30 31 32   33-35   36 37 38 39 40 41   42 43 79 80

SPP CODE	TOTAL CATCH Number %No. Weight kg or lbs %Wt.	MEAN SIZE cm or in Weight kg or lbs	MEAN CATCH/NET Number Weight kg or lbs	STD ERROR	Card

5-7   8-12   13-14   15-20   21 22   23-26   27-31   32-35   36-40   41-44   79 80

20
20
20
20
20
20
20
20
20
20

LAKE CODE	SOURCE ID	SETS OR PULLS	METHOD 1 : Seine 5 : Trapnet 2 : Trawl 6 : Babytrap 3 : Gillnet 7 : Electrogear 4 : Hoopnet 8 : Poison	MESH SIZE (mm or in) 000 : Exper	DIMENSION (m or ft) Length Height Width	TIME DURATION Days Hours Min	HA OR AC	UNITS D C	DATE Y Y MM DD	Card

1-4   5   6-9   10 11   12   13-17   18-20   21-23   24-26   27 28 29 30 31 32   33-35   36 37 38 39 40 41   42 43 79 80

SPP CODE	TOTAL CATCH Number %No. Weight kg or lbs %Wt.	MEAN SIZE cm or in Weight kg or lbs	MEAN CATCH/NET Number Weight kg or lbs	STD ERROR	Card

5-7   8-12   13-14   15-20   21 22   23-26   27-31   32-35   36-40   41-44   79 80

20
20
20
20
20
20
20
20
20
20

Lake_____ Co_____

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LENGTH FREQUENCY FORM I

LAKE CODE	SOURCE I.D.	SETS OR PULLS	METHODS 1 = Seine 5 = Trapnet 2 = Trawl 6 = Babytrap 3 = Gillnet 7 = Electrogear 4 = Hoopnet 8 = Poison	MESH SIZE (mm or in) 000 = Exper	DIMENSION (m or ft) Length Height Width	TIME DURATION Days Hours Min	HA OR AC	UNITS D C	DATE Y Y MM D D	Card
1-4	5 6-9	10 11	12	13-17	18-20 21-23 24-26	27 28 29 30 31 32	33-35		36 37 38 39 40 41 42 43	2 1 79 80

DISTRIBUTION

	TL 1/2" INCR	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100-104	105-109	110-114	115-119																	
1																																					
2	TL 1" INCR	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179	180-189	190-199	200-209	210-219	220-229	230-239	240-249	250-259	260-269	270-279	280-289	290-299	300-309	310-319	320-329	330-339	340-349	350-359	360-369	370-379
	FREQ CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

FREQUENCY CODE AND NUMBER PER INTERVAL

Species 5 6 7   Distribution 8

9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

		TOTAL	CARD
41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72		73 74 75	2 2 79 80

Lake _____ Co. _____

LAKE CODE	SOURCE ID		AGE AND GROWTH DISTRIBUTION
			FORM J

UNITS D/C DATE Y Y M M D D Card
2 3

10 11 12 13 14 15 16 17 79 80

1-4   5   6-9

MEAN TOTAL LENGTH AT AGE GROUP (CM OR IN)

Sp	Size	Sample	0	I	II	III	IV	V	VI	VII	VIII+	Card
5 6 7	8-11	12-14	15-18	19-22	23-26	27-30	31-34	35-38	39-42	43-46	47-50	2 4

79 80

			No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	No in Age / Fish Calc	Card 2 5

79 80

Lake _____   Co._____

69

POLLUTION AND SURVEY DATA
FORM K

LAKE	SOURCE
CODE	I.D

1-4 5 6-9

UNITS	D C	DATE		
		Y Y	M M	D D

10 11 12 13 14 15 16 17

SEDIMENT OR POLLUTION PROBLEMS

0= None
1= Slight
2= Moderate
3= Severe

Bank Erosion	18	Cabin Sewage	24
Watershed Erosion	19	Agri Chemical	25
Thermal	20	Feedlot	26
Mining	21	Livestock Access	27
Industrial	22	Other ( )	28
Municipal Sewage	23		

FISH KILL

Numbers OR	Duration Of Kill	Cause	Species Affected
1= 1-100		1= Summerkill	
2= 101-1000 5= Slight		2= Winterkill	(Enter all zeroes if all
3= 1000-10000 6= Moderate		3= Pollution	species are affected)
4= +10000 7= Complete	M M D D M M D D	4= Poison 5= Disease	

29   30 31 32 33   34 35 36 37   38   39-41   42-46   47-49   50-52

CARD [2][6]
79-80

CREEL SURVEY

AC	Source ID	YR	M M	M M	Total Hours	Ave Day	Total Weight (kg or lbs)	Total Numbers
5	6-9	10 11	12 13	14 15	15-21	22-24	25-30	31-36

CARD [2][7]
79-80

	Specie	Catch/Hr	Wt/Hr (kg or lb)	Specie	Catch/Hr	Wt/Hr (kg or lb)
AC ACCURACY OF SURVEY	5-7	8-10	11-13	14-16	17-19	20-22
1= Extensive study	22-25	26-28	29-31	32-34	35-37	38-40
2= Limited measurements	41-43	44-46	47-49	50-52	53-55	56-58
3= Judgement	59-61	62-64	65-67	68-70	71-73	74-76

CARD [2][8]
79 80

RECREATIONAL SURVEY

AC	Source ID	Y R	M M	M M	Total Hours	
5	6-9	10-11	12-13	14-15	16-21	Swimming

Man-Hours/ ha or ac km or mi

	Man-Hours/ ha or ac km or mi		Man-Hours/ ha or ac km or mi
Angling	22-25	Waterskiing	42-45
Spearing and Archery	26-29	Picnicing	46-49
Hunting	30-33	Camping	50-53
Trapping	34-37	Snowmobiling	54-57
Boating and Canoeing	39-41	Other	58-61
			62-65

CARD [2][9]
79 80

LAKE _____ CO _____

LAKE CODE	SOURCE ID		WATER RESOURCE IMPROVEMENTS RECOMMENDATIONS AND FINANCES FORM L	D C	DATE

Lake Code: 1-4 | 5 | 6-9

DATE: Y Y | M M | D D
10 11 12 | 13 14 | 15 16

RECOMMENDATIONS COMPLETED THIS YEAR

| 17 18 | 19 20 | 21 22 | 23 24 | | 3 0 |
| 79 80 |

MANAGEMENT RECOMMENDATIONS

Rec	Species Affected		Benefit In Man-Days	Year To Be Completed	Cost	
5-6	7-9	10-12	13-18	19 20	21-26	
27 28	29-31	32-34	35-40	41 42	43-48	3 1 79 80
5 6	7-9	10-12	13-18	19 20	21-26	
27 28	29-31	32-34	35-40	41 42	43-48	3 1 79 80
5 6	7-9	10-12	13-18	19 20	21-26	
27 28	29-31	32-34	35-40	41 42	43-48	3 1

ACCESS RECOMMENDATIONS

Location	Rec	Benefit	Cost	Rec	Benefit	Cost	
5-7	8 9	10-15	16-20	21 22	23-28	29-33	
34-36	37 38	39-44	45-49	50 51	52-57	58-62	3 2 79 80
5-7	8 9	10-15	16-20	21 22	23-28	29-33	
34-36	37 38	39-44	45-49	50 51	52-57	58-62	3 2 79 80
5-7	9 9	10-15	16-20	21 22	23-29	29-33	
34-36	37 38	39-44	45-49	50 51	52-57	58-62	3 2 79 30

ADDITIONAL INFORMATION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 | 3 3 |

LAKE _____ CO _____

ACCESS FACILITIES
FORM M

LAKE CODE | SOURCE I.D.

1-4 5 6-9

|UNITS|O C|DATE YY Y MM O D|CARD|
| | | |3|4|
10 11 12 13 14 15 16 17 79 80

OWNERSHIP	ACCESS	BOAT RMP	FACILITIES

OWNERSHIP
1=State
2=Federal
3=City
4=County
5=Commercial
6=Other

ACCESS
1=All Weather
2=Undeveloped

BOAT RMP
Internal Road
Dirt or Gravel
1=Dirt
2=Steel
3=Concrete
4=Double Wide

FACILITIES
A=Boat rental
B=Docks
C=Camping
D=Pads
E=Sewer Dump
F=Tables
G=Shelters
H=Fireplaces
I=Lights
J=Electricity
K=Garbage
L=Flush Toilet
M=Prim Toilet
N=Drinking Water
O=Snowmobile Trl
P=Showers
Q=Swim Beach
R=Change House
S=Cabin Rental
T=Bait
U=Concessions
V=Hike Trail

MAINTENANCE
58-63

FACILITIES
64-69

LOCATION | NAME | | | | | WATER FRONT DISTANCE (m or ft) | AREA (ha or ac) | LAND INVESTMENT | YR | CARD
3|5

5 6 7   8-22   23   24   25   26   27-47   48-53   54-57   70-75   76 77 79 80

LAKE _____ CO. _____

TEST NETTING FIELD SHEET FORM N

LAKE CODE	SOURCE I.D.	SETS OR PULLS
1-4	5 6-9	10 11

METHOD	MESH SIZE (mm or in)
12	13-17

DIMENSION (m or ft)		
Length	Height	Width
18-20	21-23	24-26

TIME DURATION			HA OR AC	UNITS	D C
Days	Hrs	Min			
27 28	29 30	31 32	33-35	36	37

DATE			Card
Y Y	M M	D D	3 6
38 39	40 41	42 43	79 80

LAKE CODE	SPP. CODE	METHOD
1-4	5-7	8

LOCATION	NUMBER	NET

LAKE_____CO_____   SPECIES_____

APPENDIX C

BIBFISH Subject Index

ANIMAL LIFE
Fish

Bass	10001
True Bass	10002
Catfish & Bullhead	10003
Darters	10004
Drum	10005
Eel	10006
Gar	10007
Lamprey	10008
Madtom	10009
Minnow	10010
Paddlefish	10012
Perch	10013
Pike	10014
Salmon	10015
Sculpin	10016
Shad	10017
Stickleback	10018
Sturgeon	10019
Suckers	10020
Sunfish	10021
Trout	10022
Walleye & Sauger	10023
Other FW Fishes	10024

Other Vertibrates

Amphibians & Reptiles	11001
Birds	11002
Mammals	11003

Invertibrates

Crustacea	12001
Insects	12002
Mollusk	12003
Other	12004

PLANT LIFE

Algae (See Limnology)	13001
Aquatic Macrophytes	13002
Biology	13003
Control (Not Herbicides)	13004
Identification & Keys	13005

BIOCIDES

Insecticide	14001
Herbicide	14002
Piscicide	14003

COMMERCIAL FISHING	15000

CONSERVATION	16000

CULTURE

Coldwater	17001
Culture Technique & Equipment	17002
Feeds, Feeding & Nutrition	17003
Warmwater	17004
General	17005

DATA PROCESSING	18000

DISEASE, PARASITES & SICKNESS	19000

ECOLOGY

Enviromental Parameters	20001
Diversity	20002
Habitat	20003
Species Interactions	20004

ECONOMICS	21000

GENETICS

Biochemical	22001
Hybrids	22002
Population	22003
General	22004

LAKES & RESERVOIRS

Farm Ponds	23001
Natural	23002
Reservoirs	23003
General	23004

LIFE HISTORY

Age & Growth	24001
Behavior	24002
Distribution & Movement	24003
Feeding & Diet	24004
Reproduction	24005
General	24006

LIMNOLOGY

Benthos	25001
Chemical	25002
Methods & Equipment	25003
Physical	25004
Phytoplankton	25005
Primary Production	25006
Zooplankton	25007
General	25008

LITERATURE REVIEWS 26000

MANAGEMENT
  Administrative & Planning 27001
  Fish Control & Removal 27002
  Habitat Manipulation &
    Improvement 27003
  Harvest 27004
  Laws & Regulations 27005
  Marking 27006
  Rehabilitation 27007
  Stocking 27008
  General 27009

PHYSIOLOGY & MORPHOLOGY 28000

POLLUTION
  Agricultural 29001
  Industrial & Thermal 29002
  Municipal & Urban 29003
  Fish Kills 29004
  General 29005

POPULATIONS
  Inventory 30001
  Production 30002
  Recruitment & Structure 30003
  Standing Crop 30004
  Survival & Mortality 30005

RIVERS, STREAMS AND CREEKS 31000

SURVEY
  Creel 32001
  Recreational 32002
  General 32003

TECHNIQUES
  Analysis 33001
  Chemical 33002
  Electronics 33003
  Sampling 33004
  Survey 33005
  General 33006

WATER RESOURCES
  Development 34001
  Planning 34002
  Lake & Stream Resoration 34003
  Watershed Management 34004
  Water Use & Conservation 34005

APPENDIX D

River Codes

6800	Missouri R
6900	Little Missouri R
6901	Boxelder Cr
6902	Sheep Cr
6904	Coal Bank Cr
6905	Humblot Cr
6907	Dogie Cr
6908	Kimble Cr
6909	Dry House Cr
6911	Gallup Cr
6912	Wagon Cr
6913	Slick Cr
6915	Plum Cr
6916	Antelope Cr
6917	Valley Cr
6919	Water Hole Cr
6921	Tie Cr
6922	Forty-eight Mile Cr
6923	Beaver Dam Cr
6925	Black Foot Cr
6950	Crow Head Cr
6975	Spring Cr
7025	Olson Cr
7050	Oak Cr
7100	Grand R
7101	Claymore Cr
7102	Snake Cr
7103	Deep Bank Cr
7105	Little Oak Cr
7106	High Bank Cr
7107	Plum Cr
7109	Rock Cr
7110	Iron Dog Cr
7111	Stink Cr
7113	White Shirt Cr
7114	Hump Cr
7115	Firesteel Cr
7116	Dirt Lodge Cr
7117	Red Willow Cr
7118	Louse Cr
7119	Cottonwood Cr
7121	Meadow Cr
7122	Cedar Bay Cr
7123	Black Horse Butte Cr
7124	Coal Cr
7126	Whitney Cr
7127	Willow Cr
7128	East Branch
7129	West Branch
7131	Thunderhawk Cr
7100	Grand R Cont.
7132	Dog Tooth Cr
7133	Flat Cr
7134	East Flat Cr
7135	North Fork Grand R
7136	Giles Cr
7137	Willow Cr
7138	Wilson Cr
7139	Crooked Cr
7140	South Fork Grand R
7141	Lodge Pole Cr
7142	Butcher Cr
7144	Little Nasty Cr
7145	Duck Cr
7146	Big Nasty Cr
7148	Lems Cr
7149	Middle Cr
7151	Skull Cr
7152	Brush Cr
7153	Horse Cr
7154	Turtle Cr
7156	Coal Cr
7160	Bull Cr
7161	Sheep Pen Draw Cr
7162	Hay Cr
7163	Jack Cr
7164	Dry Cr
7166	Campbell Cr
7167	Middle Cr
7169	Jones Cr
7170	Clarks Fork Cr
7171	Squaw Cr
7172	Box Elder Cr
7174	Sheep Cr
7175	Deadman Cr
7225	Blue Blanket Cr
7250	Little Bear Cr
7300	Moreau R
7301	No Mouth Cr
7302	Du Charme Cr
7303	Virgin Cr
7304	Left Hand Bear Cr
7305	Marshall Cr
7306	Le Beau Cr
7307	Hokshela Cr
7308	Laundry Cr
7309	Beaver Cr
7310	Handboy Cr
7311	Veo Cr
7312	Johnson Cr

7300	Moreau R Cont.
7313	Swan Cr
7314	Jewett Cr
7316	Whitehorse Cr
7317	Little Moreau R
7318	Bull Cr
7319	Cottonwood Cr
7320	Goose Cr
7321	Redwater Cr
7322	Meadow Cr
7323	Green Grass Cr
7324	Red Earth Cr
7325	Bear Cr
7326	Elm Cr
7327	Pretty Cr
7328	Irish Cr
7329	Ash Cr
7331	Sophia Cr
7332	Thunder Butte Cr
7333	Beaver Trap Cr
7334	Knocker Cr
7335	Big Meadow Cr
7336	Knife Cr
7337	Flint Rock Cr
7338	Locate Cr
7339	Badlands Cr
7340	Berry Cr
7341	Mud Cr
7342	Rabbit Cr
7343	Antelope Cr
7344	Deer Cr
7345	Flint Cr
7346	Lilly Cr
7348	Starve Qui Cr
7349	Cabin Cr
7350	Little Cedar Cr
7351	Brushy Cr
7352	Cottonwood Cr
7353	Big Cedar Cr
7354	Mud Cr
7355	Ash Cr
7356	North Fork Moreau R
7357	Sheep Cr
7358	Sand Cr
7359	Cottonwood Cr
7360	Cow Boy Cr
7361	Goose Cr
7362	Duck Cr
7363	Snake Cr
7365	South Fork Moreau R
7366	Trail Cr

7300	Moreau R Cont.
7365	South Fork Moreau R Cont.
7367	Sand Cr
7368	North Sand Cr
7369	South Sand Cr
7370	Frog Cr
7371	Fourmile Cr
7372	Battle Cr
7373	Antelope Cr
7374	Alkalia Cr
7375	Battle Cr
7400	Swan Cr
7425	Four Bear Cr
7450	Buffalo Cr
7475	Swift Bird Cr
7500	Little Cheyenne Cr
7525	Stove Cr
7550	Artichoke Cr
7575	Willow Cr
7600	No Heart
7625	Tall Prairie Chicken Cr
7650	Fox Cr
7700	Cheyenne R
7701	Rousseau Cr
7702	East Branch
7703	West Branch
7704	Oak Cr
7705	Hosapa Cr
7706	Ninneconjou Cr
7707	Parade Cr
7708	Aeber Cr
7709	Sansarc Cr
7711	Foster Cr
7712	Rudy Cr
7713	Hermaphrodite Cr
7714	Lone Tree Cr
7715	Big Cottonwood Cr
7716	Little Cottonwood Cr
7717	Deep Run Cr
7718	Snake Cr
7719	Plum Cr
7720	Cherry Cr
7721	Ash Cr
7722	East Branch
7723	West Branch
7724	Rattlesnake Cr
7726	Red Coat Cr
7727	Red Scaffold Cr
7728	Bever Cr
7729	Spook Cr
7730	Red Owl Cr

