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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DESIGN AND EVALUATION OF A FISHERIES INFORMATION STORAGE
AND RETRIEVAL SYSTEM (FISARS) FOR THE STATE OF 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

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 PISARS 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.
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
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 organized according to the VSAM access method as was BIRFISH. 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 usefulness 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 accurately 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.
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 I 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 improvements 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 Parameters

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 BIRPFISH 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 mega-bytes 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.

<table>
<thead>
<tr>
<th></th>
<th>Pierre</th>
<th>Brookings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GIVEFISH - Creating</strong> (1000 records or 10,000,000 bytes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transferral of data</td>
<td>$5187.00</td>
<td></td>
</tr>
<tr>
<td>Keypunching and verifying</td>
<td>$1591.00</td>
<td></td>
</tr>
<tr>
<td>Building VSAM file</td>
<td>$100.00</td>
<td></td>
</tr>
<tr>
<td><strong>GIVEFISH - Operation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-line</td>
<td>$646.00/yr</td>
<td>$1200.00/yr</td>
</tr>
<tr>
<td>Off-line</td>
<td>$360.00/yr*</td>
<td>$600.00/yr*</td>
</tr>
<tr>
<td>CPU Minute</td>
<td>$13-$17/min</td>
<td>$7.00/min</td>
</tr>
<tr>
<td>Updating</td>
<td>$100.00/yr</td>
<td>$100.00/yr</td>
</tr>
<tr>
<td><strong>BIBFISH - Creating</strong> (5000 records or 5,000,000 bytes)</td>
<td>No estimate</td>
<td></td>
</tr>
<tr>
<td>Transferral of data</td>
<td>No estimate</td>
<td></td>
</tr>
<tr>
<td>Keypunching and verifying</td>
<td>No estimate</td>
<td></td>
</tr>
<tr>
<td>Building VSAM file</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td><strong>BIBFISH - Operation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-line</td>
<td>$325.00/yr</td>
<td>$603.00/yr</td>
</tr>
<tr>
<td>Updating</td>
<td>$25.00/yr</td>
<td>$25.00/yr</td>
</tr>
</tbody>
</table>

*Includes cost for BIBFISH and GIVEFISH
Cost of Building the BIFISH Data Base

The cost of recording the BIFISH 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 database. It would probably be much less than the cost of recording data for the GIVEFISH database (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 database, 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 $5127.00 minus the $622.94 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 database 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, therefore 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 contributed 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 25 cm (8 1/4 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 allocated 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 occurring 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 Known 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 distinguish between total catchage 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 year's 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 manipulation 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 BIBFISH 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 PISARS 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.
LITERATURE CITED


APPENDIX A

BIBFISH Programs
IDENTIFICATION DIVISION.
PROGRAM-ID. BIBLIOGRAPHY-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 CARO-FILE ASSIGN TO UR-2540R-S-CARDIN.
SELECT TAPE-FILE ASSIGN TO UR-2400-S-TAPE01.
SELECT NTAP-FILE ASSIGN TO UR-2400-S-TAPE02.
SELECT NEWTAP ASSIGN TO UR-2400-S-TAPE03.

DATA DIVISION.
FILE SECTION.
FD NEWTAP.
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 CARO-FILE.
LABEL RECORDS ARE OMITTED, RECORDING MODE F, DATA RECORDS
IS CARO-REC.
01 CARO-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-REC.
01 TAPE-REC PIC X(80).
WORKING-STORAGE SECTION.
77 INCRD PIC 999.
77 BLANK-COUNTER PIC 9(9999) VALUE IS 1.

* FORMAT OF THE RECORD
******
01 TAPE-REC.
04 BIB-CODE PIC 9(5).
04 SUB-CODE.
05 SUB-CODE OCCURS 10 TIMES PIC X(5).
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 NEW TAPE.
READ-3. READ NTAP-FILE INTO TAPE-REC AT END GO TO EQJ.
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 CARO-FILE, NTAP-FILE, NEWTAPE.
STOP RUN.

//GO.SYSOBOUT OD SYSOUT=A
//GO.TAPEO1 OD UNIT=TAPE,DISP=(NEW, PASS),
  // DCB=(RECFM=FB,LRECL=80,BLKSIZE=560),
  // OSNAME=&TAPEO1,
  // LABEL=1,NL, VOL=SER=MOE
//GO.TAPEO2 OD UNIT=TAPE,DISP=(OLD, PASS),
  // DCB=(RECFM=FB,LRECL=560,BLKSIZE=560),
  // OSNAME=&TAPEO1,
  // LABEL=1,NL, VOL=SER=MOE
//GO.TAPEO3 OD UNIT=TAPE,DISP=(OLD, PASS),
  // DCB=(RECFM=FB,LRECL=560,BLKSIZE=560),
  // OSNAME=&TAPEO1,
  // LABEL=1,NL, VOL=SER=MOE
//GO.PRINT OD SYSOUT=A
//GO.CARDIN OD *
// EXEC PGM=IOCAM5
//SYSPRINT ON 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 01) -
   UNIQUE) -
DATA INAME(VSAM.DATA.FISH) -
   RECORDS(5000) -
   INDEX(INAME(VSAM.INDEX.FISH))
// EXEC PGM=IOCAM5
//SYSPRINT ON SYSOUT=A
//XCRTCH DD VOL=SER=XCRTCH,UNIT=3340,DISP=OLD
//VSAMOUT DD DSN=VSAM.CLUSTER.FISH,DISP=OLD
//NEWTAPEx DD UNIT=TAPE,DISP=OLD,
// DCB=(RECFM=FB,RECL=560,BLKSIZE=560),
// DSNAM=TAPE03,
// LABEL=(NL),VOL=SER=MOE
//SYSIN DD *
PEPROC INFILE(NEWTAPEx) -
   OUTFIL(VSAMOUT)
DEFINE ALTERNATE(INDEX -
   (NAME(VSAM.ACLUSTR.FISH1) -
   RELATE(VSAM.CLUSTER.FISH) -
   RECORDSIZE(35 510) -
   FILE(XCRTCH) -
   VOLUME(XCRTCH) -
   KEYS(5 5) -
   UNIQUE) -
DATA (NAME(VSAM.ADATA.FISH1) -
   RECORDS(5000) -
   INDEX(INAME(VSAM.AINDEX.FISH1))
DEFINE PATH -
   (NAME(VSAM.PATH.FISH1) -
   PATHENTRY(VSAM.ACLUSTER.FISH1))
DEFINE ALTERNATE(INDEX -
   (NAME(VSAM.ACLUSTR.FISH2) -
   RELATE(VSAM.CLUSTER.FISH) -
   MODEL(VSAM.ACLUSTR.FISH) -
   FILE(XCRTCH) -
   KEYS(5 101) -
   DATA (NAME(VSAM.ADATA.FISH2) -
   INDEX(INAME(VSAM.AINDEX.FISH2))
DEFINE PATH -
   (NAME(VSAM.PATH.FISH2) -
   PATHENTRY(VSAM.ACLUSTER.FISH2))
DEFINE ALTERNATE(INDEX -
   (NAME(VSAM.ACLUSTR.FISH3) -
   RELATE(VSAM.CLUSTER.FISH) -
   MODEL(VSAM.ACLUSTR.FISH) -
   FILE(XCRTCH) -
   KEYS(5 101) -
   DATA (NAME(VSAM.ADATA.FISH3) -
   INDEX(INAME(VSAM.AINDEX.FISH3))
DEFINE PATH -
   (NAME(VSAM.PATH.FISH3) -
   PATHENTRY(VSAM.ACLUSTER.FISH3))
FILE(XCRTCH) -
KEYS(S 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,ACLUSTER,FISH) -
MODEL(VSAM,ACLUSTER,FISH1) -
FILE(XCRTCH) -
KEYS(S 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,ACLUSTER,FISH) -
MODEL(VSAM,ACLUSTER,FISH1) -
FILE(XCRTCH) -
KEYS(S 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,ACLUSTER,FISH) -
MODEL(VSAM,ACLUSTER,FISH1) -
FILE(XCRTCH) -
KEYS(S 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,ACLUSTER,FISH) -
MODEL(VSAM,ACLUSTER,FISH1) -
FILE(XCRTCH) -
KEYS(S 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,ACLUSTER,FISH) -
MODEL(VSAM,ACLUSTER,FISH1) -
FILE(XCRTCH) -
KEYS(S 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) -
RELATIVE(VSAM.ACLUSTER,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) -
RELATIVE(VSAM.ACLUSTER,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=IODAMS
//SYSPRINT DD SYSOUT=A
//XCRTOCH DD VOLSER=XCRTCH,UNIT=3340,DISP=OLD
//VSMOUT 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 *
BLOINDEX -
INFILE(VSMOUT) -
OUTFILE(FISH1,FISH2,FISH3,FISH4,FISH5,FISH6,FISH7,FISH8,FISH9,FISH10) -
*/
IDENTIFICATION DIVISION.
PROGRAM-ID. BIBLIOGRAPHY-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-CODE-2 PIC 9(5).
   04 AU-THOR PIC X(50).
   04 YR PIC 9999.
04 FILLER PIC X(21).
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(11).
04 B-CODE-5 PIC 9(5).
04 TITLE-3 PIC X(74).
04 FILLER PIC X(11).
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).
FD CARRO-FILE
LABEL RECORDS ARE OMITTED, RECORDING MODE F, DATA RECORDS IS CARRO-REC.
01 CARRO-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-STOREAGE SECTION.
77 ERRAT PIC 99 VALUE ZERO.

