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Data Bases For Forest Inventory in the North-Central Region

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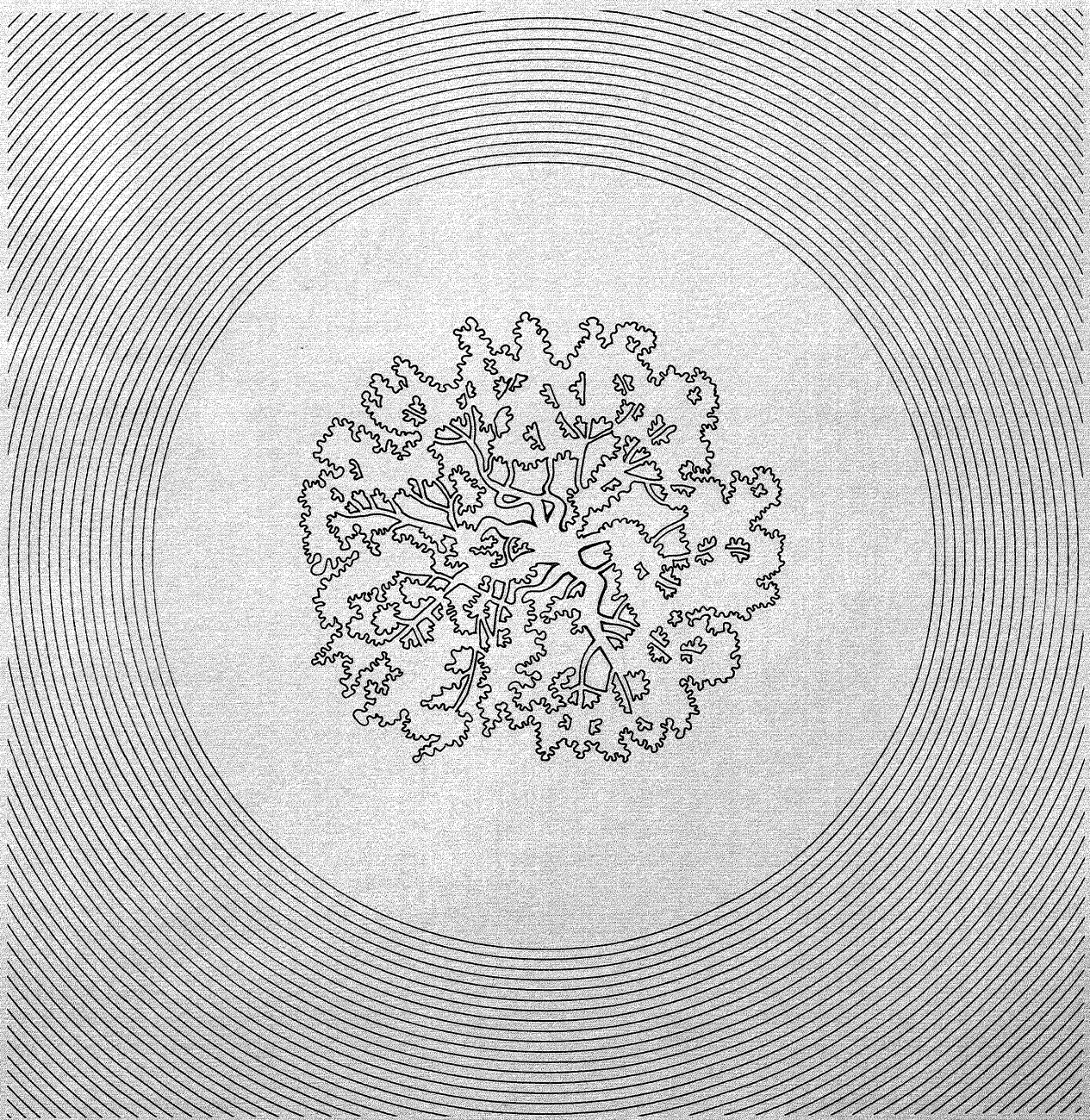