7700	Cheyenne R. Cont.	7700	Cheyenne R Cont.
7730	Red Owl Cr	7751	Bell Fourche R
7731	White Owl Cr	7783	Owl Cr
7732	Bever Cr	7784	North Canal
7733	Pine Cr	7785	Dry North Canal
7734	Sulphur Cr	7786	Todd Lateral
7736	Camp Cr	7787	Indian Cr Lateral
7737	North Fork Sulphur	7789	Johnson Lateral
7738	Lonetree Cr	7790	Redwater Ditch
7739	Straighthead Cr	7791	South Canal
7740	Bull Cr	7792	Meade Lateral
7741	Beaver Cr	7793	Dry Cr
7742	Spotted Bear Cr	7794	Wildcat Cr
7743	Upper Bear Cr	7795	Salt Cr
7744	Narcelle Cr	7796	Roundout Cr
7745	Negro Cr	7797	Bull Cr
7746	West Branch Narcel	7798	Slate Cr
7747	Ash Cr	7799	Stinking Water Cr
7748	Big Timber Cr	7801	Maloney Cr
7749	Deep Cr	7802	Crow Cr
7750	Squaw Cr	7803	Boxelder Cr
7751	Bell Fourche R	7804	Redwater R
7752	Hay Cr	7805	Hay Cr
7753	Elm Cr	7806	Willow Cr
7754	East Elm Cr	7807	False Bottom Cr
7755	West Elm Cr	7808	Polo Cr
7756	Eightmile Cr	7809	Miller Cr
7757	Mud Elm Cr	7810	Tetro Cr
7758	Station Cr	7811	Spearfish Cr
7759	Alkalia Cr	7812	Little Spearfish Cr
7760	Fourmile Cr	7813	Dry Cr
7761	Spring Cr	7814	East Spearfish Cr
7762	Bear Bute Cr	7815	Dead Ox Cr
7763	Vanocher Cr	7816	Chicken Cr
7764	Boulder Cr	7817	Crow Cr
7765	Two Bit Cr	7818	Beaver Cr
7767	Willow Cr Lateral	7819	Middle Cr
7768	Willow Cr	7820	Elk Cr
7769	Deer Cr	7821	Antelope Cr
7770	Jug Cr	7822	Morris Cr
7771	Horse Cr	7823	Little Elk Cr
7772	Lonetree Cr	7824	Meadow Cr
7773	Indian Cr	7826	Crooked Cr
7774	Bitter Cr	7827	North Fork Crooked Cr
7776	Hildebrand Cr	7828	South Fork Crooked Cr
7777	North Indian	7829	Boxelder Cr
7778	South Indian	7830	Blackhawk Cr
7779	Short Cr	7831	Bogus Jim Cr
7780	Lonetree Cr	7832	Jim Cr
781	Cottonwood Cr	7833	Estes Cr
782	Whitewood Cr	7834	South Boxelder Cr

7751	Bell Fourche R Cont.
7829	Boxelder Cr Cont.
7835	Middle Boxelder Cr
7836	North Boxelder Cr
7838	Sage Cr
7839	Beaver Cr
7840	Bear Cr
7841	Rapid Cr
7842	Antelope Cr
7843	Dry Cr
7844	Canyon Cr
7845	Victoria Cr
7846	Prairie Cr
7847	Deer Cr
7848	Slate Cr
7849	East Fork Slate Cr
7851	Castle Cr
7852	North Fork Castle
7853	South Fork Castle
7854	Heely Cr
7855	Ditch Cr
7856	Pole Cr
7857	West Grimlet Cr
7858	Silver Cr
7859	South Fork Rapid Cr
7860	North Fork Rapid Cr
7861	Spring Cr
7862	Rockerville Cr
7863	Newton Fork
7864	Negro Cr
7866	Indian Cr
7867	Battle Cr
7868	Murphy Cr
7869	Billover Cr
7870	Grace Coolidge Cr
7871	Spokane Cr
7872	Bear Cr
7873	Iron Cr
7874	Grizzly Cr
7876	Brush Cr
7877	Cedar Cr
7878	Red Shirt Cr
7879	French Cr
7880	South Fork French
7881	Dry Cr
7882	Pass Cr
7883	Little Squaw Cr
7884	Squaw-Humper Cr
7885	Cottonwood Cr
7886	Lame Johnny Cr
7887	Flynn Cr

7751	Bell Fourche R Cont.
7886	Lame Johnny Cr Cont.
7888	South Fork Lame J
7889	North Fork Lame J
7891	Beaver Cr
7892	Cold Spring Cr
7893	Elm Cr
7894	Spring Cr
7895	Fall R
7896	Cold Brook Cr
7897	Cottonwood Springs
7898	Horsehead Cr
7899	Lone Well Cr
7901	Beef Cr
7902	Black Banks Cr
7700	Cheyenne R Cont.
7903	Dry Cr
7904	Bridal Veil Springs
7905	Cascade Cr
7906	Hat Cr
7907	Bitter Cr
7908	Ash Cr
7909	Piney Cr
7910	Long Hollow
7911	Horse Cr
7912	Hay Cr
7913	Plains Cr
7914	Duck Cr
7915	Mule Cr
7916	Long Branch Cr
7917	Short Branch Cr
7919	Plum Cr
7920	Pleasant Valley Cr
7921	Hawkright Cr
7922	East Fork Hawkright
7923	Lightning Cr
7924	Hay Cr
7926	Fourmile Cr
7927	East Fork Hawkright
7928	West Fork Hawkright
7930	Cottonwood Cr
7931	Coal Cr
7932	Fiddle Cr
7933	Alum Cr
7934	Dry Cr
7935	Driftwood Cr
7936	Moss Agate Cr
7937	Griffis Canal
7938	Tubbs Cr
7939	Beaver Cr
7941	Pass Cr

7930	Cottonwood Cr Cont.	8137	South Fork Bad R Cont.
7941	Pass Cr Cont.	8142	White Water Cr
7941	Coon Cr	8143	Big Buffalo Cr
7943	Dugout Cr	8150	Dry Run Cr
7944	Bear Spring Cr	8175	Mush Cr
7945	Lone Tree Cr	8225	Antelope Cr
7946	Line Cr	8236	Sand Cr
7947	Whoopup Cr	8242	Timber Cr
7948	Stockade Beaver Cr	8250	Medicine Knoll Cr
7949	Beaver Cr	8256	Otoza Lake Drainage
7950	Agency Cr	8263	South Medicine Cr
7975	Sully Cr	8268	North Medicine Cr
8025	Okobojo Cr	8272	Walter Lake Drain
8026	Spring Cr	8275	Fort George Cr
8050	Chantier Cr	8425	Chapelle Cr
8100	Bad R	8436	South Chapelle Cr
8101	Willow Cr	8450	Cedar Cr
8102	Powell Cr	8475	Reynolds Cr
8103	Stranger Cr	8800	Missouri R Cont.
8104	Ash Cr	8500	Medicine Cr
8105	War Cr	8506	Nail Cr
8106	Lance Cr	8512	North Fork Medicine Cr
8107	Tomahawk Cr	8525	Chaney Rush Cr
8108	Plum Cr	8550	Soldier Cr
8109	Cottonwood Cr	8575	Campbell Cr
8111	Herd Camp Cr	8600	Short Cr
8112	White Clay Cr	8610	Little Elm Cr
8113	Dry Cr	8625	Crow Cr
8114	Big Prairie Cr	8636	Little Elm Cr
8115	Little Prairie Dog Cr	8642	Smith Cr
8116	Mitchell Cr	8643	Jones Lake Drainage
8117	Mule Cr	8644	East Fork Smith Cr
8119	Brave Bull Cr	8647	Elm Cr
8120	Indian Cr	8648	West Fork Elm Cr
8121	Squaw Cr	8650	American Cr
8122	Buzzard Cr	8675	American Crow Cr
8124	Medicine Cr	8680	Big Cr
8126	White Willow Cr	8700	White R
8127	Brady Cr	8701	Waver Tree Cr
8128	Franklin Cr	8702	Red Butte Cr
8129	Grindstone Cr	8703	Thunder Cr
8131	North Fork Bad R	8704	Bad Cr
8132	Mexican Cr	8705	No Moccasin Cr
8133	Dead Mans Cr	8706	Davis Cr
8134	Dirty Womans Cr	8707	Old Lodge Cr
8135	Poeno Cr	8708	Mill Iron Cr
8137	South Fork Bad R	8709	Dog Ear Cr
8138	Dry Cr	8710	Owl Cr
8139	Lone Tree Cr	8711	Hollow Cr
8140	Cottonwood Cr	8712	Mud Cr
8141	Little Buffalo Cr	8714	Mission Cr

8700	White R Cont.	8700	White R Cont.
8715	Cottonwood Cr	8773	Cottonwood Cr
8716	Little Dog Cr	8774	Fifteen Cr
8717	Sedlano Cr	8776	Long Cr
8718	Oak Cr	8777	Craven Cr
8719	Butte Cr	8778	Eagle Nest Cr
8720	White Horse Cr	8779	Rake Cr
8721	Williams Cr	8780	Bear-in-the-Lodge Cr
8722	Louis Cr	8781	Corn Cr
8723	Squaw Cr	8782	Spring Cr
8724	White Thunder Cr	8783	Lost Dog Cr
8726	Bull Cr	8784	Potatoe Cr
8727	Kaiser Cr	8785	Little Dog Spring
8728	Spring Cr	8786	Indian Cr
8729	Johnny Cr	8787	Bull Cr
8730	Hay Cr	8789	Redwater Cr
8731	Horse Cr	8790	Cain Cr
8732	Ash Cr	8791	Medicine Root Cr
8735	Little White R	8792	Mud Cr
8736	Pine Cr	8793	No Flesh Cr
8737	North Branch Pine Cr	8794	American Horse Cr
8738	South Branch Pine Cr	8795	Threemile Cr
8739	Horse Cr	8796	Palmer Cr
8740	Horse Head Cr	8797	Clifford Cr
8742	Cut Meat Cr	8798	Big Hollow Cr
8743	Phister Cr	8799	Wind Cr
8744	Upper Cut Meat Cr	8801	Spring Cr
8745	Ti-Shena-Ze Cr	8802	Cottonwood Cr
8746	Soldier Cr	8803	North Cottonwood Cr
8747	Rosebud Cr	8804	Porcupine Cr
8748	Stinking Water Cr	8805	Fog Cr
8751	Cottonwood Cr	8806	Wounded Knee Cr
8752	O'Donald Cr	8807	White Horse Cr
8753	Butch Cr	8808	Spring Cr
8754	Round-up Cr	8809	Sand Cr
8755	Cedar Cr	8810	Grass Cr
8756	Yukmi Cr	8811	East Horse Cr
8757	Runs Close Cr	8812	West Horse Cr
8758	Larvie Cr	8813	Mule Cr
8759	Black Pipe Cr	8814	Willow Cr
8760	Porcupine Cr	8815	West Fork Willow Cr
8761	Simms Cr	8816	Middle Fork Willow Cr
8762	Paulmyer Cr	8817	East Fork Willow Cr
8763	Corn Cr	8818	Cedar Bluff Cr
8765	Plum Cr	8819	Blacktail Cr
8766	Deep Cr	8820	North Fork Blacktail Cr
8767	Red Stone Cr	8821	South Fork Blacktail Cr
8768	Nancy Harris Cr	8822	White Clay Cr
8769	Pass Cr	8823	Wolf Cr
8770	Pearson Cr	8824	Slim Butte Cr
8771	Settin Up Cr	8825	Maiden Cr

6800	Missouri R Cont.	6800	Missouri R Cont.
8850	Bull Cr	9750	Keya Paha R Cont.
8853	West Branch Bull Cr	9763	Rock Cr
8863	East Branch Bull Cr	9764	Lone Tree Cr
8875	Waterhole Cr	9766	Antelope Cr
9025	Nicholas Cr	9775	Indian Cr
9050	Nelson Cr	9777	Camp Cr
9075	Elm Cr	9779	Alkalia Cr
9125	Dry Cr	9825	Emanuel Cr
9150	Snake Cr	9850	Snatch Cr
9175	Five Mile Cr	9875	Marne Cr
9225	Platte Cr	9900	James R
9229	Castallia Cr	9901	Beaver Cr
9239	East Fork Platte Cr	9902	Mud Cr
9250	Cedar Cr	9903	Prairie Cr
9275	Whetstone Cr	9904	Dawson Cr
9279	North Fork Whetstone Cr	9905	Lonetree Cr
9289	South Fork Whetstone Cr	9906	S Branch Lonetree
9290	Burnt Rock Cr	9907	Wolf Cr
9292	Coon Cr	9908	Plum Cr
9325	North Scalp Cr	9909	Dry Cr
9350	Pease Cr	9910	N Branch Dry Cr
9375	South Scalp Cr	9911	S Branch Dry Cr
9425	Joe Days Cr	9912	Twelvemile Cr
9450	Andes Cr	9913	Pony Cr
9475	Randal Cr	9914	S Fork Twelvemile
9525	Slaughter Cr	9915	Coffee Cr
9535	Mosquito Cr	9916	N Fork Twelvemile
9550	Song Hawk Lake Drainage	9918	Pierre Cr
9575	Spring Cr	9919	Johnson Cr
9600	Bull Cr	9920	Enemy Cr
9625	Choteau Cr	9921	Rock Cr
9635	Dry Choteau Cr	9922	Firesteel Cr
9675	Coffee Cr	9923	W Branch Firesteel
9700	Minnechaduza R	9924	Rock Cr
9701	Dry Cr	9926	Morris Cr
9725	Ponca Cr	9927	Jim Cr
9726	Willow Cr	9928	Sand Cr
9728	Lake Splendor Drainage	9929	Silver Cr
9730	Murphy Cr	9930	Redstone Cr
9750	Keya Paha R	9931	Marsh Cr
9751	Buffalo Cr	9931	Pearl Cr
9752	Lute Cr	9933	South Fork Pearl Cr
9753	Cottonwood Cr	9934	Middle Fork Pearl Cr
9754	Lost Cr	9935	Cain Cr
9756	Willow Cr	9936	Stoney Run Cr
9757	Sandy Cr	9937	Shue Cr
9759	Sand Cr	9938	Foster Cr
9761	Eagle Cr	9939	Snake Cr (L Dudley)
9762	Crazy Hole Cr	9940	Timber Cr

0070 Minnesota R Cont.
0082   W Branch Lac Qui Parle R
0083   Lost Cr
0084   Crow Timber Cr
0086   Monighan Cr
0087   Gary Cr
0088   Florida Cr
0090 Bois de Sioux R
0091   Cottonwood Slough Drainage
0092   Dry Run
0093   Jim Cr
0094   Wild Rice Cr
0096   La Belle Cr
0097   Short Foot Cr

Miscellaneous Drainages
0052 Wild Rice Cr. (Marshall Co)
0059 Hegna Cr. Impassable Marsh
      (Roberts Co)
0058 Goodwill Cr Impassable Marsh
      (Roberts Co)
0046 Bates Cr Rush L.-S. Waubay
      (Day Co)
0047 Webster Sewage Ditch-S.
      Waubay (Day Co)
0048 Grenville Cr.-Pickerel L.
      N Waubay (Day Co)
0049 Owens Cr.-Bluedog L. (Day Co)
0053 Dolph Cr.-L. Norden (Hamlin)
0051 Battle Cr.-L. Campbell
      (Brookings Co)
0060 Preachers Run-S. Scatterwood
      L. (Faulk Co)
0055 Hiddenwood Cr. (Walworth Co)

APPENDIX E

Lake Codes

Aurora

1001	Wilmarth
1002	Fraizer
1003	Fish
1004	Crystal
1005	Hanson"s
1006	Stickney (old)
1007	Jail Pond (Kids Pond)
1008	Platte
1009	Stoddard
1010	White
1011	Crystal, East
1012	Maine
1013	Nelson or Stockney (new)
1014	Patton
1015	Luxemborg
1016	Pleasant

Beadle

0401	Staum
0402	Ravine
0403	Byron
0404	Stoney Run
0405	Cavour
0406	Mud and Spring
0407	Newcome
0408	Tschetter
0409	Wall
0410	Berger
0411	Bergstrom
0412	Cowboy Park
0413	James River Dam
0414	James Diversion
0415	Perkins

Bennett

1101	Allen
1102	Sharman
1103	Allam
1104	Jacquot
1105	L. White River Dam
1106	Cedar Creek #1
1107	" " #2
1108	" " #3
1109	Bad Hair
1110	LaCreek Refuge Pool #1
1111	" " " #2
1112	" " " #3
1114	" " " #4
1115	" " " #5
1116	" " " #6

Bennett Cont.

1117	LaCreek Refuge Pool #7
1118	" " " #8
1119	" " " #9
1120	" " " #10
1121	" " " #11

Bon Homme

1201	Henry (Scotland)
1202	Tyndall (Kids Pond)
1203	Clear
1204	Kloucek
1205	W. Bucholy
1206	M. Bucholy
1207	Ehresward
1208	Schafer

Brookings

0601	Goldsmith
0602	Oak
0603	Hendricks
0604	Sinai
0605	Campbell
0606	Oakwood, E.
0607	Oakwood, N
0608	Johnson Pond (Interstate)
0609	Mitchell

Brown

0301	Tacoma Park
0302	Lord
0303	Highland (Keuchle)
0304	Frederick City
0305	Elm River #1
0306	" " #2
0307	" " #4
0308	Richmond
0309	Tollefson
0310	Willow Creek
0311	Elm
0312	Pigors
0313	Wiley Park
0314	Sand and Mud

Brule

1301	Wanalain
1302	Sharping
1303	Wells
1304	Jones
1305	Sixteen
1306	Pazour

Bruel Cont.
- 1307 Red
- 1308 Highland
- 1309 Silver
- 1310 Mud
- 1311 American
- 1312 Sobek
- 1313 Coven
- 1314 Auston
- 1315 Norse
- 1316 Willow

Buffalo
- 1401 Bedashosha
- 1402 Cook
- 1403 Ingerson

Butte
- 1501 Orman
- 1502 Newell
- 1503 Newell City Dam
- 1504 Belle Fourche IWLA

Campbell
- 1601 Matze
- 1602 Sand
- 1603 Chester (Boor)
- 1604 Campbell
- 1605 Pocasse
- 1606 Salt
- 1607 East Flat
- 1608 Flat
- 1609 McClarem

Charles Mix
- 1701 Andes, S.
- 1713 Andes, Center
- 1714 Andes, N.
- 1702 Dante
- 1703 Geddes
- 1704 Academy
- 1705 Dowd
- 1706 Platte
- 1707 Wagner
- 1708 Red
- 1709 Bovee
- 1710 Koupal
- 1711 George
- 1712 Song Hawk

Clark
- 1801 Willow
- 1802 Antelope
- 1803 Antelope (Kids Pond)
- 1804 Bailey
- 1805 Clear (Carson's)
- 1806 Fordham
- 1807 Logan (Paine)
- 1808 Round
- 1809 Mud
- 1810 Reid
- 1811 Lone Tree
- 1812 Todd
- 1817 Swan
- 1818 Blackrush

Clay
- 1901 Burbank

Codington
- 0501 Kampeska Pit, W.
- 0502 Kampeska
- 0503 Pelican
- 0504 Punished Woman
- 0505 Round
- 0506 Still (Twin)
- 0507 Bramble Pond
- 0508 Grass
- 0509 Long
- 0510 Nicholson
- 0511 Dry
- 0512 Horseshoe
- 0513 Horseshoe 2E.
- 0514 Cottonwood
- 0515 Kings
- 0516 Warren
- 0517 Medicine
- 0518 McKilligan's
- 0519 Richland
- 0520 Stink
- 0521 Sasse Slough
- 0522 McKilligan's, W.
- 0523 Kampeska Pit, E.