******
* PRINTOUT FORMAT
******
01 PRINT-REP.
  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-REP-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-REP-3.
  04 FILLER PIC X(5) VALUE SPACES.
  04 TIT1-1 PIC X(74).
  04 FILLER PIC X(53) VALUE SPACES.
01 PRINT-REP-4.
  04 FILLER PIC X(5) VALUE SPACES.
PROCEDURE DIVISION.
OPEN INPUT FISH, CARD-FILE, OUTPUT PRINT-FILE.
IF ERRAT NOT = ZER0 DISPLAY 'ERROR 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 R01.
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 R01.
EOJ-2.
MOVE SUB-SEARCH TO B1B2.
START FISH KEY IS = B1B2
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 R02.
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 B1B2 NOT = SUB-SEARCH GO TO KEY-3 ELSE PERFORM WRITO.
GO TO R02.

EY-3.
MOVE SUB-SEARCH TO B1B3.
START FISH KEY IS = B1B3
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 R03.
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 B1B3 NOT = SUB-SEARCH GO TO KEY-4 ELSE PERFORM WRITO.
GO TO R03.

EY-4.
MOVE SUB-SEARCH TO B1B4.
START FISH KEY IS = B1B4
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 R04.
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 B1B4 NOT = SUB-SEARCH GO TO KEY-5 ELSE PERFORM WRITO.
GO TO R04.

EY-5.
MOVE SUB-SEARCH TO B1B5.
START FISH KEY IS = B1B5
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 R05.
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 B1B5 NOT = SUB-SEARCH GO TO KEY-6 ELSE PERFORM WRITO.
GO TO R05.

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 WRITE, GO TO KEY-7.
IF ERRAT = 02 PERFORM WRITE, 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 WRITE.
GO TO RD6.
KEY-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 WRITE, GO TO KEY-8.
IF ERRAT = 02 PERFORM WRITE, GO TO RD7.
IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT GO TO EOJ.
17. 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 WRITE.
GO TO RD7.
KEY-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 WRITE, GO TO KEY-9.
IF ERRAT = 02 PERFORM WRITE, GO TO RD8.
IF ERRAT GREATER THAN 02 DISPLAY 'UNSUCCESSFUL READ' ERRAT GO TO EOJ.
18. 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 WRITE.
GO TO RD8.
KEY-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 WRITE, GO TO KEY-10.
IF ERRAT = 02 PERFORM WRITE, 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 WRITE.
GO TO RD9.
KEY-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 WRITE, GO TO READ-CARD.
IF ERRAT = 02 PERFORM WRITE, GO TO RO10.
IF ERRAT GREATER THAN 02 DISPLAY *UNSUCCESSFUL READ* ERRAT
GO TO EOJ.
RO10. 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 RO10
ELSE PERFORM WRITE.
GO TO RO10.

********
* RECORD SEARCH
********
FIND-RECORD.
MOVE SUB-SEARCH TO SEARCH-2.
WRITE PRINT-AREA FROM HEAD-2 AFTER ADVANCING 5 LINES.
MOVE SUB-SEARCH TO B18-CODE.
READ FISH INVALID KEY GO TO READ-CARD.
PERFORM WRITE.
GO TO READ-CARD.

********
* RETRIEVAL PRINTOUT
********
WRITE.
MOVE B18-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-TOR 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.FISHBIB  DD  DSN=VSAM.CLUSTER.FISH,DISP=OLD
//GO.FISHBIB1 DD  DSN=VSAM.PATH.FISH1,DISP=OLD
//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=OLD
//GO.FISHBIB5 DD  DSN=VSAM.PATH.FISH5,DISP=OLD
//GO.FISHBIB6 DD  DSN=VSAM.PATH.FISH6,DISP=OLD
//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.FISHBIB10 DD  DSN=VSAM.PATH.FISH10,DISP=OLD
//GO.CARDIN DD *
/*
EXEC COBUCLG  
// COB.SYSIN OD  
IDENTIFICATION DIVISION.  
PROGRAM-ID. BIBLIOGRAPHY-1.  
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 CARO-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  
* INITIALIZING COUNTER FOR NUMBER OF RECORD ADDITIONS  
PROCEDURE DIVISION.  
OPENS.  
OPEN INPUT NEWWTAPE, I-O FISH.  
IF ERRAT NOT = 0 DISPLAY 'ERROR ON OPEN' ERRAT GO TO EDJ.  
READ-IN.  
READ NEWWTAPE, AT END GO TO EDJ.  
READ-DISK.  
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 WRITE'
  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 NEW TAPE, 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,RECL=560,BLKSIZE=560),
     //DSNAME=CTAPE03,
     //LABEL=(NL),VOL=SER=SHEP
   */
APPENDIX B

GIVEFISH Data Sheets
<table>
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<tr>
<th>LAKE CODE</th>
<th>SOURCE ID</th>
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**LEGAL CLASSIFICATION**

**FORM A**

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<th>NAME OF WATER</th>
<th>REGION</th>
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**RANGE/TWN/SECTION**