North Central Forest Experiment Station

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DATA BASES FOR FOREST INVENTORY IN THE NORTH CENTRAL REGION

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The Forest Inventory and Analysis research work unit (FIA) at the North Central Forest Experiment Station, U.S. Department of Agriculture, Forest Service, collects information on various renewable natural resources in the 11-State North Central Region (fig. 1). To more efficiently use these data and to make them available to outside users, a commercially available data base management system was used to develop a set of data bases to enhance data storage and retrieval. This report is designed to be used by the managers, researchers, or planners who want to know what information is available from FIA data. Until recently, the only commonly available information was a series of reports that were published when a State

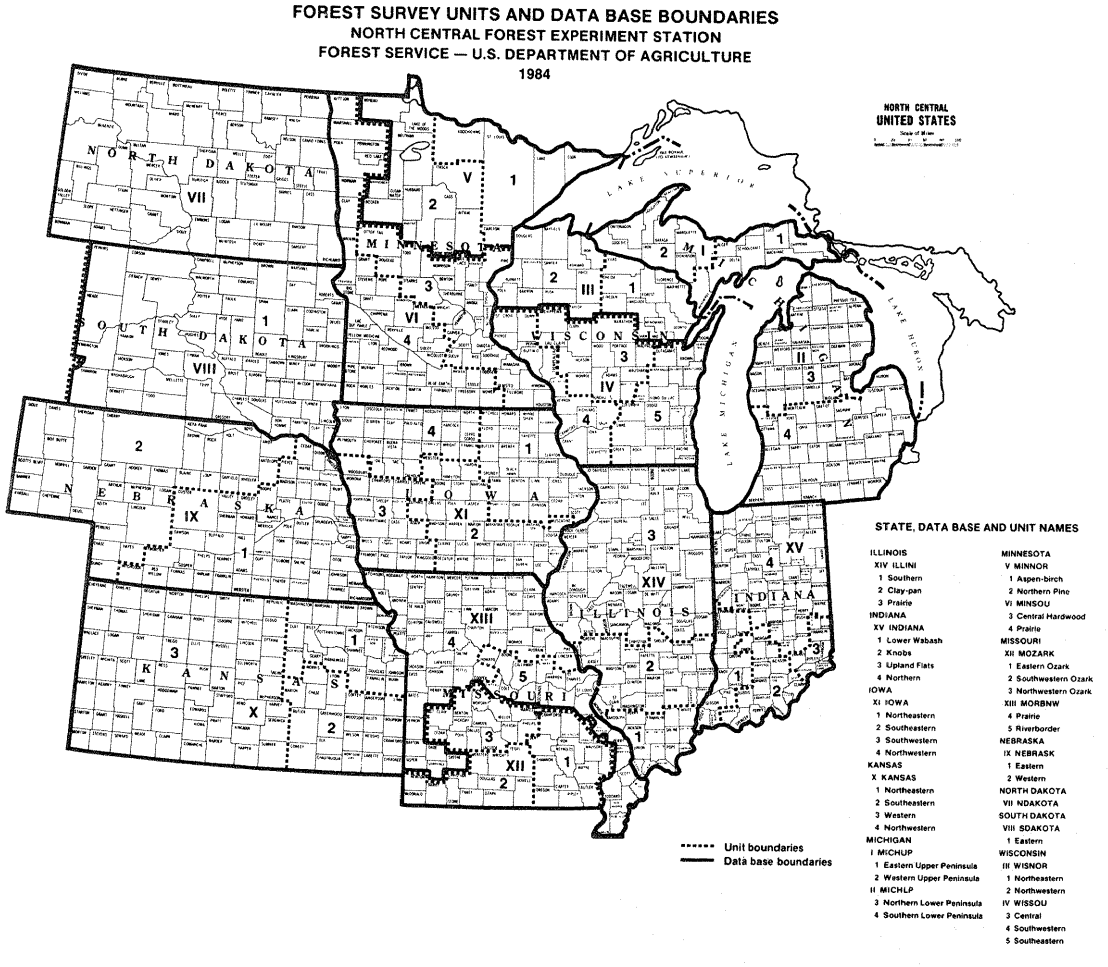

Figure 1.--Forest Survey units and data base boundaries.