Corson
- 2001 Keller's
- 2002 McGee
- 2003 Mallard
- 2004 Trail City
- 2005 Morristown, W.

Corson Cont.
2006 Morristown, E.
2007 Pudwell
2008 McIntosh, E.
2009 McIntosh, W.
2010 Tatanka
2011 Spring
2012 Dugeagle
2013 Bohle

Custer
2101 Stockade
2102 Center
2103 Bismark
2104 Legion
2105 Sylvan
2106 Glenn Erin
2107 Biltmore
2108 Butler
2109 Custer Municipal
2110 Pilgrim
2111 Newton Fork
2112 Grace Coolridge Lowheads

Davison
0801 Mitchell

Day
2201 Amsden
2202 Pickerel
2203 Pierpont
2204 Minnewasta
2205 Blue Dog
2206 Enemy Swim
2207 Antelope
2208 Horseshoe
2209 Lonesome
2210 Lynn
2211 Sweetwater
2212 Waubay, N.
2213 Waubay, S.
2214 Rush, N. and S.
2215 Campbell Slough
2216 Bitter
2217 Hillda Brands
2218 Aspen Slough
2219 Hazelton
2220 Anderson
2221 Nutley
2222 Nutley, E.
2223 Stink

Day Cont.
2224 Keintz Slough
2225 Black Slough
2226 Elbo Slough

Deuel
2301 Fish
2302 Cotteau, S.
2303 Clear
2304 Alice
2305 Cochrane
2306 Bullhead
2307 Francis
2308 Rush
2309 Silver
2311 Lone Tree
2312 Oliver
2313 Round
2314 School
2315 Ketchum
2316 Briggs
2317 Wingdahl
2318 Fox
2319 School, S.
2320 Coteau, E.
2321 Coteau, W.
2322 Coteau Island
2323 Salt
2324 Crystal Springs

Dewey
2401 Peach
2402 Moreau #2
2403 Moreau #1
2404 Lantry
2405 Glen French #1
2406 Glen French #2
2407 Eagle Butte
2408 Dewbarry
2409 Adams
2410 Rockcowen
2411 Isabel
2412 Goose Creek
2413 Jewett
2414 White Horse
2415 Moreau #3
2416 Timber
2417 Owl Creek
2418 Firesteel (Ike)

Douglas
- 2501 Corsica
- 2502 Armour (Kids Pond)
- 2503 Simpson

Edmunds
- 2601 Bowdle Hosmer
- 2602 Loyalton (Stafford)
- 2603 Mina
- 2604 Rosette
- 2605 Picton
- 2606 Scatterwood N.
- 2607 Kraft
- 2608 Grass
- 2609 Alkali

Fall River
- 2701 Angostura
- 2702 Edgemont
- 2703 Cold Brook
- 2704 Sherberth
- 2705 Limestone Butte
- 2706 Cottonwood Springs
- 2707 Williams
- 2708 Fiddle Creek
- 2709 Bochart
- 2710 Ebersol
- 2711 Bowyer
- 2712 Crow
- 2713 Sandoz
- 2714 Ellison
- 2715 Otto's
- 2716 White
- 2717 Ray
- 2718 Sides Dam
- 2719 Coffeen
- 2720 Vandenberg
- 2721 South Indian #1
- 2722 Pioneer #1
- 2723 Pioneer #2
- 2724 Fire Dam
- 2725 Dukes Dam

Faulk
- 2801 Hamak
- 2802 Cresbard
- 2803 Voegler
- 2804 Latham
- 2805 Faulkton
- 2806 Gerkin Refuges

Faulk Cont.
- 2807 Zell
- 2808 Scatterwood S.

Grant
- 2901 Summit
- 2902 Albert
- 2903 Farley (Kids Pond)
- 2904 Labolt
- 2905 Crooked (Troy)
- 2906 Stockholm
- 2907 Twin
- 2908 Blue Cloud Abbey
- 2909 Big Stone
- 2910 Lonesome
- 2911 Lonetree
- 2912 Black Slough
- 2913 Black Slough E.
- 2914 Hagen Slough

Gregory
- 3001 Berry
- 3002 Burke
- 3003 Bonesteel
- 3004 Dixon (Burch)
- 3005 Fairfax
- 3006 Herrick (Spendor)
- 3007 Star
- 3008 Ponca (Indian)
- 3009 Johnson
- 3010 Jerred
- 3011 Dalton
- 3012 Bulow

Haakon
- 3101 Kroetche
- 3102 Ottumwa
- 3103 Sunshine
- 3104 Waggoner

Hamlin
- 3201 Poinsett
- 3202 Norden
- 3203 John
- 3204 Florence
- 3205 Clear
- 3206 Mary
- 3207 Marsh
- 3208 Dry
- 3209 Five Ponds
- 3211 Saarenson Pond

Hand
  3301 Louise
  3302 Dako-tah
  3303 Rosehill
  3304 Crystal (Kids Pond)
  3305 Johnston
  3306 Jones
  3307 Pearl
  3308 Spring
  3309 Wall

Hanson
  3401 Fulton
  3402 Hanson
  3403 Ethan
  3404 Eli
  3405 Long
  3406 Spring
  3407 Twin, N.
  3408 Twin, S.
  3409 Hanson Quarry

Harding
  3501 Gardner
  3502 Antelope Range
  3503 Rabbit Creek
  3504 Ledger, W.
  3505 Ledger, E.
  3506 Vessey
  3507 Robinson
  3508 Jacobi

Hughes
  3601 Woodruff
  3602 Swanson
  3603 Arikara

Hutchinson
  3701 Menno
  3702 Dimock
  3703 Silver
  3704 Tripp

Hyde
  3801 Chapelle
  3802 Boehm
  3803 Quirk
  3804 Peno
  3805 Stephan
  3806 Rezac

Hyde Cont.
  3807 Rice
  3808 Holabird

Jackson
  3901 Kadoka
  3902 Bashen
  3903 Belvedere
  3904 Freeman
  3905 Andrews
  3906 Cottonwood Range
  3907 Brook #1
  3908 Wheeler #1
  3909 Wheeler #2

Jerauld
  4001 Crow
  4002 Magic Mirror
  4003 Long
  4004 Cottonwood
  4006 Crist
  4007 Noltensmeir
  4008 Haugland
  4009 McDonald
  4010 Nelson
  4011 Nesmith
  4012 Velverndate

Jones
  4101 Murdo
  4102 Okaton
  4103 Draper
  4104 Murdo R. R.
  4105 Richland Wildlife

Kingsbury
  4201 Agnew
  4202 Spirit
  4203 Cherry, N.
  4204 Plum (Cherry, S.)
  4205 Osceola
  4206 Iroquois
  4207 Henry
  4208 Albert
  4209 Thistad
  4210 Badger
  4211 Arlinton
  4212 Thomson
  4213 Preston
  4214 Whitewood

Kingsbury Cont.
4215	Spring
4216	Mud
4217	Brush (Twin)
4218	Spring, E.
4219	District 35
4220	Silver

Lake
4301	Green
4302	Herman
4303	Brant
4304	Madison
4305	Badus
4306	Long
4307	Milwaukee
4308	Mud
4309	Winfred
4310	Henry
4311	George
4312	Winfred, S.
4313	Round

Lawrence
0901	Iron Creek
0902	Roubaix
0903	Reausaw
0904	Mirror
0905	Coxes
C906	Dalton
0907	Columbia
C908	Strawberry Hill

Lincoln
4401	Alvin
4402	Lakota

Lyman
4501	Brakke
4502	Byre
4503	Fate
4504	Knutson
4505	Larson
4506	Reliance
4507	Dybing
4508	Fenenga
4509	Hafner
4510	Jackson
4512	Sweeney
4513	Antelope Allotment
4514	Kennebec

McCook
4601	Bollinger
4602	Vermillion
4603	Jannsen
4604	Lions
4605	McCullough
4606	Island
4607	Tuschens
4608	Eli Hofer
4609	Schimmels
4610	Gross
4611	Baureles (Schulz)
4612	Forsch
4613	Lehrams

McPherson
4701	Eureka #1
4702	Leola
4703	Hillview
4704	Wetonka (Compton)
4705	Wolff
4706	Little Eureka #2
4707	Rau
4708	Long
4709	Twin
4710	Heupel

Marshall
4801	Red Iron, N.
4802	Red Iron, S.
4803	Cottonwood
4804	Hickman
4805	Abraham
4806	Almos
4807	Bullhead
4808	Crystal
4809	Dumarce
4810	Emma
4811	Flat
4812	Fort, S.
4813	Four Mile
4814	Goodbird
4815	Grays (Grey)
4816	High
4817	Hills
4818	Hoop
4819	Horseshoe
4820	Isabella (S. Clear)
4821	Island
4822	Long
4823	Martha

Marshall Cont.
4824 Mud
4825 Nine Mile
4826 Sarah
4827 Simons
4828 Six Mile
4829 Turtlefoot
4830 Two Island
4831 White
4832 Clear
4833 Roy
4834 Buffalo, S.
4835 Buffalo, N.
4836 Lost
4838 Piyas
4839 Stink
4840 Stink, E.
4841 Goodbird, N.
4842 Turtlefoot, N.

Meade
4901 Durkee
4902 Tisdale
4903 Bear Butte
4904 Opal
4905 Curlew
4906 Marrine
4907 Lundren
4908 Mud Butte
4909 Red Owl
4910 Pinnacle
4911 Bonita
4912 Herford
4913 Fort Meade
4914 Follet
4915 Sulphur
4916 Choate
4917 Lake Dam
4918 Fort Meade VA
4919 Maurine #2

Mellette
5001 White River (Putranek)
5002 Dice
5003 Rohloff
5004 Sinclair
5005 Blackpipe

Miner
5101 Twin
5102 Carthage

Miner Cont.
5103 Chain (Twins)
5104 Silver, S.
5105 Morris
5106 Bitter
5107 Silver
5108 Belview
5110 Long
5111 Center

Minnehaha
0101 Wall
0102 Lost
0103 Clear
0104 Beaver
0105 Grass
0106 Baltic
0107 Covell
0108 Dell Rapids
0109 Garretson
0110 Loss
0111 Clear, E.
0112 Lost, S.
0113 Huntimer
0114 Huntimer
0115 Huntimer, W.

Moody
5201 Flandreau
5202 Poison
5203 Allen

Pennington
0201 New Underwood
0202 Bruce
0203 Wall (Old)
0204 Wicksville
0205 Canyon
0206 Pactola
0207 Deerfield
0208 Slate Cr. Dam
0209 Sheridan
0210 Mitchell
0211 Major
0212 Bloom
0213 Casper
0214 Cement Plant
0215 Deer Cr. Dam
0216 Farmingdale
0217 Farmingdale NGL
0218 Gage

Pennington Cont.

0219	Hamann
0220	Hoffman
0221	Horsethief
0222	Kellam
0223	Mako Sica
0224	Newton Fork
0225	Pierce
0226	Quinn, N.
0227	Quinn, S.
0228	Rapid City Dam
0229	Schulte
0230	Shyne
0231	Sinykin
0232	Smith
0233	Table 71
0234	Tennyson
0235	Teuber
0236	USDA Trout Dam
0237	Victoria
0238	Wall (New)
0239	White
0240	Conata #2
0241	Hanlon
0242	Imly
0243	Johnson
0244	Koopman
0245	Owanka
0246	Richardson
0247	Rush
0248	Scanlon
0249	Schroeder
0250	Big Foot
0251	Pike Pond
0252	Missle Allotment
0253	N. White Water
0254	Haynes
0255	Roosevelt Pond

Perkins

5301	Shadehill
5302	Lemmon State
5303	Vobedja
5304	Flat Creek
5305	Sorum
5306	Coal Springs
5307	Johnson
5308	Owen
5309	Cole
5310	Ada
5311	Jensen

Perkins Cont.

5312	Lewton
5313	73 Dam
5314	Meadow
5315	Imogene
5316	Whitehill
5317	Bowhotham

Potter

5401	Simon
5402	Corman
5403	Hurley
5404	Potts
5405	Green

Roberts

5501	Traverse
5502	Hurricane
5503	Bullhead
5504	One Road
5505	Mud
5506	Tehana
5507	N. Cottonwood
5508	Whitestone
5509	Drywood, N.
5510	Drywood, S.
5511	Big Stone
5512	Garfield
5513	One Road, N.
5514	Long Hollow
5515	Sather Slough
5516	Lien
5517	Hammer
5518	Hammer, S.
5519	Hammer, N.
5520	Hurricane, N.
5521	Bdesake
5522	Clubhouse
5523	Owl
5524	Old Agency Pond (Agency Dam)
5525	Takawitha Dam
5526	E. Ortley
5527	W. Ortley

Sanborn

5601	Twin
5602	Letcher (Kids Pond)
5603	Prior (Kids Pond)
5604	Rifle-Calahan
5605	Long Lake
5606	McCoy

Shannon
6501 Oglala Res.
6502 White Clay
6503 Kyle
6504 Derby
6505 Wolf Creek
6506 Big Alkali
6507 Pine Ridge

Spink
5701 Dudley
5702 Twin
5703 Cottonwood
5704 Redfield
5705 Timber Creek
5706 Mirage
5707 Turtle
5708 Northville
5709 Bierman (Mansfield)

Stanley
5801 Red Plum
5802 Hayes
5803 Trout Pond
5804 50-50 Allotment

Sully
5901 Cottonwood
5902 Sully
5903 Fuller
5904 Okobojo
5905 Mundt
5906 Post
5907 Stone
5908 Walker
5909 Fisher
5910 Troy

Todd
6601 Boarding School
6602 He Dog
6603 Mission
6604 Hidden Timber
6605 White
6606 Beads Creek
6607 Rosebud
6608 Ghost Hawk
6609 Sharps
6610 Chases Woman
6611 Spotted Tail
6612 Eagle Feather

Todd Cont.
6613 Iron Wood
6614 Swift Bear
6615 Heifer
6616 Enemy Woman
6617 Omaha Boy
6618 Mervin Colombe

Tripp
6001 Roosevelt
6002 Sully
6003 Irwin
6004 Beauliau
6005 Bloom
6006 Carter
6007 Covey
6008 Big Dog Ear
6009 King
6010 McLaughlin
6011 Rahn
6012 Snow
6013 Sundahl
6014 Woolheizer
6015 Witten
6016 Sinkler
6017 Hamill
6018 Lone Tree

Turner
6101 Swan
6102 Mud
6103 Marion

Union
6201 McCook
6202 Norweigan
6203 Sargent (Nison)
6204 Cole

Walworth
6301 Hiddenwood
6302 Spring
6303 Molstad
6304 Swan

Washabaugh
6701 May
6702 Dithmer
6703 Poor Bear

Yankton
    0701 Marindahl
    0702 Beaver (State)
    0703 Westside
    0705 Yankton (Cottonwood)

Ziebach
    6401 Bednor
    6402 Glad Valley
    6403 Matter
    6404 Miller
    6405 Trent
    6406 Buffalo
    6407 Rattle Snake

Mainstem Reservoirs
    1610 Oahe
    1611 Oahe Tailwaters
    1612 Sharpe
    1613 Sharpe Tailwaters
    1614 Frances Case
    1615 Francis Case Tailwaters
    1616 Missouri R. To Running W.
    1617 Lewis and Clark
    1618 Lewis and Clark Tailwaters
    1619 Missouri R. to Sioux City

APPENDIX F

Organism Codes

FISH
MASTER SPECIES
LIST

Petromyzontidae
1. <u>Ichthyomyzon unicuspis</u> - silver lamprey
Acipenseridae
2. <u>Scaphirhynchus platorynchus</u> - pallid sturgeon
3. <u>S. albus</u> - shovelnose sturgeon
4.
Polyodontidae
5. <u>Polyodon spathula</u> - paddlefish
Lepisosteidae
6. <u>Lepisosteus platostomus</u> - shortnose gar
7. <u>L. osseus</u> - longnose gar
Amiidae
8. <u>Amia calva</u> - bowfin
Anguillidae
9. <u>Anguilla rostrata</u> - Americal eel
Clupeidae
10. <u>Alosa chrysochloris</u> - skipjack herring
11. <u>Dorosoma cepedianum</u> - grizzard shad
12.
13.
Hiodontidae
14. <u>Hiodon alosoides</u> - goldeye
15. <u>H. tergisus</u> - mooneye
Salmonidae
16. <u>Salmo trutta</u> - brown trout
17. <u>S. gairdneri</u> - rainbow trout
18. <u>Salvelinus fontinalis</u> - brook trout
19. <u>S. namycush</u> - lake trout
20. <u>Oncorhynchus nerka</u> - kokanee
21. <u>O. kisutch</u> - coho salmon
22. <u>Prosopium gemmiferum</u> - Bonneville cisco
23. <u>Coregonus clupeaformis</u> - Lake whitefish
24.
25.
26.
27.
28.
Osmeridae
29. <u>Osmerus mordox</u> - rainbow smelt
Umbridae
30. <u>Umbra limi</u> - central mudminnow
Esocidae
31. <u>Esox lucius</u> - northern pike
32. <u>Esox masquinongy</u> - muskie
33.
34.