**Card 01**

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**Card 02**

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**Card 02**

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Lake___________  Co___________
### Description of General Water Characteristics

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<th><img src="image1" alt="" /></th>
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<tr>
<td><strong>Date of Map Fieldwork</strong></td>
<td><strong>Date of Map Fieldwork</strong></td>
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</tbody>
</table>

#### Dam Type and Location
- **Location**: [Location Description]
- **Date of Construction**: [Date]
- **Owner**: [Owner]
- **Spillway**: [Spillway Type]
- **Outlet Control**: [Outlet Control Type]
- **Surface Area and Depths**: [Surface Area and Depths]
- **Elevation**: [Elevation]
- **Average Depth**: [Average Depth]
- **Max Depth**: [Max Depth]
- **Litoral Depth**: [Litoral Depth]
- **Max Fluctuation**: [Max Fluctuation]
- **Annual Fluctuation**: [Annual Fluctuation]
- **Surface Area**: [Surface Area]
- **Surface Length**: [Surface Length]
- **Drainage (Drainage Area)**: [Drainage Area]

#### Water Quality
- **Water Temperature**: [Temperature]
- **Water Quality Indices**: [Indices]
- **Water Hardness**: [Hardness]
- **Water pH**: [pH]
- **Water Transparency**: [Transparency]
- **Water Color**: [Color]

#### Summary of Water Quality Assessments

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<tr>
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<th><img src="image5" alt="" /></th>
<th><img src="image6" alt="" /></th>
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</thead>
<tbody>
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<td><strong>Watershed Size</strong>: [Size]</td>
<td><strong>Watershed Size</strong>: [Size]</td>
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**Note**: The above table contains placeholder text and images. Actual data would replace these placeholders. The table structure is designed to capture various aspects of water quality assessment and management for a lakeshore ecosystem.
### GENERAL WATER DESCRIPTION FORM C

<table>
<thead>
<tr>
<th>LAKE CODE</th>
<th>SOURCE I.D.</th>
<th>UNITS</th>
</tr>
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<tbody>
<tr>
<td>1-4</td>
<td>5</td>
<td>6-9</td>
</tr>
<tr>
<td></td>
<td>10 11</td>
<td></td>
</tr>
</tbody>
</table>

#### RIVER CLASSIFICATION

<table>
<thead>
<tr>
<th>Length (km or mi)</th>
<th>Total Channelized (km or mi)</th>
<th>Mean Width (m or ft)</th>
<th>Mean Depth (m or ft)</th>
<th>Normal High (cms or cfs)</th>
<th>Mean Annual (cms or cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-29</td>
<td></td>
<td></td>
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<td></td>
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</tr>
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<td>30-32</td>
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<td>33-34</td>
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<td>25-37</td>
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<td>38-42</td>
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</tr>
<tr>
<td>43-47</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LAKE BOTTOM**

- **SHOAL WATER SOILS**
  - Ledge
  - Boulder
  - Rubble
  - Gravel
  - Sand
  - Silt
  - Clay
  - Muck
  - Other

- **LAKE BOTTOM**
  - 23 24
  - 25 26
  - 27 28
  - 29 30
  - 31 32
  - 33 34
  - 35 36
  - 37 39
  - 39 40

#### WATER RESOURCE USE AND DEVELOPMENT

**Fishing Water: Permanent and Semiperm.**

- Water Resource Use: Municipal 2: Recreational 3: Power 4: All
- 5 Industrial 6: Irrigation 7: Other
- Card

**Fishing Water: Marginal**

- Card

**GFP Water**

- Right No.
- Dwellings
- Islands

**WATERSHED DEVELOPMENT (%)**

<table>
<thead>
<tr>
<th>Woodland</th>
<th>Wetlands</th>
<th>Pasture</th>
<th>Crop</th>
<th>Fishnest</th>
<th>Ungrazed Natural</th>
<th>Municipal</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 21 22</td>
<td>23 24 25</td>
<td>26 27 28</td>
<td>29 30 31</td>
<td>32 33 34 35</td>
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</table>

**SHORELINE DEVELOPMENT (%)**

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<th>Cottages</th>
<th>Resorts</th>
<th>Municipal</th>
<th>Pasture</th>
<th>Crop</th>
<th>Feednest</th>
<th>Woodland</th>
<th>Ungrazed Natural</th>
<th>Other</th>
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<tbody>
<tr>
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<td>39 40 41</td>
<td>42 43 44</td>
<td>45 46 47</td>
<td>48 49 50 51</td>
<td>52 53 54</td>
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**INLETS AND OUTLETS**

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<td></td>
<td>Width</td>
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</table>

**Card**

- 79 80
### WATER CHEMISTRY FORM D

#### LAKE CODE SOURCE I.D.

1-4 5 6-9

---

**Station location**

---

**TURBIDITY AND COLOR**

- Secchi: [ ]
- Color (LT:Light, DK:Dark, RD:Red, OR:Orange, YL:Yellow, BL:Blue, GR:Green, BR:Brown, GR:Gray): [ ]
- Cause of color: [ ]

---

**TEMPERATURE AND DISSOLVED OXYGEN PROFILE**

<table>
<thead>
<tr>
<th>Depth (m or ft)</th>
<th>Temp (C or F)</th>
<th>Diss Oxy</th>
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<tbody>
<tr>
<td>29-32</td>
<td>33-34</td>
<td>39-37</td>
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<tr>
<td>38-47</td>
<td>42-43</td>
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<td>47-50</td>
<td>51-52</td>
<td>53-55</td>
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<tr>
<td>56-59</td>
<td>60-61</td>
<td>62-64</td>
</tr>
<tr>
<td>65-66</td>
<td>69-70</td>
<td>71-73</td>
</tr>
</tbody>
</table>

**Limit of thermocline**

---

**WATER QUALITY**

**Field analysis**

- Total Alkalinity: 13-15
- PTHH Alkalinity: 16-18
- MO Alkalinity: 19-21
- pH: 22-24
- CO2: 25-26
- Total Hardness: 27-30
- Conductivity: 31-34

<table>
<thead>
<tr>
<th>TS Solids</th>
<th>TD Solids</th>
<th>Ortho Phos</th>
<th>Total Phos</th>
<th>Chlorophyll A (mg/m^3)</th>
<th>B</th>
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</thead>
<tbody>
<tr>
<td>35-38</td>
<td>39-42</td>
<td>43-45</td>
<td>45-46</td>
<td>49-51</td>
<td>52-54</td>
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</tbody>
</table>

**Lab analysis**

- Chloride Ion: 55-58
- Ammonia-Nitrogen: 59-62
- Nitrate Nitrogen: 63-66
- Organic N (Kjeld): 67-70
- Total Nitrogen: 71-74