Table 1.--Data base date, token, and size by geographic coverage

	Geographic area covered	Date	Token[1/]	Bytes	Cases	Trees	Records	Forest plots
						Number		
I	Michigan Upper Peninsula	1980	MICHUP	14,034,143	5,719	189,744	246,088	4,709
II	Michigan Lower Peninsula	1980	MICHLP	11,027,555	8,871	125,794	190,840	3,671
III	Northern Wisconsin	1983	WISNOR	15,060,621	7,151	200,351	274,679	5,425
IV	Southern Wisconsin	1983	WISSOU	6,576,303	8,768	89,651	135,884	2,790
V	Northern Minnesota	1977	MINNOR	17,014,071	13,696	235,885	274,804	8,345
VI	Southern Minnesota	1977	MINSOU	5,702,142	22,807	49,060	96,843	2,169
VII	North Dakota	1980	NDAKOTA	2,704,102	18,214	5,339	45,164	604
VIII	South Dakota (eastern)	1980	SDAKOTA	3,333,173	23,206	2,928	50,747	518
IX	Nebraska	1983	NEBRASK	2,314,016	14,449	5,004	35,906	535
X	Kansas	1981	KANSAS	5,371,730	23,705	36,306	93,931	1,807
XI	Iowa	1974	IOWA	2,562,666	12,607	16,276	43,303	756
XII	Missouri Ozarks	1972	MOZARK	4,323,264	4,042	67,956	78,148	2,108
XIII	Missouri Riverborder and Prairies	1972	MORBNW	2,403,360	6,569	27,145	41,470	884
XIV	Illinois[2/]	1962	ILLINI	xx,xxx,xxx	x,xxx	xxx,xxx	xxx,xxx	x,xxx
XV	Indiana[3/]	1967	INDIANA	1,500,725	1,058	24,124	28,028	1,058

[1/]Token used for data base name, password, and security passwords.
[2/]Data for Illinois are not expected to be available until 1985.
[3/]The Indiana data base contains data for forest plots only.

inventory was completed. Because of the extensive area covered by the inventories and the large variety of information gathered, only a small portion of the available information gets published. Persons needing different or more detailed data had to contact FIA personnel directly to see if the data were available and if so how they could obtain it. This report describes the FIA data available so that interested persons can decide whether or not those data can help satisfy their needs. In addition, it serves as a data base description for persons wishing to access the data bases directly. It is not meant to be a complete user's manual for the data base management system.

The FIA data bases are available through the University of Minnesota Computer Center (UCC) using the Scientific Information Retrieval (SIR) data base management system (Robinson et al. 1980). SIR is a hierarchical system designed for use with scientific data. Compared with other data base management systems available at UCC, SIR is the easiest, most economical, and most flexible system available for storing and retrieving FIA data. Interested users can directly access the FIA set of data bases and make their own data retrievals, or they can request the FIA data base manager to develop a specialized data retrieval for them. Users accessing the data bases will need to have a UCC user account, access to a computer terminal, knowledge of the SIR data base management system, and a basic understanding of FIA sampling and estimating procedures. The data base manager can assist anyone seeking a UCC account or information about SIR. Persons requesting the data base manager to access the data bases for them will be charged for computer and personnel costs.

The North Central FIA data base collection is stored in 15 separate SIR data bases, each covering a State or portion of a State (fig. 1, table 1). Within each data base is a data case for each inventory plot. Each case consists of up to seven data record types (table 2). These seven record types relate closely to the way data are collected and used in the FIA inventory.

This report is divided into four sections plus an appendix. The first section briefly describes FIA sampling and estimation procedures as they relate to the seven record types. The second section describes the data base, providing names, descriptions, formats, and data type codes for each variable in the data base.

Table 2.--North central FIA data base record types

Record number	Record name	Record occurrence
1	PLOTALL	All ground plots
2	PLOTFOR	Forest plots and nonforest plots with trees plots
3	TREE	Measured trees on a plot
4	SHRUBT	Measured tall shrubs on a plot
5	SHRUBL	Measured low shrubs on a plot
6	SITETR	Site index trees recorded on a plot
7	POINT	Nonstocked points on a plot

A table of contents and an index of variable names are included. The third section lists the stored procedures contained in the data bases and instructions on their use. The fourth section contains examples of retrievals that can be made from the data bases and demonstrates how interested users may access the data bases. The appendix describes those codes that vary between data bases or whose descriptions are too long to include in section II. The appendix also contains a glossary of terms and definitions used in this and other FIA publications.