Cyprinidae
35. Ctenopharyngodon idella - grass carp
36. Cyprinus carpio - carp
37. Carrassius auratus - goldfish
38. Notemigonus crysoleucas - golden shiner
39. Semotilus margarita - pearl dace
40. S. atromaculatus - creekchub
41. Phoxinus eos - northern redbelly dace
42. P. neogaeus - finescale dace
43. Couesius plumbeus - lake chub
44. Hybopsis gracilis - flathead chub
45. H. storeriana - silver chub
46. H. gelida - sturgeon chub
47. H. meeki - sicklefin chub
48. Nocomis biguttatus - hornyhead chub
49. Rhinichthys atratulus - blacknose dace
50. R. cataractae - longnose dace
51. Phenacobius mirabilis - suckermouth minnow
52. Notropis atherinoides - emerald shiner
53. N. rubellus - rosyface shiner
54. N. shumardi - silverband shiner
55. N. cornutus - common shiner
56. N. heterodon - blackchin shiner
57. N. hudsonius - spottail shiner
58. N. blennius - river shiner
59. N. dorsalis - bigmouth shiner
60. N. lutrensis - red shiner
61. N. stramineus - sand shiner
62. N. topeka - Topeka shiner
63. N. heterolepis - blacknose shiner
64. Hybognathus hankinsoni - brassy minnow
65. H. placitus - plains minnow
66. H. nuchalis - silvery minnow
67. Pimephales notatus - bluntnose minnow
68. P. promelas - fathead minnow
69. Campostoma anomalum - stoneroller
70.
71.
72.
73.
74.
75. minnow
Catostomidae
76. Cycleptus elongatus - blue sucker
77. Ictiobus cyprinellus - bigmouth buffalo
78. I. bubalus - smallmouth buffalo
79. I. niger - black buffalo
80. Carpiodes cyprinus - quillback
81. C. carpio - river carpsucker
82. Hypentelium nigricans - northern hog sucker

Castostomidae Cont.
83. *Moxostoma erythrurum* – golden redhorse
84. *M. Macrolepidotum* – shorthead redhorse
85. *Catostomus commersoni* – white sucker
86. *C. catostomus* – longnose sucker
87. *C. platyrhunchus* – mountain sucker
88.
89. Buffalo
90. Sucker

Ictaluride
91. *Ictalurus melas* – black bullhead
92. *I. nebulosus* – brown bullhead
93. *I. natalis* – yellow bullhead
94. *I. punctatus* – channel catfish
95. *I. furcatus* – blue catfish
96. *Noturus gyrinus* – tadpole madtom
97. *N. exilis* – slender madtom
98. *Pylodictis olivaris* – flathead catfish
99. *Noturus flavus* – Stonecat
100.
101.

Percopsidae
102. *Percopsis omiscomaycus* – trout-perch

Gadidae
103. *Lota lota* – burbot

Cyprinodontidae
104. *Fundulus diaphenus* – banded killifish
105. *F. kansae* – plains killifish
106. *F. sciadicus* – plains topminnow
107.

Gasterosteidae
108. *Culaea inconstans* – brook stickleback

Percichthyidae
109. *Morone chrysops* – white bas
110.
111.

Centrarchidae
112. *Micropterus dolomieui* – smallmouth bass
113. *M. salmoides* – largemouth bass
114. *Lepomis cyanellus* – green sunfish
115. *L. gibbosus* – pumpkinseed
116. *L. macrochirus* – bluegill
117. *L. humilis* – orangesptted sunfish
118. *Ambloplites rupestris* – rock bass
119. *Pomoxis annularis* – white crappie
120. *P. nigromaculatus* – black crappie
121.
122. Crappie
123. Sunfish

AQUATIC MACROPHYTES

Family Poaceae (Gramineae)
1.	Alopecurus	Foxtail
2.	Beckmannia	Slough grass
3.	Spartina	Cordgrass
4.	Glyceria	Mannagrass
5.	Phragmites	Plume reed grass
6.	Leersia	Rice cut-grass
7.	Phalaris	Reed canary grass
8.	Zizania	Wild rice

Family Cyperaceae
9.	Carex	Sedge
10.	Cyperus	Nut sedge
11.	Eleocharis	Spike rush
12.	Scirpus	Roundstem bullrush
13.	Scirpus	Bullrush

Family Juncaceae
14.	Juncus	Rush

Family Lemnaceae
15.	Lemna	Duckweed

Family Araceae
16.	Acorus	Sweetflag

Family Hydrocaritaceae
17.	Elodea (Anacharis)	Waterweed
18.	Vallisneria	Wild celery

Family Najadaceae
19.	Najas	
20.	Potamogeten	Narrowleaf pondweed (Sago and curlyleaf)
21.	Potamogeten	Variableleaf pondweed (Floating leaf)
22.	Ruppia	Widgeon grass

Family Typhaceae
23.	Typha	Cattail

Family Sparganaceae
24.	Sparganium	Burreed

Family Alismataceae
25.	Alisma	Water plantain

Family Ceratophllaccae
26.	Ceratophyllum	Coontail

Family Compositae
    27. <u>Bidens</u>   Beggers lice

Family Haloragidaceae
    28. <u>Myriophyllum</u>   Water millfoil

Family Nymphaceae
    29. <u>Nuphar</u>   Yellow water lily
    30. <u>Nymphea</u>   White water lily

Family Polygonaceae
    31. <u>Polygonum</u>   Smartweed

Family Ranunculaceae
    32. <u>Ranunculus</u>   Crowfoot

Family Cruciferae
    33. <u>Nasturtium</u>   Water cress

APPENDIX G

Management And Access Recommendations

MANAGEMENT RECOMMENDATIONS

FISH MANAGEMENT

1. Control - Biological
2. Control - Chemical
3. Control - Physical
4. Forage - Increase
5. Intro other food organism
6. Mapping
7. Special regulations
8. Special study
9. Species change (Stocking)
10. Stocking - Decrease
11. Stocking - Increase
12. Stocking size change
13. Survey

HABITAT MANAGEMENT

20. Aerate to prevent fishkill
21. Deep water siphon
22. Dredging
23. Fertilization
24. Fish barrier - Install
25. Fish barrier - Remove
26. Fish structure - Install
27. Nursery areas - Improve
28. Nutrient control
29. Pollution abatement
30. Repair dam or dike
31. Spawning improvement
32. Waterlevel - Lower
33. Waterlevel - Raise
34. Waterlevel - Stabilize
35. Vegetation control - Algae
36. Vegetation control - Macrophytes
37. Manage for waterfowl

SHORE MANAGEMENT

40. Access - Aquire
41. Access - Improve
42. Access - Limit
43. Clearing - Obstructions
44. Fencing
45. Plantings
46. Sediment control
47. Shore stabilization
48. Shore vegetation cover
49. Watershed restoration
50. Limit livestock access
60. Other

ACCESS RECOMMENDATIONS

1. Aquire land access
2. Camping pads
3. Change house
4. Docks
5. Electricity
6. Fencing
7. Fireplaces
8. Garbage cans
9. Lights
10. Parking areas
11. Picnic tables
12. Posting
13. Ramp - Concrete
14. Ramp - Double-wide
15. Ramp - Gravel or dirt
16. Ramp - Steel
17. Roads - All weather
18. Roads - Internal
19. Roads - Gravel
20. Sewer dump
21. Shelters
22. Showers
23. Swimming beach
24. Trails - Hiking
25. Trails - Snowmobile
26. Tree planting
27. Toilets - Flush
38. Toilets - Primitive
29. Weed control
30. Well