**Lake Code**

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<table>
<thead>
<tr>
<th>LAKE CODE</th>
<th>SOURCE ID</th>
<th>D C</th>
<th>ORGANISM ABUNDANCE AND SPAWNING HABITAT FORM E</th>
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<th>DATE</th>
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<tbody>
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<td></td>
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<td>STANDING EMERGENTS</td>
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<tr>
<td>% Coverage</td>
<td></td>
<td></td>
<td>Depth of Growth (cm or ft)</td>
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<td>23-24</td>
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<td></td>
<td></td>
<td>SUBMERGED OR FLOATING LEAF</td>
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<tr>
<td>45-46</td>
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<td>FLOWING PLANTS AND PHYTOPLANKTON</td>
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<td>FISH SPECIES KNOWN TO OCCUR</td>
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<td>Abundance *</td>
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<tr>
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<td></td>
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<td>1: Excellent</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2: Good</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3: Fair</td>
<td></td>
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<td>5: None</td>
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<td>EVALUATION OF SPAWNING AREA</td>
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<td></td>
<td></td>
<td></td>
<td>Card</td>
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</tr>
</tbody>
</table>

*Abundance: 1: Rare, 2: Occasional, 3: Common, 4: Abundant, 5: Endangered*
### Fish Stocking and Removal Form F

#### Stocking

<table>
<thead>
<tr>
<th>Size</th>
<th>No.</th>
<th>Size</th>
<th>No.</th>
<th>Size</th>
<th>No.</th>
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<td>40-42</td>
<td>43-49</td>
<td>50</td>
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<tr>
<td>51-53</td>
<td>54-60</td>
<td>61</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Commercial Fishing

**Methods**

1. **Pocket Net**
2. **Hood Net**
3. **Open Seine**
4. **U-Shaped Net**
5. ** Gillnet**
6. **Trap**
7. **Weir**

#### Commercial Species

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<tbody>
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<td>54-57</td>
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<tr>
<td>40-42</td>
<td>43-49</td>
<td>50</td>
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<td>51-53</td>
<td>54-60</td>
<td>61</td>
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#### Game Species

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<td>54-60</td>
<td>61</td>
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Lake Source Code: 1-4 5 6-9

Date: Card 1-4 79-80

Lake Source Code: _______ Co _________
### Natural Reproduction Summary Form G

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<th>SOURCE I.D.</th>
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</tbody>
</table>

#### Table A: Seine Measurement

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<tr>
<th>TOTAL PULLS</th>
<th>METHOD</th>
<th>TIME DURATION</th>
<th>SEINE MEASUREMENT</th>
<th>TOTAL DISTANCE</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>Tr•wl</td>
<td>hr min</td>
<td>m or ft</td>
<td>m or ft</td>
<td>m or ft</td>
</tr>
<tr>
<td>20</td>
<td>Seine</td>
<td>min</td>
<td>ft or in</td>
<td>ft or in</td>
<td>ft or in</td>
</tr>
</tbody>
</table>

#### Table B: Total No./Area

<table>
<thead>
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<th>SPECIES NUMBER</th>
<th>NO./AREA</th>
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<tr>
<td>5-7</td>
<td>8-13</td>
</tr>
<tr>
<td>14-16</td>
<td>17-19</td>
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<td>56-61</td>
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<td>62-64</td>
<td>65-67</td>
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<tr>
<td>68-73</td>
<td>74-76</td>
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</tbody>
</table>

#### Table C: Card Numbers

- CARD 18
- CARD 18
- CARD 18
- CARD 18

**Lake: __________________**  **Co: _________**
## Netting Summary Sheet Form H

### Lake Code

<table>
<thead>
<tr>
<th>Lake Code</th>
<th>Source ID</th>
<th>Sets of Pulls</th>
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<tbody>
<tr>
<td>1-4</td>
<td>5</td>
<td>5-9</td>
</tr>
</tbody>
</table>

### Method

- 1: seine
- 2: trawl
- 3: Gillnet
- 4: hoopnet
- 5: trammel net
- 6: trapping
- 7: electric stunning

### Mesh Size

<table>
<thead>
<tr>
<th>Mesh Size</th>
<th>Dimension (cm or ft)</th>
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</table>

### Time Duration

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<td>Days:Hours:Min</td>
<td>0:30</td>
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### STD Error

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<th>Card</th>
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<tbody>
<tr>
<td>20</td>
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</tr>
</tbody>
</table>

### Total Catch

- Number
- Weight (kg or lbs)
- % of Total

### Mean Size

- CM or in
- Weight (kg or lbs)

### Mean Catch / NFT

- Weight (kg or lbs)

### STD Error

<table>
<thead>
<tr>
<th>STD Error</th>
<th>Card</th>
</tr>
</thead>
<tbody>
<tr>
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Lake: ________  Co: ________
### LENGTH FREQUENCY FORM I

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<th>SOURCE</th>
<th>ID</th>
<th>SETS OR PULL</th>
<th>Methods</th>
<th>MESH SIZE</th>
<th>DIMENSION</th>
<th>TIME DURATION</th>
<th>HA OR AC</th>
<th>ID</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1: Seine</td>
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<td>2: Trawl</td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>3: Gillnet</td>
<td></td>
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</tr>
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<td></td>
<td>4: Halibut</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>5: Tramp</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6: Babytrap</td>
<td></td>
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#### DISTRIBUTION

<table>
<thead>
<tr>
<th>LENGTH FREQUENCY CODE AND NUMBER PER INTERVAL</th>
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<td>Species</td>
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</tr>
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<td>7</td>
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<table>
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<th>1/2&quot;</th>
<th>INCR</th>
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Lake Co. _____
# AGE AND GROWTH DISTRIBUTION

**FORM J**

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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

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 Klousek
1205 W. Bucholy
1206 M. Bucholy
1207 Ehresward
1208 Schafer

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

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

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

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 Austin
1315 Norse
1316 Willow

Buffalo
1401 Bedashosha
1402 Cook
1403 Ingerson

Butte
1501 Orman
1502 Newell
1503 Newell City Dam
1504 Belle Fourche TWLA

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, D.
2009 McIntosh, W.
2010 Tatanka
2011 Spring
2012 Deuel
2013 Bohle

Day Cont.
2201 Amsden
2202 Pickeral
2203 Deuel
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 Dug eagle
2219 Hazleton
2220 Anderson
2221 Nutley
2222 Nutley, E.
2223 Stink

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

Day
2201 Amsden
2202 Pickeral
2203 Deuel
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 Cotteau, S.
2219 Coots
2220 Anderson
2221 Nutley
2222 Nutley, E.
2223 Stink

Davison
0801 Mitchell

Day
2201 Amsden
2202 Pickeral
2203 Deuel
2204 Minnewasta
2205 Blue Dog
2206 Enemy Swim
2207 Antelope
2208 Horseshoe
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2215 Campbell Slough
2216 Bitter
2217 Hillda Brands
2218 Cotteau, S.
2219 Coots
2220 Anderson
2221 Nutley
2222 Nutley, E.
2223 Stink

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 Parley (Kids POND)
2904 Labolt
2905 Crooked (Tray)
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 Kroetchc
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

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 Arlington
4212 Thomson
4213 Preston
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6502 White Clay
6503 Kyle
6504 Derby
6505 Wolf Creek
6506 Big Alkali
6507 Pine Ridge

Todd
6601 Boarding School
6602 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

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 Mindt
5906 Post
5907 Stone
5908 Walker
5909 Fisher
5910 Troy

Turner
6101 Swan
6102 Mud
6103 Marion

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

Walworth
6301 Hiddenwood
6302 Spring
6303 Molsstad
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
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  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. Ichthyomyzon unicuspis - silver lamprey

Acipenseridae
2. Saaphirhynchus platorynchus - pallid sturgeon
3. S. albus - shovelnose sturgeon
4. 