APPENDIX H

GIVEFISH Build Program

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000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID. GIVEFISH BUILD PROGRAM.
000030 REMARKS. GIVEFISH BUILCS GIVEFISH DATA BASE.
000035 AUTHOR. WARREN HOVLAND.
0C0040 DATE WRITTEN. 1979.
000050 ENVIRONMENT DIVISION.
0C0060 CONFIGURATION SECTION.
000070 SOURCE-COMPUTER. IBM-370.
000080 OBJECT-COMPUTER. IBM-370.
000090 INPUT-OUTPUT SECTION.
000100 FILE-CONTROL.
000110     SELECT TAPEIN-FILE ASSIGN TO OA-2314-S-TAPEIN.
000120     SELECT TAPEOUT-FILE ASSIGN TO OA-2314-S-TAPEOUT.
000130     SELECT TEMP-FILE ASSIGN TO DA-2314-S-TEMP.
000131     SELECT SORT-FILE ASSIGN TO DA-2314-S-SORTTEMP.
000140 DATA DIVISION.
000150 FILE SECTION.
000151 FD  TAPEIN-FILE
000152     RECORDING MODE F, RECORD CONTAINS 80 CHARACTERS,
000153     LABEL RECORDS ARE OMITTED, DATA RECORD IS TAPEIN-REC.
000154 01  TAPEIN-REC.
000155     C2  LAKE-CODE-IN          PIC X(4).
000156     C2  CARD-INFO-IN          PIC X(74).
000157     02  CARD-COCE-IN          PIC X(2).
000160 SO  SORT-FILE
000220     DATA RECORC IS SORT-REC.
000252 01  SORT-REC.
000254     C2  SORT-LAKE-CODE        PIC X(4).
000256     G2  SORT-CARD-INFC        PIC X(74).
000258     C2  SORT-CARD-CODE        PIC X(2).
000260 FD  TAPEOUT-FILE
000270     RECORCING MODE F, LABEL RECORDS ARE OMITTED,
000280     RECORD CONTAINS 9292 CHARACTERS, BLOCK CONTAINS 1 RECORDS,
000290     DATA RECORC IS TAPEOUT-RECORD.
000300 01  TAPEOUT-RECORD            PIC X(9292).
0C0310 FD  TEMP-FILE
000320     RECORDING MODE F, LABEL RECORDS ARE OMITTED,
000330     RECORD CONTAINS 80 CHARACTERS, BLOCK CONTAINS 10 RECORDS,
000340     DATA RECORCS ARE CARD-1-INPUT, CARD-2-INPUT, CARD-3-INPUT,
000350     CARD-4-INPUT, CARD-5-INPLT, CARD-6-INPUT, CARD-7-INPUT,
000360     CARD-8-INPUT, CARD-9-INPUT, CARD-10-INPUT, CARO-11-INPUT,
000370     CARD-12-INPUT, CARD-13-INPUT, CARD-14-INPUT, CARD-15-INPUT,
0C0380     CARD-16-INPUT, CARD-17-INPUT, CARD-18-INPUT, CARD-19-INPUT,
000390     CARO-20-INPUT, CARD-21-INPUT, CARD-22-INPUT, CARD-23-INPUT,
0C0400     CARD-24-INPUT, CARD-25-INPUT, CARD-26-INPUT, CARD-27-INPUT,
000410     CARD-28-INPLT, CARD-29-INPUT, CARD-30-INPUT, CARD-31-INPUT,
000420     CARD-32-INPLT, CARD-33-INPUT, CARD-34-INPUT, CARD-35-INPUT,
000430     TEMP-REC.
000440 01  TEMP-REC.
000450     02  TEMP-LAKE-CODE  PIC X(4).
000460     02  FILLER          PIC X(74).
0C0470     C2  TEMP-CARD-CODE  PIC S9.
000510 01  CARD-1-INPUT.
000520     C2  LAKE-CODE       PIC 9(5).
000530     C2  SOURCE-1        PIC 9(5).
000540     C2  DATE-1          PIC X(6).
000550     02  DATA-1          PIC X(22).
000560     02  FILLER          PIC X(40).
000570     02  CARD-NUMBER     PIC 99.
000580 01  CARD-2-INPUT.
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000590        C2   LAKE-CODE          PIC 9(4).
C00600        C2   DATA-2             PIC X(7C).
000610        02   FILLER             PIC X(4).
000620        02   CARD-NUMBER        PIC 99.
000630 01  CARD-3-INPLT.
000640        02   LAKE-CODE          PIC 9(4).
000650        02   SOURCE-3           PIC 9(5).
000660        C2   UNITS              PIC X.
000670        C2   ACTION-CODE        PIC X.
000680        02   RIVER-3            CCCURS 2 TIMES.
000685             03   RIVER-3-CATA      PIC 9(3).
00069C        02   DATE-3             PIC 9(6).
CC0700        02   DATA-3             PIC X(4).
000710        02   SPECIES-3          CCCURS 4 TIMES.
000715             C3   SPECIES-3-DATA      PIC 9(3).
000720        C2   DRAINAGE-3             GCCURS 3 TIMES.
000725             03   DRAINAGE-3-CATA    PIC 9(4).
000730        02   MAP-DATE-3         PIC X(4).
000740        02   POPULATE-3         CCCURS 3 TIMES.
000745             03   POPULATE-3-CATA PIC 9(6).
000750   ·    02   FILLER             PIC X(5).
000760        02   CARD-NUMBER        PIC 99.
000770 01  CARD-4-INPUT.
000780        02   LAKE-COCE          PIC 9(4).
000790        02   TYPE-4             PIC X.
000800        02   LGCATION-4         PIC 9(3).
000810        02   CONST-DATE-4       PIC 9(4).
000820        C2   SPILLWAY-4         PIC X.
000830        02   WIDTH-4            PIC 9(5).
000840        C2   OWNER-4            PIC XX.
000850        02   PLAN-ESTIM         PIC X.
000860        02   AREA-4             PIC 9(7).
000870        02   MEANDERED          PIC 9(6).
000880        02   LITTORAL           PIC 9(6).
000890        02   PERCENT-LT         PIC XX.
000900        02   MAX-DEPTH-4        PIC 9(4).
000910        02   AVE-DEPTH-4        PIC 9(3).
000920        C2   BENCHMARK          PIC 9(3).
000930        C2   ANN-FLUC-HIGH      PIC 9(3).
000940        02   ANN-FLUC-LOW       PIC 9(3).
000950        02   LT-FLUC-HIGH       PIC 9(3).
000960        02   LT-FLUC-LOW        PIC 9(3).
000970        02   ELEVATION-4        PIC 9(4).
000980        02   WATERSHED-4        PIC 9(8)V99.
000990        02   CARD-NUMBER        PIC 99.
C01000 01  CARD-5-INPUT.
001010        02   LAKE-CCOE          PIC 9(4).
001020        02   UNITS              PIC X.
001030        02   ACTION-CCDE        PIC X.
001040        02   SOURCE-5           PIC 9(5).
001050        02   RIVER1-5           PIC 9(3).
001055        C2   RIVER2-5           PIC 9(3).
001060        C2   DATE-5             PIC X(6).
001070        02   LENGTH-5           PIC 9(5)V9.
001080        02   CHANNEL-5          PIC 9(3).
001090        02   WIDTH-5            PIC XX.
001100        C2   DEPTH-5            PIC 9(2)V9.
001110        C2   NORMAL-HIGH        PIC S9(5).
001120        02   MEAN-ANNUAL        PIC S9(5).
001130        C2   POOL-WATER         PIC X(14).
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001140      02  AVE-GRADIENT        PIC 99V9.
001150      C2  STABLE-BANK         PIC XX.
001160      C2  FILLER              PIC X(12).
001170      02  CARD-NUMBER         PIC 9S.
001180 01  CARD-6-INPUT.
001190      C2  LAKE-CODE           PIC 9(4).
001200      02  BOTTOM-STRATA       PIC X(36).
001210      C2  FISHING-WATER1      CCCURS 3 TIMES.
001215          03  FISHING-WATER1-DATA     PIC 9(6).
001220      02  FISHING-WATER2      CCCURS 3 TIMES.
001225          03  FISHING-WATER2-DATA     PIC 9(5).
001230      C2  FILLER              PIC X(5).
001240      C2  CARD-NUMBER         PIC 99.
001250 01  CARD-7-INPUT.
001260      02  LAKE-CODE           PIC 9(4).
001270      02  RESOURCE-USE        PIC 9(4).
001280      02  WATER-RIGHT         PIC 9(6).
001290      C2  DWELLINGS           PIC 9(3).
001300      C2  ISLANDS             PIC XX.
001310      C2  DEVELOPMENT         PIC X(34).
001320      02  FILLER              PIC X(25).
001330      02  CARD-NUMBER         PIC 99.
001340 01  CARD-8-INPUT.
001350      C2  LAKE-CODE           PIC 9(4).
001360      02  TYPE-8              PIC X(2).
001370      C2  NAME-8              PIC X(1C).
001380      C2  LOCATION-8          PIC 9(3).
001390      02  DEPTH-8             PIC X(4).
001400      02  HIGH-8              PIC 9(5).
001410      02  ANNUAL-8            PIC 9(5).
001420      02  BOTTOM-8            PIC XX.
001430      02  FILLER              PIC X(43).
001440      02  CARD-NUMBER         PIC 99.
001450 01  CARD-9-INPUT.
001460      02  LAKE-CODE           PIC 9(4).
001470      02  SOURCE-9            PIC 9(5).
001480      02  UNITS               PIC X.
001490      02  ACTION-CODE         PIC X.
001500      02  DATE-9              PIC X(6).
001510      02  LOCATION-9          PIC 9(3).
001520      C2  SECCHI              PIC 9(3).
001530      02  COLOR               PIC X(5).
001540      02  TEMP-OXY            CCCURS 5 TIMES.
001550          03  DEPTH-9             PIC 9(3)V9.
001560          03  TEMP                PIC XX.
001570          03  DISS-OXY            PIC 9(2)V9.
001580      02  FILLER              PIC X(5).
001590      02  CARD-NUMBER         PIC 99.
001600 01  CARD-10-INPUT.
001610      02  LAKE-CODE           PIC 9(4).
001620      02  THERMO-LOW          PIC 9(3)V9.
001630      02  THERMO-HIGH         PIC 9(3)V9.
001640      C2  ALKALINITY          CCCURS 3 TIMES.
001645          03  ALKALINITY-DATA     PIC 9(3).
001650      02  PH-10               PIC 9(2)V9.
001660      02  CC2                 PIC XX.
001670      02  HARDNESS            PIC 9(4).
001672      02  CONDUCTIVITY         PIC 9(4).
001674      C2  SOLIDS              CCCURS 2 TIMES.
001677    .     03  SOLIDS-DATA     PIC 9(4).
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001680      02  PHOS                OCCURS 2 TIMES.
001685          03  PHOS-OATA   PIC 9V99.
001690      02  CHLOROPHYLL         CCCURS 2 TIMES.
001695          03  CHLOROPHYLL-OATA        PIC 9(3).
001700      02  CHLORIOE-ION    PIC 9(4).
001710      02  NITROGEN            CCCURS 4 TIMES.
001715          03  NITROGEN-OATA    PIC 99V99.
001720      02  OATE-LC         PIC X(4).
001730      02  CARO-NUMBER     PIC 99.
001740 01  CARO-11-INPUT.
001750      02  LAKE-CODE       PIC 9(4).
001760      02  SOURCE-11        PIC 9(5).
001770      02  ACTION-CODE     PIC X.
001780      C2  RIVER-LL            CCCURS 2 TIMES.
001785          03  RIVER-11-OATA    PIC 9(3).
001790      02  OATE-11         PIC X(6).
001800      02  COVERAGE-1      PIC XX.
001810      02  STANOING-EMERG      CCCURS 5 TIMES.
001820          03  SPECIES1-11     PIC 9(3).
001830          03  ABLNO1-11       PIC X.
001840      02  COVERAGE-2      PIC XX.
001850      02  GROWTH-11       PIC 9(3).
001860      02  SUBMERGED           OCCURS 5 TIMES.
001870          03  SPECIES2-11     PIC 9(3).
001880          03  A8LNO2-11       PIC X.
001890      02  OTHER-LIFE      PIC X(9).
001900      02  CARO-NUMBER     PIC 99.
001910 01  CARO-12-INPUT.
001920      C2  LAKE-CODE       PIC 9(4).
001930      C2  SPECIES-12          OCCURS 18 TIMES.
001940          03  SPECIES1-12     PIC 9(3).
001950          03  ABLNO1-12       PIC X.
001960      02  FILLER          PIC XX.
001970      02  CARO-NUMBER     PIC 99.
001980 01  CARO-13-INPUT.
001990      02  LAKE-CODE       PIC 9(4).
002000      02  SPAWNING-AREA       CCCURS 5 TIMES.
002010          03  SPECIES-13      PIC 9(3).
002020          03  EVALUATION      PIC X.
002030          03  LOCATION-13     GCCURS 3 TIMES PIC 9(3).
002040      02  FILLER          PIC X(9).
002050      02  CARO-NUMBER     PIC 99.
002060 01  CARO-14-INPUT.
002070      02  LAKE-CODE       PIC 9(4).
002080      02  SOURCE-14       PIC 9(5).
002090      02  UNITS           PIC X.
002100      02  ACTICN-CCOE     PIC X.
002110      02  OATE-14         PIC X(6).
002120      02  STOCKING            CCCURS 4 TIMES.
002130          03  SPECIES-14      PIC 9(3).
002140          03  NUMBER-14       PIC 9(7).
002150          03  SIZE-14         PIC X.
002160      02  FILLER          PIC X(17).
002170      02  CARO-NUMBER     PIC 99.
002180 01  CARO-15-INPUT.
002190      02  LAKE-CODE       PIC 9(4).
002200      02  METHOO          PIC X.
002210      02  HAULS           PIC 9(3).
002220      C2  COMMERCIAL          CCCURS 6 TIMES.
002230          03  SPECIES-15 .     PIC 9(3).
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002240         03  HEIGHT-15              PIC 9(6).
002250     02  FILLER                 PIC X(14).
002260     C2  YEAR-15            PIC XX.
002270     02  CARD-NUMBER        PIC 99.
002280 01  CARD-16-INPUT.
002290     02  LAKE-CODE          PIC 9(4).
002300     C2  COMM-16            CCCURS 2 TIMES.
002310         03  SPECIES1-16            PIC 9(3).
002320         03  HEIGHT1-16             PIC 9(6).
002330     02  GAME1-16           CCCURS 5 TIMES.
002340         03  SPECIES2-16            PIC 9(3).
002350         03  NUMBER2-16             PIC 9(4).
002360     C2  GAME2-16           CCCURS 2 TIMES.
002370         03  SPECIES3-16            PIC 9(3).
002380         03  NUMBER3-16             PIC 9(6).
0C2390     C2  FILLER             PIC X.
002400     02  YEAR-16            PIC XX.
002410     02  CARD-NUMBER        PIC 99.
002420 01  CARO-17-INPUT.
002430     C2  LAKE-CODE          PIC 9(4).
002440     02  SOURCE-17          PIC 9(5).
002450     02  UNITS              PIC X.
0C2460     02  ACTION-CODE        PIC X.
002470     02  DATE-17            PIC X(6).
002480     02  PULLS-17           PIC X(6).
002490     02  LENGTH-17          PIC 9(3).
002500     C2  DEPTH-17           PIC XX.
002510     02  MESH-17            PIC 9V9(3).
002520     02  DISTANCE-17        PIC 9(4).
002530     02  AREA-17            PIC 9(3)V9.
002540     02  FILLER             PIC X(38).
002550     02  CARD-NUMBER        PIC 99.
002560 01  CARD-18-INPUT.
002570     02  LAKE-CODE          PIC 9(4).
002580     02  OATA-18            CCCURS 6 TIMES.
002590         03  SPECIES-18             PIC 9(3).
0C2600         03  NUMBER-18              PIC 9(6).
002610         03  FILLER                 PIC X(3).
002620     02  FILLER-2           PIC XX.
002630     02  CARD-NUMBER        PIC 99.
002640 01  CARD-19-INPUT.
002650     02  LAKE-CODE          PIC 9(4).
002660     02  SOURCE-19          PIC 9(5).
002670     02  METHOD-19          PIC XXX.
002680     02  MESH-19            PIC 99V9(3).
002690     02  LENGTH-19          PIC 99V9.
002700     02  HEIGHT-19          PIC 99V9.
002710     C2  WIOTH-19           PIC 99V9.
002720     02  OURATION-19        PIC X(6).
002730     02  AREA-19            PIC 99V9.
002740     02  UNITS-19           PIC X.
002750     02  ACTION-CODE        PIC X.
002760     02  OATE-19            PIC X(6).
002770     02  FILLER             PIC X(35).
002780     02  CARD-NUMBER        PIC 99.
002790 01  CARD-2C-INPUT.
002800     02  LAKE-CODE          PIC 9(4).
002810     C2  SPECIES-20         PIC 9(3).
002820     02  TOTAL-20           PIC 9(5).
002830     02  PCT-NUM-20         PIC XX.
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002840      02   TOTAL-WT-20          PIC 9(5)V9.
002850      02   PCT-WT-20            PIC XX.
002860      02   MEAN-LENGTH-20       PIC 9(3)V9.
002870      02   MEAN-WT-20           PIC 99V9(3).
002880      02   NET-NUM-20           PIC 9(4).
002890      02   NET-WT-20            PIC 9(4)V9.
002900      02   FILLER               PIC X(36).
002905      02   YEAR-20              PIC XX.
002910      02   CARD-NUMBER          PIC 99.
002920 01   CARD-21-INPUT.
002930      02   LAKE-CODE            PIC 9(4).
002940      02   SOURCE-21            PIC 9(5).
002950      02   METHOD-21            PIC X(3).
002960      02   MESH-21              PIC 99V9(3).
002970      02   LENGTH-21            PIC 99V9.
002980      02   HEIGHT-21            PIC 99V9.
002990      02   WIDTH-21             PIC 99V9.
003000      02   DURATION-21          PIC X(6).
003010      02   AREA-21              PIC 99V9.
003020      02   UNITS-21             PIC X.
003030      02   ACTION-CCODE         PIC X.
003040      02   DATE-21              PIC X(6).
003050      02   FILLER               PIC X(35).
003060      02   CARD-NUMBER          PIC 99.
003070 01   CARD-22-INPUT.
003080      02   LAKE-CODE            PIC 9(4).
003090      02   SPECIES-22           PIC 9(3).
003100      02   DATA-22              PIC X(65).
003110      02   TOTAL-22             PIC 9(3).
003120      02   FILLER               PIC X.
003130      02   YEAR-22              PIC XX.
003140      02   CARD-NUMBER          PIC 99.
003150 01   CARD-23-INPUT.
003160      02   LAKE-CODE            PIC 9(4).
003170      02   SOURCE-23            PIC 9(5).
003180      02   UNITS-23             PIC X.
003190      02   ACTION-CODE-23       PIC X.
003200      02   DATE-23              PIC X(6).
003210      02   FILLER               PIC X(61).
003220      02   CARD-NUMBER          PIC 99.
003230 01   CARD-24-INPUT.
003240      02   LAKE-CODE            PIC 9(4).
003250      02   SPECIES-24           PIC 9(3).
003260      02   SIZE-24              PIC 9(4).
003270      02   SAMPLE-24            PIC 9(3).
003280      02   AGE-GROUP-24         OCCURS 9 TIMES.
003285           03  AGE-GROUP-24-DATA     PIC 9(3)V9.
003290      02   FILLER               PIC X(28).
003300      02   CARD-NUMBER          PIC 99.
003310 01   CARD-25-INPUT.
003320      02   LAKE-CODE            PIC 9(4).
003330      02   AGE-GROUP-25         PIC X(36).
003340      02   FILLER               PIC X(138).
003350      02   CARD-NUMBER          PIC 99.
003360 01   CARD-26-INPUT.
003370      02   LAKE-CODE            PIC 9(4).
003380      02   SOURCE-26            PIC 9(5).
003390      02   UNITS-26             PIC X.
003400      02   ACTION-CODE-26       PIC X.
003410      02   DATE-26              PIC X(6).
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003420      02  DATA-26              PIC X(21).
003430      02  SPECIES-26           OCCURS 4 TIMES.
003435          03  SPECIES-26-DATA      PIC 9(3).
003440      02  FILLER               PIC X(28).
003450      02  CARD-NUMBER          PIC 99.
003460 01  CARD-27-INPUT.
003470      02  LAKE-CODE            PIC 9(4).
003480      02  ACCURACY-27          PIC X.
003490      02  SOURCE-27            PIC 9(4).
003500      02  DATE-27              PIC X(6).
003510      02  HOURS-27             PIC 9(6).
003520      02  AVE-DAY-27           PIC 99V9.
003530      C2  WEIGHT-27            PIC 9(6).
003540      02  NUMBER-27            PIC 9(6).
003550      02  FILLER               PIC X(42).
003560      02  CARD-NUMBER          PIC 99.
003570 01  CARD-28-INPUT.
003580      02  LAKE-CODE            PIC 9(4).
003590      02  DATA-28              CCCURS 8 TIMES.
003600          03  SPECIES-28           PIC 9(3).
003610          03  CATCH-HR-28          PIC 9(3).
003620          03  WT-HR-28             PIC 9V99.
003630      02  FILLER               PIC XX.
003640      02  CARD-NUMBER          PIC 99.
003650 01  CARD-29-INPUT.
003660      02  LAKE-CODE            PIC 9(4).
003670      02  SOURCE-29            PIC 9(5).
003690      02  DATE-29              PIC X(6).
003700      02  HOURS-29             PIC 9(6).
003710      02  ACTIVS-29            CCCURS 11 TIMES.
003715          03  ACTIVS-29-DATA       PIC 9(4).
003720      02  FILLER               PIC X(13).
003730      02  CARD-NUMBER          PIC 99.
003740 01  CARD-30-INPUT.
003750      02  LAKE-CODE            PIC 9(4).
003760      02  SOURCE-30            PIC 9(5).
003770      02  ACTION-CODE          PIC X.
003780      02  DATE-30              PIC X(6).
003790      02  RECS-30              PIC X(8).
003800      02  FILLER               PIC X(54).
003810      02  CARD-NUMBER          PIC 99.
003820 01  CARD-31-INPUT.
003830      02  LAKE-CODE            PIC 9(4).
003840      02  DATA-31              CCCURS 2 TIMES.
003850          03  REC-31               PIC XX.
003860          03  SPECIES1-31          PIC 9(3).
003870          03  SPECIES2-31          PIC 9(3).
003880          03  BENEFIT-31           PIC 9(6).
003890          03  YEAR-COMPLETE        PIC XX.
003900          03  COST-31              PIC 9(6).
003910      C2  FILLER               PIC X(28).
003920      02  YEAR-31              PIC XX.
003930      02  CARD-NUMBER          PIC 99.
003940 01  CARD-32-INPUT.
003950      02  LAKE-CODE            PIC 9(4).
003960      02  DATA-32              CCCURS 2 TIMES.
003970          03  LOCATION-32          PIC 9(3).
003980          03  REC-32               PIC XX.
003990          03  BENEFIT-32           PIC 9(6).
004000          03  COST-32              PIC 9(5).
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004010          03  REC2-32           PIC XX.
004020          03  BENEFIT2-32       PIC 9(6).
004030          03  COST2-32          PIC 9(5).
004040     02  FILLER            PIC X(14).
004050     02  YEAR-32           PIC XX.
004060     02  CARD-NUMBER       PIC 99.
004070 01  CARD-33-INPUT.
004080     02  LAKE-CODE         PIC 9(4).
004090     02  CARD-33-INFO      PIC X(74).
004100     02  CARD-NUMBER       PIC 99.
004110 01  CARD-34-INPUT.
004120     02  LAKE-CODE         PIC 9(4).
004130     02  SOURCE-34         PIC 9(5).
004140     02  UNITS-34          PIC X.
004150     02  ACTION-CODE-34    PIC X.
004160     02  DATE-34           PIC X(6).
004170     02  FILLER            PIC X(61).
004180     02  CARD-NUMBER       PIC 99.
004190 01  CARD-35-INPUT.
004200     02  LAKE-CODE         PIC 9(4).
004210     02  LOCATION-35       PIC 9(3).
004220     02  NAME-35           PIC X(15).
004230     02  FACILITIES-35     PIC X(25).
004240     02  WATERFRONT-35     PIC 9(6).
004250     02  AREA-35           PIC 9(4).
004260     02  MAINTENANCE-35    PIC 9(6).
004270     02  FACIL-35          PIC 9(6).
004280     02  INVEST-35         PIC 9(6).
004290     02  YEAR-35           PIC XX.
004300     02  FILLER            PIC X.
004310     02  CARD-NUMBER       PIC 99.
004320 WORKING-STORAGE SECTION.
004330 77  CLO-LAKE-CODE              PIC 9(4).
004335 77  ISUB          PIC 99.
004335 77  JSUB          PIC 99.
004340 01  TAPEOUT-REC.
004350     02  CARD-1-NUM        PIC 9.
004360     02  CARD-1-DATA       OCCURS 1 TIMES.
004370          03  SOURCE-1          PIC S9(5) COMP-3.
004380          03  DATE-1            PIC X(6).
004390          03  DATA-1            PIC X(22).
004400     02  CARD-2-NUM        PIC 9.
004410     02  CARD-2-DATA       OCCURS 2 TIMES.
004415          03  DATA-2        PIC X(70).
004420     02  CARD-3-NUM        PIC 9.
004430     02  CARD-3-DATA       OCCURS 1 TIMES.
004440          03  SOURCE-3          PIC S9(5) COMP-3.
004450          03  RIVER-3           OCCURS 2 TIMES.
004455              04  RIVER-3-DATA   PIC S9(3) COMP-3.
004460          03  DATE-3            PIC S9(6) COMP-3.
004470          03  DATA-3            PIC X(4).
004480          03  SPECIES-3         OCCURS 4 TIMES.
004485              04  SPECIES-3-DATA  PIC S9(3) COMP-3.
004490          03  DRAINAGE-3        OCCURS 3 TIMES.
004495              04  DRAINAGE-3-DATA  PIC S9(4) COMP-3.
004500          03  MAP-DATE-3        PIC S9(4) COMP-3.
004510          03  POPULATE-3        OCCURS 3 TIMES.
004515              04  POPULATE-3-DATA  PIC S9(6) COMP-3.
004520     02  CARD-4-NUM        PIC 9.
004530     02  CARD-4-DATA       OCCURS 1 TIMES.
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004540          03   TYPE-4              PIC X.
004550          03   LOCATION-4          PIC S9(3) COMP-3.
004560          03   CONST-DATE-4        PIC X(4).
004570          03   SPILLWAY-4          PIC X.
004580          03   WIDTH-4             PIC S9(5) COMP-3.
004590          03   OWNER-4             PIC XX.
004600          03   PLAN-ESTIM          PIC X.
004610          03   AREA-4              PIC S9(9) COMP-3.
004620          03   MEANDERED           PIC S9(6) COMP-3.
004630          03   LITTORAL            PIC S9(6) COMP-3.
004640          03   PERCENT-LT          PIC XX.
004650          03   MAX-DEPTH-4          PIC S9(4) COMP-3.
004660          03   AVE-DEPTH-4         PIC S9(4) COMP-3.
004670          03   BENCHMARK           PIC S9(3) COMP-3.
004680          03   ANN-FLUC-HIGH       PIC S9(3) COMP-3.
004690          03   ANN-FLUC-LOW        PIC S9(3) COMP-3.
004700          03   LT-FLUC-HIGH        PIC S9(3) COMP-3.
004710          03   LT-FLUC-LOW         PIC S9(3) COMP-3.
004720          03   ELEVATION-4         PIC S9(4) COMP-3.
004730          03   WATERSHED-4         PIC S9(8)V9(2) COMP-3.
004740     02   CARD-5-NUM         PIC 9.
004750     02   CARD-5-DATA        OCCURS 1 TIMES.
004760          03   SOURCE-5            PIC S9(5) COMP-3.
004770          03   RIVER1-5            PIC S9(3) COMP-3.
004775          03   RIVER2-5            PIC S9(3) COMP-3.
004780          03   DATE-5              PIC X(6).
004790          03   LENGTH-5            PIC S9(5)V9 COMP-3.
004800          03   CHANNEL-5           PIC S9(3) COMP-3.
004810          03   WIDTH-5             PIC XX.
004820          03   DEPTH-5             PIC S9(2)V9 COMP-3.
004830          03   NORMAL-HIGH         PIC S9(5) COMP-3.
004840          03   MEAN-ANNUAL         PIC S9(5) COMP-3.
004850          03   POOL-WATER          PIC X(14).
004860          03   AVE-GRADIENT        PIC S9(2)V9 COMP-3.
004870          03   STABLE-BANK         PIC XX.
004880     02   CARD-6-NUM         PIC 9.
004890     02   CARD-6-DATA        OCCURS 1 TIMES.
004900          03   BOTTOM-STRATA       PIC X(36).
004910          03   FISHING-WATER1      OCCURS 3 TIMES.
004915               04  FISHING-WATER1-DATA    PIC S9(6) COMP-3.
004920          03   FISHING-WATER2      OCCURS 3 TIMES.
004925               04  FISHING-WATER2-DATA    PIC S9(5) COMP-3.
004930     02   CARD-7-NUM         PIC 9.
004940     02   CARD-7-DATA        OCCURS 1 TIMES.
004950          03   RESOURCE-USE        PIC S9(4) COMP-3.
004960          03   WATER-RIGHT         PIC S9(6) COMP-3.
004970          03   DWELLINGS           PIC S9(3) COMP-3.
004980          03   ISLANDS             PIC XX.
004990          03   DEVELOPMENT         PIC X(34).
005000     02   CARD-8-NUM         PIC 9.
005010     02   CARD-8-DATA        OCCURS 5 TIMES.
005020          03   TYPE-8              PIC XX.
005030          03   NAME-8              PIC X(10).
005040          03   LOCATION-8          PIC S9(3) COMP-3.
005050          03   DEPTH-8             PIC X(4).
005060          03   HIGH-8              PIC S9(5) COMP-3.
005070          03   ANNUAL-8            PIC S9(5) COMP-3.
005080          03   BOTTOM-8            PIC XX.
005090     02   CARD-9-NUM         PIC 9.
005100     02   CARD-9-DATA        OCCURS 4 TIMES.
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005110          03   SOURCE-9           PIC S9(5) COMP-3.
005120          03   DATE-9             PIC X(6).
005130          03   LOCATION-9         PIC S9(3) COMP-3.
005140          03   SECCHI             PIC S9(2)V9 COMP-3.
005150          03   COLOR              PIC X(5).
005160          03   TEMP-OXY           OCCURS 5 TIMES.
005170          04   DEPTH-9            PIC S9(3)V9 COMP-3.
005180          04   TEMP               PIC XX.
005190          04   DISS-OXY           PIC S9(2)V9 COMP-3.
005200    02   CARD-10-NUM        PIC 9.
005210    02   CARD-10-DATA       OCCURS 4 TIMES.
005220          03   THERMO-LCW         PIC S9(3)V9 COMP-3.
005230          03   THERMO-HIGH        PIC S9(3)V9 COMP-3.
005240          03   ALKALINITY         OCCURS 3 TIMES.
005245          04   ALKALINITY-DATA    PIC S9(3) COMP-3.
005250          03   PH-1C              PIC S9(2)V9 COMP-3.
005260          03   CO2                PIC XX.
005270          03   HARDNESS           PIC S9(4) COMP-3.
005280          03   CONDUCTIVITY       PIC S9(4) COMP-3.
005290          03   SOLIDS             OCCURS 2 TIMES.
005295          04   SOLIDS-DATA        PIC S9(4) COMP-3.
005300          03   PHOS               OCCURS 2 TIMES.
005305          04   PHOS-DATA          PIC S9V9(2) COMP-3.
005310          03   CHLOROPHYLL        OCCURS 2 TIMES.
005315          04   CHLOROPHYLL-DATA   PIC S9(3) COMP-3.
005320          03   CHLORIDE-ION       PIC S9(4) COMP-3.
005330          03   NITROGEN           OCCURS 4 TIMES.
005335          04   NITROGEN-DATA      PIC S99V99 COMP-3.
005340          03   DATE-10            PIC X(4).
005350    02   CARD-11-NUM        PIC 9.
005360    02   CARD-11-DATA       OCCURS 1 TIMES.
005370          03   SOURCE-11          PIC S9(5) COMP-3.
005380          03   RIVER-11           OCCURS 2 TIMES.
005385          04   RIVER-11-DATA      PIC S9(3) COMP-3.
005390          03   DATE-11            PIC X(6).
005400          03   COVERAGE-1         PIC XX.
005410          03   STANDING-EMERG     OCCURS 5 TIMES.
005420          04   SPECIES1-11        PIC S9(3) COMP-3.
005430          04   ABUND1-11          PIC X.
005440          03   COVERAGE-2         PIC XX.
005450          03   GROWTH-11          PIC S9(3) COMP-3.
005460          03   SUBMERGED          OCCURS 5 TIMES.
005470          04   SPECIES2-11        PIC S9(3) COMP-3.
005480          04   ABUND2-11          PIC X.
005490          03   OTHER-LIFE         PIC X(9).
005500    02   CARD-12-NUM        PIC 9.
005510    02   CARD-12-DATA       OCCURS 4 TIMES.
005520          03   SPECIES-12         OCCURS 18 TIMES.
005530          04   SPECIES1-12        PIC S9(3) COMP-3.
005540          04   ABUND1-12          PIC X.
005550    02   CARD-13-NUM        PIC 9.
005560    02   CARD-13-DATA       OCCURS 1 TIMES.
005570          03   SPAWNING-AREA      OCCURS 5 TIMES.
005580          04   SPECIES-13         PIC S9(3) COMP-3.
005590          04   EVALUATION         PIC X.
005600          04   LOCATION-13        OCCURS 3 TIMES PIC S9(3) COMP-3.
005610    02   CARD-14-NUM        PIC 9.
005620    02   CARD-14-DATA       OCCURS 1 TIMES.
005625          03   SOURCE-14          PIC S9(5) COMP-3.
005630          03   DATE-14            PIC X(6).