Polyodontidae
5. Polyodon spathula - paddlefish

Lepisosteidae
6. Lepisosteus platostomus - shortnose gar
7. L. osseus - longnose gar

Amiidae
8. Amia calva - bowfin

Anguillidae
9. Anguilla rostrata - American eel

Clupeidae
10. Alosa chrysochloris - skipjack herring
11. Dorosoma cepedianum - grizzard shad
12. 
13. 

Hiodontidae
14. Hiodon alosoides - goldeye
15. H. tergisus - mooneye

Salmonidae
16. Salmo trutta - brown trout
17. S. gairdnerii - rainbow trout
18. Salvelinus fontinalis - brook trout
19. S. namycush - lake trout
20. Oncorhynchus nerka - kokanee
21. O. kisutch - coho salmon
22. Prosopium gemmiferum - Bonneville cisco
23. Coregonus clupeaformis - Lake whitefish
24. 
25. 
26. 
27. 
28. 

Osmeridae
29. Osmerus mordax - rainbow smelt

Umbriidae
30. Umbra limi - central mudminnow

Esocidae
31. Esox lucius - northern pike
32. Esox masquinongy - muskie
33. 
34. 
Cyprinidae

35. Ctenopharyngodon idella - grass carp
36. *Cyprinus carpio* - carp
37. *Carassius auratus* - goldfish
38. *Notemigonus crysoleucas* - golden shiner
39. *S. atromaculatus* - creekchub
41. *Phoxinus eos* - northern redbelly dace
42. *P. ncogaeus* - finescale dace
43. *Couesius plumeus* - lake chub
44. *Hybopsis gracilis* - flathead chub
46. *H. storeriana* - silver chub
47. *H. meeki* - sicklefin chub
48. *Noemis 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. *C. carpio* - river carpsucker
81. *Hypentelium nigricans* - northern hog sucker
Castostomidae Cont.

83. Morostoma erythrum - golden redhorse
84. M. Macrolepidotum - shorthead redhorse
85. Catostomus commersoni - white sucker
86. C. catostomus - longnose sucker
87. C. platyrhunchus - mountain sucker
88. Buffalo
89. 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.

Percopsis omiscomaycus - trout-perch

Gadidae

103. Lota lota - burbot

Cyprinodontidae

104. Fundulus diaphanus - banded killifish
105. F. kansae - plains killifish
106. F. sciadicus - plains topminnow
107.

Gasterosteidae

108. Culaea inconstans - brook stickleback

Percichthyidae

109. Morone chrysops - white bass
110.
111.

Centrarchidae

112. Micropterus dolomieu - smallmouth bass
113. M. salmoides - largemouth bass
114. Lepomis cyanellus - green sunfish
115. L. gibbosus - pumpkinseed
116. L. macrochirus - bluegill
117. L. humilis - orangespotted 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. Carox Sedge
10. Cyperus Nut sedge
11. Eleocharis Spike rush
12. Scirpus Roundstem bullrush
13. Scirpus Bullrush

Family Juncaceae
14. Juncus Rush

Family Lemnaceae
15. Lemma Duckweed

Family Araceae
16. Acorus Sweetflag

Family Hydrocharitaceae
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 Ceratophyllaceae
26. Ceratophyllum Coontail
Family Compositae
27. Bidens  Beggers lice

Family Haloragidaceae
28. Myriophyllum  Water millfoil

Family Nymphaeae
29. Nuphar  Yellow water lily
30. Nymphaea  White water lily

Family Polygonaceae
31. Polygonum  Smartweed

Family Ranunculaceae
32. Ranunculus  Crowfoot

Family Cruciferae
33. Nasturtium  Water cress
APPENDIX G

Management And Access 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. Menage for waterfowl

### SHORE MANAGEMENT

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

1. Acquire 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
28. Toilets - Primitive
29. Weed control
30. Well
APPENDIX H