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005640          03   STOCKING              OCCURS 4 TIMES.
005650          04   SPECIES-14            PIC S9(3) COMP-3.
005660          04   NUMBER-14             PIC S9(7) COMP-3.
005670          04   SIZE-14               PIC X.
005680      02  CARD-15-NUM           PIC 9.
005690      02  CARD-15-DATA          OCCURS 2 TIMES.
005700          03   METHOD                PIC X.
005710          03   HAULS                 PIC S9(3) COMP-3.
005720          03   COMMERCIAL            OCCURS 6 TIMES.
005730          04   SPECIES-15            PIC S9(3) COMP-3.
005740          04   WEIGHT-15             PIC S9(6) COMP-3.
005750          03   YEAR-15               PIC XX.
005760      02  CARD-16-NUM           PIC 9.
005770      02  CARD-16-DATA          OCCURS 2 TIMES.
005780          03   COMM-16               OCCURS 2 TIMES.
005790              04   SPECIES1-16          PIC S9(3) COMP-3.
005800              04   WEIGHT1-16           PIC S9(6) COMP-3.
005810          03   GAME1-16              OCCURS 5 TIMES.
005820          04   SPECIES2-16           PIC S9(3) COMP-3.
005830          04   NUMBER2-16            PIC S9(4) COMP-3.
005840          03   GAME2-16              OCCURS 2 TIMES.
005850          04   SPECIES3-16           PIC S9(3) COMP-3.
005860          04   NUMBER3-16            PIC S9(6) COMP-3.
005870          03   YEAR-16               PIC XX.
005880      02  CARD-17-NUM           PIC 9.
005890      02  CARD-17-DATA           OCCURS 1 TIMES.
005900          03   SOURCE-17             PIC S9(5) COMP-3.
005910          03   DATE-17               PIC X(6).
005920          03   PULLS-17              PIC X(6).
005930          03   LENGTH-17             PIC S9(3) COMP-3.
005940          03   DEPTH-17              PIC XX.
005950          03   MESH-17                PIC S9V9(3) COMP-3.
005960          03   DISTANCE-17           PIC S9(4) COMP-3.
005970          03   AREA-17               PIC S9(3)V9 COMP-3.
005980      02  CARD-18-NUM           PIC 9.
005990      02  CARD-18-DATA          OCCURS 5 TIMES.
006000          03   DATA-18               OCCURS 6 TIMES.
006010          04   SPECIES-18            PIC S9(3) COMP-3.
006020          04   NUMBER-18             PIC S9(6) COMP-3.
006030      02  CARD-19-NUM           PIC 9.
006040      02  CARD-19-DATA          OCCURS 4 TIMES.
006050          03   SOURCE-19             PIC S9(5) COMP-3.
006060          03   METHOD-19             PIC X(3).
006070          03   MESH-19               PIC S9(2)V9(3) COMP-3.
006080          03   LENGTH-19             PIC S9(2)V9 COMP-3.
006090          03   HEIGHT-19             PIC S9(2)V9 COMP-3.
006100          03   WIDTH-19              PIC S9(2)V9 COMP-3.
006110          03   DURATION-19           PIC X(6).
006120          03   AREA-19               PIC S9(2)V9 COMP-3.
006130          03   DATE-19               PIC X(6).
006140      02  CARD-20-NUM           PIC 99.
006150      02  CARD-20-DATA          OCCURS 40 TIMES.
006160          03   SPECIES-20            PIC S9(3) COMP-3.
006170          03   TOTAL-20              PIC S9(5) COMP-3.
006180          03   PCT-NUM-20            PIC XX.
006190          03   TOTAL-WT-20           PIC S9(5)V9 COMP-3.
006200          03   PCT-WT-20             PIC XX.
006210          03   MEAN-LENGTH-20        PIC S9(3)V9 COMP-3.
006220          03   MEAN-WT-20            PIC S9(2)V9(3) COMP-3.
006230          03   NET-NUM-20            PIC S9(4) COMP-3.
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006240          03  NET-WT-20           PIC S9(4)V9 COMP-3.
006290          03  YEAR-20             PIC XX.
006300     C2  CARD-21-NUM          PIC 9.
006310     C2  CARD-21-OATA         CCCURS 2 TIMES.
006320          03  SOURCE-21           PIC S9(5) COMP-3.
006330          03  METHOD-21           PIC X(3).
006340          03  MESH-21             PIC S9(2)V9(3) COMP-3.
006350          03  LENGTH-21           PIC S9(2)V9 COMP-3.
006360          03  HEIGHT-21           PIC 59(2)V9 COMP-3.
006370          03  WIDTH-21            PIC S9(2)V9 COMP-3.
006380          03  DURATION-21         PIC X(6).
006390          03  AREA-21             PIC S9(2)V9 COMP-3.
006400          03  DATE-21             PIC X(6).
006410     02  CARD-22-NUM          PIC 99.
006420     02  CARD-22-CATA         CCCURS 10 TIMES.
006430          03  SPECIES-22          PIC 59(3) COMP-3.
006440          03  DATA-22             PIC X(65).
006450          03  TOTAL-22            PIC S9(3) COMP-3.
0C6460          03  YEAR-22             PIC XX.
006470     02  CARD-23-NUM          PIC 9.
006480     02  CARD-23-DATA         CCCURS 2 TIMES.
006490          03  SOURCE-23           PIC S9(5) COMP-3.
006500          03  DATE-23             PIC X(6).
006510     02  CARD-24-NUM          PIC 99.
006520     02  CARD-24-DATA         CCCURS 16 TIMES.
006530          03  SPECIES-24          PIC S9(3) COMP-3.
006540          03  SIZE-24             PIC S9(4) COMP-3.
006550          03  SAMPLE-24           PIC S9(3) COMP-3.
006560          03  AGE-GROUP-24        OCCURS 9 TIMES.
006565              04  AGE-GROUP-24-DATA     PIC 59(3)V9 COMP-3.
006570     02  CARD-25-NUM          PIC 99.
006580     02  CARD-25-DATA         CCCURS 16 TIMES.
006590          03  AGE-GROUP-25        PIC X(36).
006600     02  CARD-26-NUM          PIC 9.
006610     02  CARD-26-OATA          OCCURS 1 TIMES.
006620          03  DATE-26             PIC X(6).
006630          03  DATA-26             PIC X(21).
006640          03  SPECIES-26          OCCURS 4 TIMES.
006645              04  SPECIES-26-OATA      PIC S9(3) COMP-3.
006650     02  CARD-27-NUM          PIC 9.
006660     02  CARD-27-OATA          OCCURS 1 TIMES.
006670          03  ACCURACY-27         PIC X.
006680          03  SOURCE-27           PIC S9(4) COMP-3.
006690          03  DATE-27             PIC X(6).
006700          03  HOURS-27            PIC 59(6) COMP-3.
006710          03  AVE-DAY-27          PIC S9(2)V9 COMP-3.
006720          03  WEIGHT-27           PIC S9(6) COMP-3.
006730          03  NUMBER-27           PIC S9(6) COMP-3.
006740     02  CARD-28-NUM          PIC 9.
006750     02  CARD-28-DATA          OCCURS 1 TIMES.
006760          03  DATA-28             OCCURS 8 TIMES.
006770          04  SPECIES-28          PIC 59(3) COMP-3.
006780          04  CATCH-HR-28         PIC S9(3) COMP-3.
006790          04  WT-HR-28            PIC S9V9(2) COMP-3.
006800     02  CARD-29-NUM          PIC 9.
006810     02  CARD-29-OATA          OCCURS 1 TIMES.
006820          03  SOURCE-29           PIC S9(5) COMP-3.
006830          03  DATE-29             PIC X(6).
006840          03  HOURS-29            PIC SS(6) COMP-3.
006850          03  ACTIVS-29           OCCURS 11 TIMES.
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006855            04   ACTIVS-29-DATA     PIC S9(4) COMP-3.
006860     02  CARD-30-NUM        PIC 9.
006870     02  CARD-3C-CATA       CCCURS 2 TIMES.
006880         03  SOURCE-30          PIC S9(5) COMP-3.
006890         03  DATE-30            PIC X(6).
006900         03  RECS-30            PIC X(8).
006910     02  CARD-31-NUM        PIC 9.
006920     02  CARD-31-CATA       CCCURS 6 TIMES.
006930         03  OATA-31            OCCURS 2 TIMES.
006940         04  REC-31             PIC XX.
006950         04  SPECIESL-31        PIC S9(3) COMP-3.
006960         04  SPECIES2-31        PIC S9(3) COMP-3.
006970         04  BENEFIT-31         PIC 59(6) COMP-3.
006980         04  YEAR-COMPLETE      PIC XX.
006990         04  COST-31            PIC S9(6) COMP-3.
006995         03  YEAR-31            PIC XX.
007000     02  CARD-32-NUM        PIC 9.
007010     C2  CARD-32-CATA       CCCURS 6 TIMES.
007020         03  DATA-32            CCCURS 2 TIMES.
007030         04  LOCATION-32        PIC S9(3) COMP-3.
007040         04  REC-32             PIC XX.
007050         04  BENEFIT-32          PIC S9(6) COMP-3.
007060         04  COST-32            PIC S9(5) COMP-3.
007070         04  REC2-32            PIC XX.
007080         04  BENEFIT2-32        PIC S9(6) COMP-3.
007090         04  COST2-32           PIC S9(5) COMP-3.
007100         03  YEAR-32            PIC XX.  .
007110     02  CARD-33-NUM        PIC 9.
007120     02  CARD-33-DATA       CCCURS 2 TIMES.
007125         03  CARD-33-INFO        PIC X(74).
007130     02  CARD-34-NUM        PIC 9.
007140     02  CARD-34-CATA       CCCURS 7 TIMES.
007150         03  SOURCE-34          PIC S9(5) COMP-3.
007160         03  DATE-34            PIC X(6).
007170     02  CARD-35-NUM        PIC 99.
007180     02  CARD-35-DATA       CCCURS 49 TIMES.
007190         03  LOCATION-35        PIC S9(3) COMP-3.
007200         03  NAME-35            PIC X(15).
007210         03  FACILITIES-35      PIC X(25).
0C7220         03  WATERFRONT-35      PIC S9(6) COMP-3.
007230         03  AREA-35            PIC S9(4) COMP-3.
007240         03  MAINTENANCE-35     PIC 59(6) COMP-3.
007250         03  FACIL-35           PIC S9(6) COMP-3.
007260         03  INVEST-35          PIC S9(6) COMP-3.
007270         03  YEAR-35            PIC XX.
007280 PROCECURE DIVISION.
007290 SORT-DATA SECTION.
007300     SORT SORT-FILE
007310         ASCENOING KEY SORT-LAKE-CODE
007320         ASCENOING KEY SORT-CARO-CODE
007330         INPUT PROCEDURE SORT-PREP
007340         GIVING TEMP-FILE.
007350 BUILC-RECORO.
007360     OPEN INPUT TEMP-FILE OUTPUI TAPEOUT-FILE.
007365     MOVE SPACES TO TAPEOUT-REC.
007370     READ TEMP-FILE.
007380     MOVE TEMP-LAKE-CODE TO OLD-LAKE-CODE.
007390     GO TO BRANCH.
007400 REAO-TAPE.
007410     READ TEMP-FILE AT END GO·TO NO-MORE-OATA.
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007420      IF TEMP-LAKE-CODE IS NCT EQUAL TO OLD-LAKE-CODE PERFORM
0C7430      WRITE-LAKE-RECORD.
007435 BRANCH.
007440      GO TO CARD-1, CARD-2, CARD-3, CARD-4, CARD-5, CARD-6, CARD-7,
007450      CARD-8, CARD-9, CARD-1C, CARD-11, CARD-12, CARD-13, CARD-14,
007460      CARD-15, CARD-16, CARD-17, CARD-18, CARD-19, CARD-20, CARD-21,
007470      CARD-22, CARD-23, CARD-24, CARC-25, CARD-26, CARD-27, CARD-28,
007480      CARD-29, CARD-30, CARD-31, CARD-32, CARD-33, CARD-34, CARD-35
007490      DEPENDING ON TEMP-CARD-CCDE.
007500      DISPLAY 'BAD RECCRO--LAKE CODE ', TEMP-LAKE-CODE,
007510      ', CARD CODE ', TEMP-CARC-CODE  .
007520      GO TO READ-TAPE.
007530 CARD-1.
007540      IF CARD-1-NUM IS NOT NUMERIC CCMPUTE CARD-1-NUM = 0.
007550      IF CARD-1-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
007560      GO TO READ-TAPE.
007580      COMPUTE CARD-1-NUM = CARD-1-NUM + 1.
007590      MOVE CORRESPONDING CARD-1-INPUT TO CARD-1-DATA(CARD-1-NUM).
007600      GO TO READ-TAPE.
007610 CARD-2.
007620      IF CARD-2-NUM IS NCT NUMERIC CCMPUTE CARD-2-NUM = 0.
007630      IF CARD-2-NUM IS GREATER THAN 1 PERFCRM CARD-ERROR
007640      GO TO READ-TAPE.
007660      COMPUTE CARD-2-NUM = CARD-2-NUM + 1.
007670      MOVE CORRESPONDING CARC-2-INPUT TO CARD-2-DATA(CARD-2-NUM).
007680      GO TO READ-TAPE.
007690 CARD-3.
007700      IF CARD-3-NUM IS NCT NUMERIC CCMPUTE CARD-3-NUM = 0.
007710      IF CARC-3-NUM IS GREATER THAN 0 PERFCRM CARD-ERROR
007720      GO TO READ-TAPE.
007730      COMPUTE CARD-3-NUM = CARD-3-NUM + 1.
007740      PERFORM MOVE-CARD-3.
007750      GO TO READ-TAPE.
007760 CARD-4.
007770      IF CARD-4-NUM IS NOT NUMERIC COMPUTE CARD-4-NUM = 0.
0C7780      IF CARC-4-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
007790      GO TO READ-TAPE.
007800      COMPUTE CARD-4-NUM = CARD-4-NUM + 1.
007810      MOVE CORRESPONDING CARD-4-INPUT TO CARD-4-DATA(CARD-4-NUM).
007820      GO TO READ-TAPE.
007830 CARD-5.
007840      IF CARD-5-NUM IS NCT NUMERIC CCMPUTE CARD-5-NUM = 0.
007850      IF CARD-5-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
007860      GO TO READ-TAPE.
007870      COMPUTE CARD-5-NUM = CARD-5-NUM + 1.
007880      MOVE CORRESPONCING CARD-5-INPUT TO CARD-5-DATA(CARD-5-NUM).
007890      GO TO READ-TAPE.
007900 CARD-6.
007910      IF CARD-6-NUM IS NCT NUMERIC CCMPUTE CARD-6-NUM = 0.
007920      IF CARD-6-NUM IS GREATER THAN C PERFORM CARD-ERROR
007930      GO TO READ-TAPE.
007940      COMPUTE CARD-6-NUM = CARD-6-NUM + 1.
007950      PERFORM MOVE-CARD-6.
007960      GO TO READ-TAPE.
007970 CARD-7.
007980      IF CARD-7-NUM IS NOT NUMERIC COMPUTE CARD-7-NUM = 0.
007990      IF CARD-7-NUM IS GREATER THAN C PERFORM CARD-ERROR
008000      GO TO READ-TAPE.
008010      COMPUTE CARD-7-NUM = CARD-7-NUM + 1.
008020      .MOVE CORRESPONDING CARD-7-INPUT TO CARD-7-DATA(CARD-7-NUM).
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008030      GO TO READ-TAPE.
008040 CARD-8.
008050      IF CARD-8-NUM IS NCT NUMERIC CCMPUTE CARD-8-NUM = 0.
008060      IF CARD-8-NUM IS GREATER THAN 4 PERFCRM CARD-ERROR
008070      GO TO READ-TAPE.
008080      COMPUTE CARD-8-NUM = CARD-8-NUM + 1.
008090      MOVE CORRESPCNDING CARD-8-INPUT TO CARD-8-DATA(CARD-8-NUM)
008100      GO TO READ-TAPE.
008110 CARD-9.
008120      IF CARD-9-NUM IS NOT NUMERIC CCMPUTE CARD-9-NUM = 0.
008130      IF CARD-9-NUM IS GREATER THAN 3 PERFCRM CARD-ERROR
008140      GO TO READ-TAPE.
008150      COMPUTE CARD-9-NUM = CARD-9-NUM + 1.
008160      PERFORM MOVE-CARD-9.
008170      GO TO READ-TAPE.
008180 CARD-10.
008190      IF CARD-10-NUM IS NOT NUMERIC COMPUTE CARD-10-NUM = 0.
0C8200      IF CARD-10-NUM IS GREATER THAN 3 PERFORM CARD-ERROR
008210      GO TO READ-TAPE.
008220      COMPUTE CARD-10-NUM = CARD-10-NUM + 1.
008230      PERFORM MOVE-CARD-10.
008240      GO TO READ-TAPE.
008250 CARD-11.
008260      IF CARD-11-NUM IS NOT NUMERIC CCMPUTE CARD-11-NUM = 0.
008270      IF CARD-11-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
008280      GO TO READ-TAPE.
008290      COMPUTE CARD-11-NUM = CARD-11-NUM + 1.
008300      PERFORM MOVE-CARD-11.
008310      GO TO READ-TAPE.
008320 CARD-12.
008330      IF CARD-12-NUM IS NOT NUMERIC COMPUTE CARD-12-NUM = 0.
008340      IF CARD-12-NUM IS GREATER THAN 3 PERFORM CARD-ERROR
008350      GO TO READ-TAPE.
008360      COMPUTE CARD-12-NUM = CARD-12-NUM + 1.
008370      PERFORM MOVE-CARD-12.
008380      GO TO READ-TAPE.
008390 CARD-13.
008400      IF CARD-13-NUM IS NOT NUMERIC COMPUTE CARD-13-NUM = 0.
008410      IF CARD-13-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
008420      GO TO READ-TAPE.
008430      COMPUTE CARD-13-NUM = CARD-13-NUM + 1.
008440      PERFORM MOVE-CARD-13.
008450      GO TO READ-TAPE.

008460 CARD-14.
008470      IF CARD-14-NUM IS NOT NUMERIC COMPUTE CARD-14-NUM = 0.
008480      IF CARD-14-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
008490      GO TO READ-TAPE.
008500      COMPUTE CARD-14-NUM = CARD-14-NUM + 1.
008510       PERFORM MOVE-CARD-14.
008520      GO TO READ-TAPE.
008530 CARD-15.
008540      IF CARD-15-NUM IS NOT NUMERIC COMPUTE CARD-15-NUM = 0.
008550      IF CARD-15-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
008560      GO TO READ-TAPE.
008570      COMPUTE CARD-15-NUM = CARD-15-NUM + 1.
008580       PERFORM MOVE-CARD-15.
008590      GO TO READ-TAPE.
008600 CARD-16.
008610      IF CARD-16-NUM IS NOT NUMERIC COMPUTE CARD-16-NUM = 0.
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008620        IF CARO-16-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
008630        GO TO READ-TAPE.
008640        COMPUTE CARD-16-NUM = CARD-16-NUM + 1.
008650         PERFORM MOVE-CARD-16.
008660        GO TO READ-TAPE.
008670 CARD-17.
008680        IF CARD-17-NUM IS NOT NUMERIC COMPUTE CARD-17-NUM = 0.
008690        IF CARD-17-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
008700        GO TO READ-TAPE.
008710        COMPUTE CARD-17-NUM = CARD-17-NUM + 1.
008720        MOVE CORRESPONDING CARD-17-INPUT TO CARD-17-OATA(CARD-17-NUM).
008730        GO TO READ-TAPE.
008740 CARD-18.
008750        IF CARO-18-NUM IS NOT NUMERIC COMPUTE CARD-18-NUM = 0.
008760        IF CARD-18-NUM IS GREATER THAN 4 PERFORM CARD-ERROR
008770        GO TO READ-TAPE.
008780        COMPUTE CARD-18-NUM = CARD-18-NUM + 1.
008790        PERFORM MOVE-CARD-18.
008800        GO TO READ-TAPE.
008810 CARD-19.
008820        IF CARD-19-NUM IS NOT NUMERIC COMPUTE CARD-19-NUM = 0.
008830        IF CARO-19-NUM IS GREATER THAN 3 PERFORM CARD-ERROR
008840        GO TO READ-TAPE.
008850        COMPUTE CARD-19-NUM = CARD-19-NUM + 1.
008860        MOVE CORRESPONDING CARD-19-INPUT TO CARD-19-OATA(CARD-19-NUM).
008870        GO TO READ-TAPE.
008880 CARD-20.
008890        IF CARD-20-NUM IS NOT NUMERIC COMPUTE CARD-20-NUM = 0.
008900        IF CARO-20-NUM IS GREATER THAN 39 PERFORM CARD-ERROR
008910        GO TO READ-TAPE.
008920        COMPUTE CARD-20-NUM = CARD-20-NUM + 1.
008930        MOVE CORRESPONDING CARD-20-INPUT TO CARD-20-OATA(CARD-20-NUM).
008940        GO TO READ-TAPE.
008950 CARD-21.
008960        IF CARD-21-NUM IS NOT NUMERIC COMPUTE CARD-21-NUM = 0.
008970        IF CARO-21-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
008980        GO TO READ-TAPE.
008990        COMPUTE CARD-21-NUM = CARD-21-NUM + 1.
009000        MOVE CORRESPONDING CARD-21-INPUT TO CARD-21-OATA(CARD-21-NUM).
009010        GO TO READ-TAPE.
009020 CARD-22.
009030        IF CARD-22-NUM IS NOT NUMERIC COMPUTE CARD-22-NUM = 0.
009040        IF CARD-22-NUM IS GREATER THAN 9 PERFORM CARD-ERROR
009050        GO TO READ-TAPE.
009060        COMPUTE CARD-22-NUM = CARD-22-NUM + 1.
009070        MOVE CORRESPONDING CARD-22-INPUT TO CARD-22-OATA(CARD-22-NUM).
009080        GO TO READ-TAPE.
009090 CARD-23.
009100        IF CARD-23-NUM IS NOT NUMERIC CCMPUTE CARD-23-NUM = 0.
009110        IF CARD-23-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
009120        GO TO READ-TAPE.
009130        COMPUTE CARD-23-NUM = CARD-23-NUM + 1.
009140        MOVE CORRESPONDING CARD-23-INPUT TO CARD-23-OATA(CARD-23-NUM).
009150        GO TO READ-TAPE.
009160 CARD-24.
009170        IF CARD-24-NUM IS NOT NUMERIC CCMPUTE CARD-24-NUM = 0.
009180        IF CARD-24-NUM IS GREATER THAN 15 PERFORM CARD-ERROR
009190        GO TO READ-TAPE.
009200        COMPUTE CARD-24-NUM = CARD-24-NUM + 1.
009210         PERFORM MOVE-CARD-24.
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009220      GO TO READ-TAPE.
009230 CARD-25.
009240      IF CARD-25-NUM IS NOT NUMERIC COMPUTE CARD-25-NUM = 0.
009250      IF CARD-25-NUM IS GREATER THAN 15 PERFORM CARD-ERROR
009260      GO TO READ-TAPE.
009270      COMPUTE CARD-25-NUM = CARD-25-NUM + 1.
009280      MOVE CORRESPONDING CARD-25-INPUT TO CARD-25-DATA(CARD-25-NUM).
009290      GO TO READ-TAPE.
009300 CARD-26.
009310      IF CARD-26-NUM IS NOT NUMERIC COMPUTE CARD-26-NUM = 0.
009320      IF CARD-26-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
0C9330      GO TO READ-TAPE.
009340      COMPUTE CARD-26-NUM = CARD-26-NUM + 1.
009350       PERFORM MOVE-CARD-26.
009360      GO TO READ-TAPE.
009370 CARD-27.
009380      IF CARD-27-NUM IS NOT NUMERIC COMPUTE CARD-27-NUM = 0.
009390      IF CARD-27-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
G09400      GO TO READ-TAPE.
009410      COMPUTE CARD-27-NUM = CARD-27-NUM + 1.
009420      MOVE CORRESPONDING CARD-27-INPUT TO CARD-27-DATA(CARD-27-NUM).
009430      GO TO READ-TAPE.
009440 CARD-28.
009450      IF CARD-28-NUM IS NOT NUMERIC COMPUTE CARD-28-NUM = 0.
009460      IF CARD-28-NUM IS GREATER THAN 7 PERFORM CARD-ERROR
009470      GO TO READ-TAPE.
009480      COMPUTE CARD-28-NUM = CARD-28-NUM + 1.
009490       PERFORM MOVE-CARD-28.
009500      GO TO READ-TAPE.
009510 CARD-29.
009520      IF CARD-29-NUM IS NOT NUMERIC COMPUTE CARD-29-NUM = 0.
009530      IF CARD-29-NUM IS GREATER THAN 0 PERFORM CARD-ERROR
009540      GO TO READ-TAPE.
009550      COMPUTE CARD-29-NUM = CARD-29-NUM + 1.
009560       PERFORM MOVE-CARD-29.
009570      GO TO READ-TAPE.
009580 CARD-30.
009590      IF CARD-30-NUM IS NOT NUMERIC COMPUTE CARD-30-NUM = 0.
009600      IF CARD-30-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
009610      GO TO READ-TAPE.
009620      COMPUTE CARD-30-NUM = CARD-30-NUM + 1.
009630      MOVE CORRESPONDING CARD-30-INPUT TO CARD-30-DATA(CARD-30-NUM).
009640      GO TO READ-TAPE.
009650 CARD-31.
009660      IF CARD-31-NUM IS NOT NUMERIC COMPUTE CARD-31-NUM = 0.
009670      IF CARD-31-NUM IS GREATER THAN 5 PERFORM CARD-ERROR
009680      GO TO READ-TAPE.
009690      COMPUTE CARD-31-NUM = CARD-31-NUM + 1.
009700       PERFORM MOVE-CARD-31.
009710      GO TO READ-TAPE.
009720 CARD-32.
009730      IF CARD-32-NUM IS NOT NUMERIC COMPUTE CARD-32-NUM = 0.
009740      IF CARD-32-NUM IS GREATER THAN 5 PERFORM CARD-ERROR
009750      GO TO READ-TAPE.
009760      COMPUTE CARD-32-NUM = CARD-32-NUM + 1.
0C9770      PERFORM MOVE-CARD-32.
009780      GO TO READ-TAPE.
009790 CARD-33.
009800      IF CARD-33-NUM IS NOT NUMERIC COMPUTE CARD-33-NUM = 0.
009810      IF CARD-33-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
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009820      GO TO READ-TAPE.
009830      COMPUTE CARD-33-NUM = CARD-33-NUM + 1.
009840      MOVE CORRESPONDING CARD-33-INPUT TO CARD-33-DATA(CARD-33-NUM).
009850      GO TO READ-TAPE.
009860 CARD-34.
009870      IF CARD-34-NUM IS NOT NUMERIC COMPUTE CARD-34-NUM = 0.
009880      IF CARD-34-NUM IS GREATER THAN 6 PERFORM CARD-ERROR
009890      GO TO READ-TAPE.
009900      COMPUTE CARD-34-NUM = CARD-34-NUM + 1.
009910      MOVE CORRESPONDING CARD-34-INPUT TO CARD-34-DATA(CARD-34-NUM).
009920      GO TO READ-TAPE.
009930 CARD-35.
009940      IF CARD-35-NUM IS NOT NUMERIC COMPUTE CARD-35-NUM = 0.
009950      IF CARD-35-NUM IS GREATER THAN 48 PERFORM CARD-ERROR
009960      GO TO READ-TAPE.
009970      COMPUTE CARD-35-NUM = CARD-35-NUM + 1.
009980      MOVE CORRESPONDING CARD-35-INPUT TO CARD-35-DATA(CARD-35-NUM).
009990      GO TO READ-TAPE.
010000 CARD-ERROR.
010010      DISPLAY 'TOO MANY RECORDS--LAKE CODE ', TEMP-LAKE-CODE,
010020      ', CARD CODE ', TEMP-CARD-CODE.
010030 WRITE-LAKE-RECORD.
010040      WRITE TAPEOUT-RECORD FROM TAPEOUT-REC.
010050      MOVE SPACES TO TAPEOUT-REC.
010055      MOVE TEMP-LAKE-CODE TO OLD-LAKE-CODE.
010060 SORT-PREP SECTION.
010070 READ-SORT.
010080      OPEN INPUT TAPEIN-FILE.
010090 READ-NEXT-CARD.
010100      READ TAPEIN-FILE AT END GO TO READ-SORT-END.
010110      IF CARD-CODE-IN = SPACES OR LAKE-CODE-IN = SPACES
010120      DISPLAY CARD-CODE-IN, CARD-INFO-IN, LAKE-CODE-IN
010130      ELSE MOVE TAPEIN-REC TO SORT-REC RELEASE SORT-REC.
010135      DISPLAY SORT-LAKE-CODE, SORT-CARD-CODE.
010140      GO TO READ-NEXT-CARD.
010150 READ-SORT-END.
010160      CLOSE TAPEIN-FILE.
010165 READ-SORT-EXIT.
010170      EXIT.
010099 MOVE-CARD SECTION.
010100 MOVE-CARD-3.
010110      MOVE SOURCE-3 OF CARD-3-INPUT TO SOURCE-3 OF CARD-3-DATA
010120      (CARD-3-NUM).
010130      PERFORM MOVE-RIVER-3 VARYING ISUB FROM 1 BY 1 UNTIL
010140      ISUB IS GREATER THAN 2.
010150      MOVE DATE-3 OF CARD-3-INPUT TO DATE-3 OF CARD-3-DATA
010160      (CARD-3-NUM).
010170      MOVE DATA-3 OF CARD-3-INPUT TO DATA-3 OF CARD-3-DATA
010180      (CARD-3-NUM).
010190      PERFORM MOVE-SPECIES-3 VARYING ISUB FROM 1 BY 1 UNTIL
010200      ISUB IS GREATER THAN 4.
010210      PERFORM MOVE-DRAINAGE-3 VARYING ISUB FROM 1 BY 1 UNTIL
010220      ISUB IS GREATER THAN 3.
010230      MOVE MAP-DATE-3 OF CARD-3-INPUT TO MAP-DATE-3 OF
010240      CARD-3-DATA(CARD-3-NUM).
010250      PERFORM MOVE-POPULATE-3 VARYING ISUB FROM 1 BY 1 UNTIL
010260      ISUB IS GREATER THAN 3.
010270 MOVE-RIVER-3.
010280      MOVE RIVER-3-DATA OF CARD-3-INPUT(ISUB) TO RIVER-3-DATA
010290      OF TAPEOUT-REC(CARD-3-NUM, ISUB).
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010300 MOVE-SPECIES-3.
010310      MOVE SPECIES-3-DATA OF CARD-3-INPUT(ISUB) TO
010320      SPECIES-3-DATA OF TAPEOUT-REC(CARD-3-NUM, ISUB).
010330 MOVE-DRAINAGE-3.
010340      MOVE DRAINAGE-3-DATA OF CARD-3-INPUT(ISUB) TO
010350      DRAINAGE-3-DATA OF TAPEOUT-REC(CARD-3-NUM, ISUB).
010360 MOVE-POPULATE-3.
010370      MOVE POPULATE-3-DATA OF CARD-3-INPUT(ISUB) TO
010380      POPULATE-3-DATA OF TAPEOUT-REC(CARD-3-NUM, ISUB).
010390 MOVE-CARD-6.
010400      MOVE BOTTOM-STRATA OF CARD-6-INPUT TO BOTTOM-STRATA OF
010410      CARD-6-DATA(CARD-6-NUM).
010420      PERFORM MOVE-FISHING-WATER-6 VARYING ISUB FROM 1 BY 1
010430      UNTIL ISUB IS GREATER THAN 3.
010440 MOVE-FISHING-WATER-6.
010450      MOVE FISHING-WATER1-DATA OF CARD-6-INPUT(ISUB) TO
010460      FISHING-WATER1-DATA OF TAPEOUT-REC(CARD-6-NUM, ISUB).
010470      MOVE FISHING-WATER2-DATA OF CARD-6-INPUT(ISUB) TO
010480      FISHING-WATER2-DATA OF TAPEOUT-REC(CARD-6-NUM, ISUB).
010490 MOVE-CARD-9.
010500      MOVE SOURCE-9 OF CARD-9-INPUT TO SOURCE-9 OF
010510      CARD-9-DATA(CARD-9-NUM).
010520      MOVE DATE-9 OF CARD-9-INPUT TO DATE-9 OF CARD-9-DATA
010530      (CARD-9-NUM).
010540      MOVE LOCATION-9 OF CARD-9-INPUT TO LOCATION-9 OF
010550      CARD-9-DATA(CARD-9-NUM).
010560      MOVE SECCHI OF CARD-9-INPUT TO SECCHI OF CARD-9-DATA
010570      (CARD-9-NUM).
010580      MOVE COLOR OF CARD-9-INPUT TO COLOR OF CARD-9-DATA
010590      (CARD-9-NUM).
010600      PERFORM MOVE-TEMP-OXY-9 VARYING ISUB FROM 1 BY 1 UNTIL
010610      ISUB IS GREATER THAN 5.
010620 MOVE-TEMP-OXY-9.
010630      MOVE DEPTH-9 OF CARD-9-INPUT(ISUB) TO DEPTH-9
010640      OF TAPEOUT-REC(CARD-9-NUM, ISUB).
010630      MOVE TEMP OF CARD-9-INPUT(ISUB) TO TEMP
010640      OF TAPEOUT-REC(CARD-9-NUM, ISUB).
010630      MOVE DISS-OXY OF CARD-9-INPUT(ISUB) TO DISS-OXY
010640      OF TAPEOUT-REC(CARD-9-NUM, ISUB).
010690 MOVE-CARD-10.
010700      MOVE THERMO-LOW OF CARD-10-INPUT TO THERMO-LOW OF
010710      CARD-10-DATA(CARD-10-NUM).
010720      MOVE THERMO-HIGH OF CARD-10-INPUT TO THERMO-HIGH OF
010730      CARD-10-DATA(CARD-10-NUM).
010740      PERFORM MOVE-CARD-10-ALKALINITY VARYING ISUB FROM 1 BY 1
010750      UNTIL ISUB IS GREATER THAN 3.
010760      MOVE PH-10 OF CARD-10-INPUT TO PH-10 OF CARD-10-DATA
010770      (CARD-10-NUM).
010780      MOVE CO2 OF CARD-10-INPUT TO CO2 OF CARD-10-DATA
010790      (CARD-10-NUM).
010800      MOVE HARDNESS OF CARD-10-INPUT TO HARDNESS OF
010810      CARD-10-DATA(CARD-10-NUM).
010820      MOVE CONDUCTIVITY OF CARD-10-INPUT TO CONDUCTIVITY OF
010830      CARD-10-DATA(CARD-10-NUM).
010840      PERFORM MOVE-SPC-CARD-10 VARYING ISUB FROM 1 BY 1 UNTIL
010850      ISUB IS GREATER THAN 2.
010860      MOVE CHLORIDE-ION OF CARD-10-INPUT TO CHLORIDE-ION OF
010870      CARD-10-DATA(CARD-10-NUM).
010880      PERFORM MOVE-NITROGEN-10 VARYING ISUB FROM 1 BY 1 UNTIL
010890      ISUB IS GREATER THAN 4.
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010900      MOVE DATE-10 OF CARD-10-INPUT TC DATE-10 OF CARD-10-DATA
010910      (CARD-10-NUM).
010920 MOVE-CARD-10-ALKALINITY.
010930      MOVE ALKALINITY-DATA OF CARD-10-INPUT(ISUB) TO
010940      ALKALINITY-DATA OF TAPEOUT-REC(CARD-10-NUM, ISUB).
010950 MOVE-SPC-CARD-10.
010960      MOVE SOLIDS-DATA OF CARD-10-INPUT(ISUB) TO
010970      SOLIDS-DATA OF TAPEOUT-REC(CARD-10-NUM, ISUB).
010980      MOVE PHOS-DATA OF CARD-10-INPUT(ISUB) TO PHOS-DATA OF
010990      TAPEOUT-REC(CARD-10-NUM, ISUB).
011000      MOVE CHLOROPHYLL-DATA CF CARD-10-INPUT(ISUB) TC
011010      CHLOROPHYLL-DATA CF TAPEOUT-REC(CARD-10-NUM, ISUB).
011020 MOVE-NITROGEN-10.
011030      MOVE NITROGEN-DATA OF CARD-10-INPUT(ISUB) TO
011040      NITROGEN-DATA OF TAPEOUT-REC(CARD-10-NUM, ISUB).
011050 MOVE-CARD-11.
011060      MOVE SOURCE-11 OF CARD-11-INPUT TO SOURCE-11 OF
011070      CARD-11-DATA(CARD-11-NUM).
011080      PERFORM MOVE-RIVER-11 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
011090      IS GREATER THAN 2.
011100      MOVE DATE-11 OF CARD-11-INPUT TO DATE-11 OF CARD-11-DATA
011110      (CARD-11-NUM).
011120      MOVE COVERAGE-1 OF CARD-11-INPUT TO COVERAGE-1 OF
011130      CARD-11-DATA(CARD-11-NUM).
011140      PERFORM MOVE-STAND-SUBMERG-11 VARYING ISUB FRCM 1 BY 1
011150      UNTIL ISUB IS GREATER THAN 5.
011160      MOVE COVERAGE-2 OF CARD-11-INPUT TO COVERAGE-2 OF
011170      CARD-11-DATA(CARD-11-NUM).
011180      MOVE GROWTH-11 OF CARD-11-INPUT TC GROWTH-11 OF
011190      CARD-11-DATA(CARD-11-NUM).
011200      MOVE OTHER-LIFE OF CARD-11-INPUT TO OTHER-LIFE OF
011210      CARD-11-DATA(CARD-11-NUM).
011220 MOVE-RIVER-11.
011230      MOVE RIVER-11-DATA CF CARD-11-INPUT(ISUB) TO
011240      RIVER-11-DATA OF TAPEOUT-REC(CARD-11-NUM, ISUB).
011250 MOVE-STAND-SUBMERG-11.
011260      MOVE SPECIES1-11 OF CARD-11-INPUT(ISUB) TO SPECIES1-11
011270      OF TAPEOUT-REC(CARD-11-NUM, ISUB).
011280      MOVE ABUND1-11 OF CARD-11-INPUT(ISUB) TO ABUND1-11
011290      OF TAPEOUT-REC(CARD-11-NUM, ISUB).
011280      MOVE SPECIES2-11 OF CARD-11-INPUT(ISUB) TO
011290      SPECIES2-11 OF TAPEOUT-REC(CARD-11-NUM, ISUB).
011291      MOVE ABUND2-11 OF CARD-11-INPUT(ISUB) TO
011292      ABUND2-11 OF TAPEOUT-REC(CARD-11-NUM, ISUB).
011300 MOVE-CARD-12.
011310      PERFORM MOVE-SPECIES-12 VARYING ISUB FROM 1 BY 1 UNTIL
011320      ISUB IS GREATER THAN 18.
011330 MOVE-SPECIES-12.
011380      MOVE SPECIES1-12 OF CARD-12-INPUT(ISUB) TO SPECIES1-12
011390      OF TAPEOUT-REC(CARD-12-NUM, ISUB).
011391      MOVE ABUND1-12 OF CARD-12-INPUT(ISUB) TO ABUND1-12
011392      OF TAPEOUT-REC(CARD-12-NUM, ISUB).
011420 MOVE-CARD-13.
011430      PERFORM MOVE-SPECIES-13 VARYING ISUB FROM 1 BY 1 UNTIL
011440      ISUB IS GREATER THAN 5.
011450 MOVE-SPECIES-13.
011460      MOVE SPECIES-13 OF CARD-13-INPUT(ISUB) TO
011470      SPECIES-13 OF TAPEOUT-REC(CARD-13-NUM, ISUB).
011480      MOVE EVALUATION OF CARD-13-INPUT(ISUB) TO
011490      EVALUATION OF TAPEOUT-REC(CARD-13-NUM, ISUB).
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011491      PERFORM MOVE-LOCATION-13 VARYING JSUB FROM 1 BY 1 UNTIL
011492      JSUB IS GREATER THAN 3.
011493 MOVE-LOCATION-13.
011500      MOVE LOCATION-13 OF CARD-13-INPUT(ISUB, JSUB) TO
011510      LOCATION-13 OF TAPEOUT-REC(CARD-13-NUM, ISUB, JSUB).
011520 MOVE-CARD-14.
011530      MOVE DATE-14 OF CARD-14-INPUT TO DATE-14 OF CARD-14-DATA
011540      (CARD-14-NUM).
011550      PERFORM MOVE-STOCKING-14 VARYING ISUB FROM 1 BY 1 UNTIL
011560      ISUB IS GREATER THAN 4.
011570 MOVE-STOCKING-14.
011573      MOVE SOURCE-14 OF CARD-14-INPUT TO SOURCE-14 OF
011574      CARD-14-DATA(CARD-14-NUM).
011580      MOVE SPECIES-14 OF CARD-14-INPUT(ISUB) TO
011590      SPECIES-14 OF TAPEOUT-REC(CARD-14-NUM, ISUB).
011591      MOVE NUMBER-14 OF CARD-14-INPUT(ISUB) TO
011592      NUMBER-14 OF TAPEOUT-REC(CARD-14-NUM, ISUB).
011593      MOVE SIZE-14 OF CARD-14-INPUT(ISUB) TO
011594      SIZE-14 OF TAPEOUT-REC(CARD-14-NUM, ISUB).
011640 MOVE-CARD-15.
011650      MOVE METHOD OF CARD-15-INPUT TO METHOD OF CARD-15-DATA
011660      (CARD-15-NUM).
011670      MOVE HAULS OF CARD-15-INPUT TO HAULS OF CARD-15-DATA
011680      (CARD-15-NUM).
011690      PERFORM MOVE-COMMERCIAL-15 VARYING ISUB FROM 1 BY 1 UNTIL
011700      ISUB IS GREATER THAN 6.
011710 MOVE-COMMERCIAL-15.
011720      MOVE SPECIES-15 OF CARD-15-INPUT(ISUB) TO
011730      SPECIES-15 OF TAPEOUT-REC(CARD-15-NUM, ISUB).
011731      MOVE WEIGHT-15 OF CARD-15-INPUT(ISUB) TO
011732      WEIGHT-15 OF TAPEOUT-REC(CARD-15-NUM, ISUB).
011733      MOVE YEAR-15 OF CARD-15-INPUT TO
011734      YEAR-15 OF TAPEOUT-REC(CARD-15-NUM).
011780 MOVE-CARD-16.
011790      PERFORM MOVE-COMM-16 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
011800      IS GREATER THAN 2.
011850      PERFORM MOVE-GAME1-16 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
011860      IS GREATER THAN 5.
011870      PERFORM MOVE-GAME2-16 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
011880      IS GREATER THAN 2.
011890      MOVE YEAR-16 OF CARD-16-INPUT TO YEAR-16 OF CARD-16-DATA
011900      (CARD-16-NUM).
011902 MOVE-COMM-16.
011904      MOVE SPECIES1-16 OF CARD-16-INPUT(ISUB) TO
011906      SPECIES1-16 OF TAPEOUT-REC(CARD-16-NUM, ISUB).
011907      MOVE WEIGHT1-16 OF CARD-16-INPUT(ISUB) TO
011908      WEIGHT1-16 OF TAPEOUT-REC(CARD-16-NUM, ISUB).
011910 MOVE-GAME1-16.
011920      MOVE SPECIES2-16 OF CARD-16-INPUT(ISUB) TO
011930      SPECIES2-16 OF TAPEOUT-REC(CARD-16-NUM, ISUB).
011940      MOVE NUMBER2-16 OF CARD-16-INPUT(ISUB) TO
011950      NUMBER2-16 OF TAPEOUT-REC(CARD-16-NUM, ISUB).
011960 MOVE-GAME2-16.
011970      MOVE SPECIES3-16 OF CARD-16-INPUT(ISUB) TO
011980      SPECIES3-16 OF TAPEOUT-REC(CARD-16-NUM, ISUB).
011990      MOVE NUMBER3-16 OF CARD-16-INPUT(ISUB) TO
012000      NUMBER3-16 OF TAPEOUT-REC(CARD-16-NUM, ISUB).
012010 MOVE-CARD-18.
012020      PERFORM MOVE-DATA-18 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012030      IS GREATER THAN 6.
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012040 MOVE-DATA-18.
012050     MOVE SPECIES-18 OF CARD-18-INPUT(ISUB) TO
012060     SPECIES-18 OF TAPEOUT-REC(CARD-18-NUM, ISUB).
012070     MOVE NUMBER-18 OF CARD-18-INPUT(ISUB) TO
012080     NUMBER-18 OF TAPEOUT-REC(CARD-18-NUM, ISUB).
012090 MOVE-CARD-24.
012100     MOVE SPECIES-24 OF CARD-24-INPUT TO SPECIES-24 OF
012110     CARD-24-DATA(CARD-24-NUM).
012120     MOVE SIZE-24 OF CARD-24-INPUT TO SIZE-24 OF CARD-24-DATA
012130     (CARD-24-NUM).
012140     MOVE SAMPLE-24 OF CARD-24-INPUT TO SAMPLE-24 OF CARD-24-DATA
012150     (CARD-24-NUM).
012160     PERFORM MOVE-AGE-GROUP-24 VARYING ISUB FROM 1 BY 1 UNTIL
012170     ISUB IS GREATER THAN 9.
012180 MOVE-AGE-GROUP-24.
012190     MOVE AGE-GROUP-24-DATA OF CARD-24-INPUT(ISUB) TO
012200     AGE-GROUP-24-DATA OF TAPEOUT-REC(CARD-24-NUM, ISUB).
012210 MOVE-CARD-26.
012220     MOVE DATE-26 OF CARD-26-INPUT TO DATE-26 OF CARD-26-DATA
012230     (CARD-26-NUM).
012240     MOVE DATA-26 OF CARD-26-INPUT TO DATA-26 OF CARD-26-DATA
012250     (CARD-26-NUM).
012260     PERFORM MOVE-SPECIES-26 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012270     IS GREATER THAN 4.
012280 MOVE-SPECIES-26.
012290     MOVE SPECIES-26-DATA OF CARD-26-INPUT(ISUB) TO
012300     SPECIES-26-DATA OF TAPEOUT-REC(CARD-26-NUM, ISUB).
012310 MOVE-CARD-28.
012320     PERFORM MOVE-DATA-28 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012330     IS GREATER THAN 8.
012340 MOVE-DATA-28.
012350     MOVE SPECIES-28 OF CARD-28-INPUT(ISUB) TO
012360     SPECIES-28 OF TAPEOUT-REC(CARD-28-NUM, ISUB).
012370     MOVE CATCH-HR-28 OF CARD-28-INPUT(ISUB) TO
012380     CATCH-HR-28 OF TAPEOUT-REC(CARD-28-NUM, ISUB).
012390     MOVE WT-HR-28 OF CARD-28-INPUT(ISUB) TO
012400     WT-HR-28 OF TAPEOUT-REC(CARD-28-NUM, ISUB).
012410 MOVE-CARD-29.
012420     MOVE SOURCE-29 OF CARD-29-INPUT TO SOURCE-29 OF CARD-29-DATA
012430     (CARD-29-NUM).
012440     MOVE DATE-29 OF CARD-29-INPUT TO DATE-29 OF CARD-29-DATA
012450     (CARD-29-NUM).
012460     MOVE HOURS-29 OF CARD-29-INPUT TO HOURS-29 OF CARD-29-DATA
012470     (CARD-29-NUM).
012480     PERFORM MOVE-ACTIVS-29 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012490     IS GREATER THAN 11.
012500 MOVE-ACTIVS-29.
012510     MOVE ACTIVS-29-DATA OF CARD-29-INPUT(ISUB) TO
012520     ACTIVS-29-DATA OF TAPEOUT-REC(CARD-29-NUM, ISUB).
012530 MOVE-CARD-31.
012540     PERFORM MOVE-DATA-31 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012550     IS GREATER THAN 2.
012560 MOVE-DATA-31.
012570     MOVE REC-31 OF CARD-31-INPUT(ISUB) TO
012580     REC-31 OF TAPEOUT-REC(CARD-31-NUM, ISUB).
012590     MOVE SPECIES1-31 OF CARD-31-INPUT(ISUB) TO
012600     SPECIES1-31 OF TAPEOUT-REC(CARD-31-NUM, ISUB).
012610     MOVE SPECIES2-31 OF CARD-31-INPUT(ISUB) TO
012620     SPECIES2-31 OF TAPEOUT-REC(CARD-31-NUM, ISUB).
012630     MOVE BENEFIT-31 OF CARD-31-INPUT(ISUB) TO
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012640     BENEFIT-31 OF TAPEOUT-REC(CARD-31-NUM, ISUB).
012650     MOVE YEAR-COMPLETE OF CARD-31-INPUT(ISUB) TO
012660     YEAR-COMPLETE OF TAPEOUT-REC(CARD-31-NUM, ISUB).
012670     MOVE COST-31 OF CARD-31-INPUT(ISUB) TO
012680     COST-31 OF TAPEOUT-REC(CARD-31-NUM, ISUB).
012690 MOVE-CARD-32.
012700     PERFORM MOVE-DATA-32 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012710     IS GREATER THAN 2.
012720     MOVE YEAR-32 OF CARD-32-INPUT TO YEAR-32 OF CARD-32-DATA
012730     (CARD-32-NUM).
012740 MOVE-DATA-32.
012750     MOVE LOCATION-32 OF CARD-32-INPUT(ISUB) TO
012760     LOCATION-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012790     MOVE REC-32 OF CARD-32-INPUT(ISUB) TO
012800     REC-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012810     MOVE BENEFIT-32 OF CARD-32-INPUT(ISUB) TO
012820     BENEFIT-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012830     MOVE COST-32 OF CARD-32-INPUT(ISUB) TO
012840     COST-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012860     MOVE REC2-32 OF CARD-32-INPUT(ISUB) TO
012870     REC2-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012880     MOVE BENEFIT2-32 OF CARD-32-INPUT(ISUB) TO
012890     BENEFIT2-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012900     MOVE COST2-32 OF CARD-32-INPUT(ISUB) TO
012910     COST2-32 OF TAPEOUT-REC(CARD-32-NUM, ISUB).
012850 NO-MORE-DATA.
012860     CLOSE TEMP-FILE.
012870     STOP RUN.
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