GIVEFISH Build Program
IDENTIFICATION DIVISION.
PROGRAM-IC: GIVEFISH BUILD PROGRAM.
REMARKS: GIVEFISH BUILDS GIVEFISH DATA BASE.
AUTHOR: WARREN HOWLAND.
ENVIRONMENT DIVISION.
CONFIGURATION SECTION.
SOURCE-COMPUTER: IBM-370.
OBJECT-COMPUTER: IBM-370.
INPUT-OUTPUT SECTION.
FILE-CONTROL.
SELECT TAPEIN-FILE ASSIGN TO OA-2314-S-TAPEIN.
SELECT TAPEOUT-FILE ASSIGN TO OA-2314-S-TAPEOUT.
SELECT TEMP-FILE ASSIGN TO OA-2314-S-TEMP.
SELECT SORT-FILE ASSIGN TO OA-2314-S-SORTTEMP.
DATA DIVISION.
FILE SECTION.
FD TAPEIN-FILE.
RECORDING MODE F, RECORD CONTAINS 80 CHARACTERS.
LABEL RECORDS ARE OMITTED, DATA RECORD IS TAPEIN-REC.
TAPEIN-REC.
C2 LAKE-CODE-IN PIC X(4).
C2 CARD-INFO-IN PIC X(74).
C2 CARD-CODE-IN PIC X(2).
SORT-FILE.
DATA RECORD IS SORT-REC.
SORT-REC.
C2 SORT-LAKE-CODE PIC X(4).
C2 SORT-CARD-INFO PIC X(74).
C2 SORT-CARD-CODE PIC X(2).
TAPEOUT-FILE.
RECORDING MODE F, LABEL RECORDS ARE OMITTED.
RECORD CONTAINS 9292 CHARACTERS, BLOCK CONTAINS 1 RECORDS.
DATA RECORD IS TAPEOUT-RECORD.
TAPEOUT-RECORD.
PIC X(9292).
TEMP-FILE.
RECORDING MODE F, LABEL RECORDS ARE OMITTED.
RECORD CONTAINS 80 CHARACTERS, BLOCK CONTAINS 10 RECORDS.
DATA RECORDS ARE CARD-1-INPUT, CARD-2-INPUT, CARD-3-INPUT,
CARD-4-INPUT, CARD-5-INPUT, CARD-6-INPUT, CARD-7-INPUT,
CARD-8-INPUT, CARD-9-INPUT, CARD-10-INPUT, CARD-11-INPUT,
CARD-12-INPUT, CARD-13-INPUT, CARD-14-INPUT, CARD-15-INPUT,
CARD-16-INPUT, CARD-17-INPUT, CARD-18-INPUT, CARD-19-INPUT,
CARD-20-INPUT, CARD-21-INPUT, CARD-22-INPUT, CARD-23-INPUT,
CARD-24-INPUT, CARD-25-INPUT, CARD-26-INPUT, CARD-27-INPUT,
CARD-28-INPUT, CARD-29-INPUT, CARD-30-INPUT, CARD-31-INPUT,
CARD-32-INPUT, CARD-33-INPUT, CARD-34-INPUT, CARD-35-INPUT,
TEMP-REC.
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C2 FILLER PIC X(174).
C2 CARD-1-INPUT.
C2 LAKE-CODE PIC 9(5).
C2 SOURCE-1 PIC 9(5).
C2 DATE-1 PIC X(16).
C2 DATA-1 PIC X(22).
C2 FILLER PIC X(46).
C2 CARD-NUMBER PIC 99.
C2 CARD-2-INPUT.
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007450 CAR0-8, CAR0-9, CAR0-10, CAR0-11, CAR0-12, CAR0-13, CAR0-14,
007460 CAR0-15, CAR0-16, CAR0-17, CAR0-18, CAR0-19, CAR0-20, CAR0-21,
007470 CAR0-22, CAR0-23, CAR0-24, CAR0-25, CAR0-26, CAR0-27, CAR0-28,
007480 CAR0-29, CAR0-30, CAR0-31, CAR0-32, CAR0-33, CAR0-34, CAR0-35,
007490 DEPENDING ON TEMP-CARD-CODE.
007500 DISPLAY *BAD RECORD—LAKE CODE *, TEMP-LAKE-CODE, *
007510 *, CAR0 CODE *, TEMP-CARD-CODE *
007520 GO TO READ-TAPE.
007530 CAR0-1.
007540 IF CAR0-1-NUM IS NOT NUMERIC COMPUTE CAR0-1-NUM = 0.
007550 IF CAR0-1-NUM IS GREATER THAN 0 PERFORM CAR0-ERROR
007560 GO TO READ-TAPE.
007580 COMPUTE CAR0-1-NUM = CAR0-1-NUM + 1.
007590 MOVE CORRESPONDING CAR0-1-INPUT TO CAR0-1-DATA(CAR0-1-NUM).
007600 GO TO READ-TAPE.
007610 CAR0-2.
007620 IF CAR0-2-NUM IS NOT NUMERIC COMPUTE CAR0-2-NUM = 0.
007630 IF CAR0-2-NUM IS GREATER THAN 1 PERFORM CAR0-ERROR
007640 GO TO READ-TAPE.
007660 COMPUTE CAR0-2-NUM = CAR0-2-NUM + 1.
007670 MOVE CORRESPONDING CAR0-2-INPUT TO CAR0-2-DATA(CAR0-2-NUM).
007680 GO TO READ-TAPE.
007690 CAR0-3.
007700 IF CAR0-3-NUM IS NOT NUMERIC COMPUTE CAR0-3-NUM = 0.
007710 IF CAR0-3-NUM IS GREATER THAN 0 PERFORM CAR0-ERROR
007720 GO TO READ-TAPE.
007730 COMPUTE CAR0-3-NUM = CAR0-3-NUM + 1.
007740 PERFORM MOVE-CARD-3.
007750 GO TO READ-TAPE.
007760 CAR0-4.
007770 IF CAR0-4-NUM IS NOT NUMERIC COMPUTE CAR0-4-NUM = 0.
007780 IF CAR0-4-NUM IS GREATER THAN 0 PERFORM CAR0-ERROR
007790 GO TO READ-TAPE.
007800 COMPUTE CAR0-4-NUM = CAR0-4-NUM + 1.
007810 MOVE CORRESPONDING CAR0-4-INPUT TO CAR0-4-DATA(CAR0-4-NUM).
007820 GO TO READ-TAPE.
007830 CAR0-5.
007840 IF CAR0-5-NUM IS NOT NUMERIC COMPUTE CAR0-5-NUM = 0.
007850 IF CAR0-5-NUM IS GREATER THAN 0 PERFORM CAR0-ERROR
007860 GO TO READ-TAPE.
007870 COMPUTE CAR0-5-NUM = CAR0-5-NUM + 1.
007880 MOVE CORRESPONDING CAR0-5-INPUT TO CAR0-5-DATA(CAR0-5-NUM).
007890 GO TO READ-TAPE.
007900 CAR0-6.
007910 IF CAR0-6-NUM IS NOT NUMERIC COMPUTE CAR0-6-NUM = 0.
007920 IF CAR0-6-NUM IS GREATER THAN 0 PERFORM CAR0-ERROR
007930 GO TO READ-TAPE.
007940 COMPUTE CAR0-6-NUM = CAR0-6-NUM + 1.
007950 PERFORM MOVE-CARD-6.
007960 GO TO READ-TAPE.
007970 CAR0-7.
007980 IF CAR0-7-NUM IS NOT NUMERIC COMPUTE CAR0-7-NUM = 0.
007990 IF CAR0-7-NUM IS GREATER THAN 0 PERFORM CAR0-ERROR
008000 GO TO READ-TAPE.
008010 COMPUTE CAR0-7-NUM = CAR0-7-NUM + 1.
008020 MOVE CORRESPONDING CAR0-7-INPUT TO CAR0-7-DATA(CAR0-7-NUM).
008030 GO TO READ-TAPE.
008040 CARD-8.
008050 IF CARD-8-NUM IS NOT NUMERIC COMPUTE CARD-8-NUM = 0.
008060 IF CARD-8-NUM IS GREATER THAN 4 PERFORM CARD-ERROR
008070 GO TO READ-TAPE.
008080 COMPUTE CARD-8-NUM = CARD-8-NUM + 1.
008090 MOVE CORRESPONDING 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 COMPUTE CARD-9-NUM = 0.
008130 IF CARD-9-NUM IS GREATER THAN 3 PERFORM 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.
008200 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 COMPUTE 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.
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.
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.
008620 IF CAR0-16-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-DATA(CARD-17-NUM).
008730 GO TO READ-TAPE.
008740 CARD-18.
008750 IF CARD-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.
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 CARD-19-NUM IS GREATER THAN 3 PERFORM CARD-ERROR
008840 GO TO READ-TAPE.
008870 GO TO READ-TAPE.
008880 CARD-20.
008890 IF CARD-20-NUM IS NOT NUMERIC COMPUTE CARD-20-NUM = 0.
008900 IF CARD-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-DATA(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 CARD-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-DATA(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 39 PERFORM CARD-ERROR
009050 GO TO READ-TAPE.
009070 MOVE CORRESPONDING CARD-22-INPUT TO CARD-22-DATA(CARD-22-NUM).
009080 GO TO READ-TAPE.
009090 CARD-23.
009100 IF CARD-23-NUM IS NOT NUMERIC COMPUTE 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-DATA(CARD-23-NUM).
009150 GO TO READ-TAPE.
009160 CARD-24.
009170 IF CARD-24-NUM IS NOT NUMERIC COMPUTE 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.
GO TO READ-TAPE.

IF CARD-25-NUM IS NOT NUMERIC COMPUTE CARD-25-NUM = 0.

IF CARD-25-NUM IS GREATER THAN 15 PERFORM CARD-ERROR

GO TO READ-TAPE.

COMPUTE CARD-25-NUM = CARD-25-NUM + 1.

MOVE CORRESPONDING CARD-25-INPUT TO CARD-25-DATA(CARD-25-NUM).

GO TO READ-TAPE.

IF CARD-26-NUM IS NOT NUMERIC COMPUTE CARD-26-NUM = 0.

IF CARD-26-NUM IS GREATER THAN 0 PERFORM CARD-ERROR

GO TO READ-TAPE.

COMPUTE CARD-26-NUM = CARD-26-NUM + 1.

PERFORM MOVE-CARD-26.

GO TO READ-TAPE.

IF CARD-27-NUM IS NOT NUMERIC COMPUTE CARD-27-NUM = 0.

IF CARD-27-NUM IS GREATER THAN 0 PERFORM CARD-ERROR

GO TO READ-TAPE.


GO TO READ-TAPE.

IF CARD-28-NUM IS NOT NUMERIC COMPUTE CARD-28-NUM = 0.

IF CARD-28-NUM IS GREATER THAN 7 PERFORM CARD-ERROR

GO TO READ-TAPE.

COMPUTE CARD-28-NUM = CARD-28-NUM + 1.

PERFORM MOVE-CARD-28.

GO TO READ-TAPE.

IF CARD-29-NUM IS NOT NUMERIC COMPUTE CARD-29-NUM = 0.

IF CARD-29-NUM IS GREATER THAN 0 PERFORM CARD-ERROR

GO TO READ-TAPE.

COMPUTE CARD-29-NUM = CARD-29-NUM + 1.

PERFORM MOVE-CARD-29.

GO TO READ-TAPE.

IF CARD-30-NUM IS NOT NUMERIC COMPUTE CARD-30-NUM = 0.

IF CARD-30-NUM IS GREATER THAN 1 PERFORM CARD-ERROR

GO TO READ-TAPE.

COMPUTE CARD-30-NUM = CARD-30-NUM + 1.

MOVE CORRESPONDING CARD-30-INPUT TO CARD-30-DATA(CARD-30-NUM).

GO TO READ-TAPE.

IF CARD-31-NUM IS NOT NUMERIC COMPUTE CARD-31-NUM = 0.

IF CARD-31-NUM IS GREATER THAN 5 PERFORM CARD-ERROR

GO TO READ-TAPE.

COMPUTE CARD-31-NUM = CARD-31-NUM + 1.

PERFORM MOVE-CARD-31.

GO TO READ-TAPE.

IF CARD-32-NUM IS NOT NUMERIC COMPUTE CARD-32-NUM = 0.

IF CARD-32-NUM IS GREATER THAN 5 PERFORM CARD-ERROR

GO TO READ-TAPE.


PERFORM MOVE-CARD-32.

GO TO READ-TAPE.

IF CARD-33-NUM IS NOT NUMERIC COMPUTE CARD-33-NUM = 0.

IF CARD-33-NUM IS GREATER THAN 1 PERFORM CARD-ERROR
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.
009990 Go to read-tape.
010000 Card-error.
010010 Display 'Too many records--lake code '; temp-lake-code.
010020 If card-code = ' ', card-code = temp-card-code.
010030 Write lake-record.
010040 Write tape-out-record from tapecut-rec.
010050 Move spaces to tape-cut-rec.
010055 Move temp-lake-code to clo-lake-code.
010060 Sort-prep section.
010070 Read-sort.
010080 Open input tape-in-file.
010090 Read-next-card.
010100 Read tape-in-file at end go to read-sort-end.
010010 Read tape-in-file = spaces or lake-code-in = spaces.
010020 Display card-code-in, card-infc-in, lake-code-in.
010030 Else move tape-in-rec to sort-rec release sort-rec.
010040 Display sort-lake-code, sort-card-code.
010050 Go to read-next-card.
010060 Read-sort-end.
010080 Read-sort-exit.
010099 Move-card section.
010100 Move-card-3.
010110 Move source-3 of card-3-input to source-3 of card-3-data(card-3-num).
010120 If card-code = ' ', card-code = temp-card-code.
010130 Perform move-river-3 varying isub from 1 by 1 until isub is greater than 2.
010140 Move date-3 of card-3-input to date-3 of card-3-data(card-3-num).
010150 Move data-3 of card-3-input to data-3 of card-3-data(card-3-num).
010160 If card-code = ' ', card-code = temp-card-code.
010170 Perform move-river-3 varying isub from 1 by 1 until isub is greater than 4.
010180 Move map-date-3 of card-3-input to map-date-3 of card-3-data(card-3-num).
010190 Perform move-populate-3 varying isub from 1 by 1 until isub is greater than 3.
010200 Move river-3-data of card-3-input(isub) to river-3-data(card-3-num, isub).
010210 Of tape-out-rec(card-3-num, isub).
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 SECCI OF CARD-9-INPUT TO SECCI 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.
010630 MOVE DEPTH-9 OF CARD-9-INPUT(ISUB) TO DEPTH-9
010640 OF TAPEOUT-REC(CARD-9-ALP), {ISUB}.
010650 MOVE TEMP OF CARD-9-INPUT(ISUB) TO TEMP
010660 OF TAPEOUT-REC(CARD-9-ALP), {ISUB}.
010670 MOVE DISS-OXY OF CARD-9-INPUT(ISUB) TO DISS-OXY
010680 OF TAPEOUT-REC(CARD-9-ALP), {ISUB}.
010690 MOVE-CARD-10.
010700 MOVE THERMO-LOW OF CARD-10-INPUT TO THERMO-LOW OF
010710 CARD-10-DATA(CARD-10-ALP).
010720 MOVE THERMO-HIGH OF CARD-10-INPUT TO THERMO-HIGH OF
010730 CARD-10-DATA(CARD-10-ALP).
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-ALP]).
010780 MOVE C02 OF CAR0-10-INPUT TO C02 OF CARD-10-DATA
010790 ([CARD-10-ALP]).
010800 MOVE HARDNESS OF CARD-10-INPUT TO HARDNESS OF
010810 CARD-10-DATA(CARD-10-ALP).
010820 MOVE CONDUCTIVITY OF CARD-10-INPUT TO CONDUCTIVITY OF
010830 CARD-10-DATA(CARD-10-ALP).
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-ALP).
010880 PERFORM MOVE-NITROGEN-1C VARYING {ISUB FROM 1 BY 1 UNTIL
010890 ISUB IS GREATER THAN 4.
010900 MOVE DATE-10 OF CARD-10-INPUT TO 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-RECICARD-10-NUM, (ISUB).
010950 MOVE-SPC-CARD-10.
010960 MOVE SOLIDS-DATA OF CARD-10-INPUT(ISUB) TO
010970 SOLIDS-DATA OF TAPEOUT-RECICARD-10-NUM, (ISUB).
010980 MOVE PHOS-DATA OF CARD-10-INPUT(ISUB) TO PHOS-DATA OF
010990 TAPEOUT-RECICARD-10-NUM, (ISUB).
011000 MOVE CHLOROPHYLL-DATA CF CARD-10-INPUT(ISUB) TO
011010 CHLOROPHYLL-DATA CF TAPEOUT-RECICARD-10-NUM, (ISUB).
011020 MOVE-NITROGEN-10.
011030 MOVE NITROGEN-DATA OF CARD-10-INPUT(ISUB) TO
011040 NITROGEN-DATA OF TAPEOUT-RECICARD-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 [SUB FROM 1 BY 1 UNTIL ISUB
011090 IS GREATER THAN 2.
011100 MOVE DATE-11 OF CARO-11-INPUT TO DATE-11 OF CARO-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 [SUB FROM 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 TO 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 OF CARD-11-INPUT(ISUB) TO
011240 RIVER-11-DATA OF TAPEOUT-RECICARD-11-NUM, (ISUB).
011250 MOVE-STAND-SUBMERG-11.
011260 MOVE SPECIES-11 OF CARD-11-INPUT(ISUB) TO SPECIES1-11
011270 OF TAPEOUT-RECICARD-11-NUM, (ISUB).
011280 MOVE ABUND-11 OF CARD-11-INPUT(ISUB) TO ABUND1-11
011290 OF TAPEOUT-RECICARD-11-NUM, (ISUB).
011300 MOVE SPECIES2-11 OF CARD-11-INPUT(ISUB) TO
011310 SPECIES2-11 OF TAPEOUT-RECICARD-11-NUM, (ISUB).
011320 MOVE ABUND2-11 OF CARD-11-INPUT(ISUB) TO
011330 ABUND2-11 OF TAPEOUT-RECICARD-11-NUM, (ISUB).
011340 MOVE-CARD-12.
011350 PERFORM MOVE-SPECIES-12 VARYING [SUB FROM 1 BY 1 UNTIL
011360 ISUB IS GREATER THAN 18.
011370 MOVE-SPECIES-12.
011380 MOVE SPECIES-12 OF CARD-12-INPUT(ISUB) TO SPECIES1-12
011390 OF TAPEOUT-RECICARD-12-NUM, (ISUB).
011400 MOVE ABUND-12 OF CARD-12-INPUT(ISUB) TO ABUND1-12
011410 OF TAPEOUT-RECICARD-12-NUM, (ISUB).
011420 MOVE-CARD-13.
011430 PERFORM MOVE-SPECIES-13 VARYING [SUB 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
011480 MOVE EVALUATION OF CARD-13-INPUT(ISUB) TO
011490 EVALUATION OF TAPEOUT-RECICARD-13-NUM, (ISUB).
011491 PERFORM MOVE-LOCATION-13 VARYING JSUB FROM 1 BY 1 UNTIL
011492 JSUB IS GREATER THAN 3.
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
011731 MOVE WEIGHT-15 OF CARD-15-INPUT(ISUB) TO
011733 MOVE YEAR-15 OF CARD-15-INPUT TO
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.
012040 MOVE-DATA-18.
012050 MOVE SPECIES-18 OF CARO-18-INPUT(ISUB) TO
012060 SPECIES-18 OF TAPEUT-REC(CARO-18-NUM, ISUB).
012070 MOVE NUMBER-18 OF CARO-18-INPUT(ISUB) TO
012080 NUMBER-18 OF TAPEUT-REC(CARO-18-NUM, ISUB).
012090 MOVE-CARO-24.
012100 MOVE SPECIES-24 OF CARO-24-INPUT TO SPECIES-24 OF
012110 CARO-24-DATE(CARO-24-NUM).
012120 MOVE SIZE-24 OF CARO-24-INPUT TO SIZE-24 OF CARO-24-DATA
012130 (CARO-24-NUM).
012140 MOVE SAMPLE-24 OF CARO-24-INPUT TO SAMPLE-24 OF CARO-24-DATA
012150 (CARO-24-NUM).
012160 PERFORM MOVE-AGE-GROUP-24 VARYING ISUB FROM 1 BY 1 UNTIL
012170 ISUB IS GREATER THAN 9.
012190 MOVE AGE-GROUP-24-DATE OF CARO-24-INPUT(ISUB) TO
012200 AGE-GROUP-24-DATA OF TAPEUT-REC(CARO-24-NUM, ISUB).
012210 MOVE-CARO-26.
012220 MOVE DATE-26 OF CARO-26-INPUT TO DATE-26 OF CARO-26-DATA
012230 (CARO-26-NUM).
012240 MOVE DATA-26 OF CARO-26-INPUT TO DATA-26 OF CARO-26-DATA
012250 (CARO-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 CARO-26-INPUT(ISUB) TO
012300 SPECIES-26-DATA OF TAPEUT-REC(CARO-26-NUM, ISUB).
012310 MOVE-CARO-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 CARO-28-INPUT(ISUB) TO
012360 SPECIES-28 OF TAPEUT-REC(CARO-28-NUM, ISUB).
012370 MOVE CATCH-HR-28 OF CARO-28-INPUT(ISUB) TO
012380 CATCH-HR-28 OF TAPEUT-REC(CARO-28-NUM, ISUB).
012390 MOVE WT-HR-28 OF CARO-28-INPUT(ISUB) TO
012400 WT-HR-28 OF TAPEUT-REC(CARO-28-NUM, ISUB).
012410 MOVE-CARO-29.
012420 MOVE SOURCE-29 OF CARO-29-INPUT TO SOURCE-29 OF CARO-29-DATA
012430 (CARO-29-NUM).
012440 MOVE DATE-29 OF CARO-29-INPUT TO DATE-29 OF CARO-29-DATA
012450 (CARO-29-NUM).
012460 MOVE HOURS-29 OF CARO-29-INPUT TO HOURS-29 OF CARO-29-DATA
012470 (CARO-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 CARO-29-INPUT(ISUB) TO
012520 ACTIVS-29-DATA OF TAPEUT-REC(CARO-29-NUM, ISUB).
012530 MOVE-CARO-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 CARO-31-INPUT(ISUB) TO
012580 REC-31 OF TAPEUT-REC(CARO-31-NUM, ISUB).
012590 MOVE SPECIES-31 OF CARO-31-INPUT(ISUB) TO
012600 SPECIES-31 OF TAPEUT-REC(CARO-31-NUM, ISUB).
012610 MOVE SPECIES-31 OF CARO-31-INPUT(ISUB) TO
012620 SPECIES-31 OF TAPEUT-REC(CARO-31-NUM, ISUB).
012630 MOVE BENEFIT-31 OF CARO-31-INPUT(ISUB) TO
012640  BENEFIT-31 OF TAPEOUT-RECICARD-31-NUM, [SUB].
012650  MOVE YEAR-COMPLETE OF CARD-31-INPUT[SUB] TO
012660  YEAR-COMPLETE OF TAPEOUT-RECICARD-31-NUM, [SUB].
012670  MOVE COST-31 OF CARD-31-INPUT[SUB] TO
012680  COST-31 OF TAPEOUT-RECICARD-31-NUM, [SUB].
012690  MOVE-CARD-31.
012700  PERFORM MOVE-DATA-31 VARYING ISUB FROM 1 BY 1 UNTIL ISUB
012710   IS GREATER THAN 2.
012720  MOVE YEAR-31 OF CARD-31-INPUT TO YEAR-31 OF CARD-31-DATA
012730  (CARD-31-NUM).
012740  MOVE-DATA-31.
012750  MOVE LOCATION-32 OF CARD-32-INPUT[SUB] TO
012760  LOCATION-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012790  MOVE REC-32 OF CARD-32-INPUT[SUB] TO
012800  REC-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012810  MOVE BENEFIT-32 OF CARD-32-INPUT[SUB] TO
012820  BENEFIT-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012830  MOVE COST-32 OF CARD-32-INPUT[SUB] TO
012840  COST-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012860  MOVE REC2-32 OF CARD-32-INPUT[SUB] TO
012870  REC2-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012880  MOVE BENEFIT2-32 OF CARD-32-INPUT[SUB] TO
012890  BENEFIT2-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012900  MOVE COST2-32 OF CARD-32-INPUT[SUB] TO
012910  COST2-32 OF TAPEOUT-RECICARD-32-NUM, [SUB].
012850  NC-MORE-DATA.
012860  CLOSE TEMP-FILE.
012870  STOP RUN.