SECTION I.--SAMPLING AND ESTIMATION PROCEDURES

Users of the FIA data bases need to understand FIA sampling procedures in order to know the type of information that can be obtained from the data bases, how to go about obtaining this information, and the value and accuracy of the information. Specific FIA sampling procedures differ somewhat from State to State; however, the general description of the sampling procedure given here applies to all States.

The FIA inventory begins with an aerial-photo sample that estimates the area of land by various classes. These classes are based on land-use and, for forested land, forest type, volume, size and/or density. Also, as part of the aerial-photo sample, ground plots are located on the aerial photos and similarly classified. Ground plots may be remeasurement plots, transferred to the aerial photos from old photos or maps, or new plots, selected by systematic sampling. The photo classification of these ground plots, together with the area estimates from the photo sample, is used to assign area expansion factors to the ground plots. If 25 ground plots in the same sampling area have a photo interpretation classification that was observed for 50,000 acres in the sampling area, then each of these 25 ground plots would be given an expansion factor of 2,000 acres (50,000/25). The sampling area, or level at which expansion factors are assigned, is different from State to State, as is the classification scheme used to assign photo-interpretation classes. Sampling areas may be forest survey units (fig. 1), counties, groups of counties, or national forests. Persons interested in the details of how these expansion factors were assigned to the ground plots for a particular area should contact the data base manager.

Once a ground plot location has been selected on an aerial photograph, it is established and measured in the field. On all ground plots the information recorded includes plot location, land use, date of aerial photography, and date of ground measurement. This information is collected for all plots and is stored in record type 1 (PLOTALL), along with two expansion factiors. The first, the area expander (EXPAREA), is recorded for all plots and is used to estimate area based on all sample plots. The second, the remeasurement expander (EXPREMEA), is recorded only for remeasurement plots and is used to make estimates based on the remeasured sample.

On plots that are currently classified as forest or nonforest with trees, and on remeasurement plots that were forest at the previous measurement, additional plot information is recorded in record type 2 (PLOTFOR). This information includes ownership, total basal area, forest type, stand age, site index, and a volume expander (EXPVOL). The volume expander is similar to the area expander, and in most States the two are equal; however, in some States the inventory design necessitated a different expander. The volume expander must be used to expand plot volumes per acre to estimate total volume.

The basic FIA plot is a 10-point cluster that covers a 1-acre sample area. At each sample point a 37.5 BAF (English) prism plot is established, and all live trees with a diameter breast height (d.b.h.) 5 inches or greater are sampled, as well as salvagable dead trees or those that have died in the past 3 years. Trees with a d.b.h. less than 5 inches but at least 1 inch are sampled on fixed-radius (6.8 feet) plots. Stumps cut in the past 3 years are recorded on ten 1/50-acre plots. Each tallied tree or stump is identified by a unique point and tree number. Items tallied include species d.b.h., crown ratio, and other tree information. This information is stored in record type 3 (TREE). There is one occurrence of this record for each tree. Some of the items in this record, such as tree volume, are computed from basic tree measurements. There is also an expander for each tree (EXPANDR) that expresses the number of trees per acre represented by the sample tree.

Shrubs are sampled on the northeast quarter of a 6.8-foot fixed-radius plot located at each of the first three cluster sample points. Shrubs are tallied as tall or low. Tall shrub species and stem diameter are recorded in record type 4 (SHRUBT), and low shrub species and percent cover are recorded in record type 5 (SHRUBL).

Also, for each forest plot a number of additional trees are measured to determine site index. This information is recorded in record type 6 (SITETR) and occurs once for each site index tree that was measured. In addition, when one of the 10-point cluster sample points is observed to be nonstocked (no trees or seedlings present), an explanation of why it is nonstocked is recorded in record type 7 (POINT).

For remeasurement plots additional information is recorded for each tree, such as original tree d.b.h. and other original tree data. This information may be used to estimate growth, mortality, and removals on these remeasurement plots. On new plots removals can be estimated using the measured stumps and assuming these

stumps were cut in the past 3 years. Mortality on new plots can be estimated from the dead trees tallied, also assuming these trees died in the past 3 years.

Another method to estimate mortality using new plots is by using the mortality factor, an estimate of the number of trees per acre represented by the tally tree that will die in the next year. This mortality factor is the product of the tree expander and the probability that the tree will die in the next year. Growth on new plots is estimated using data stored as original tree data. For new plots, the original tree data are an estimate of the trees' condition 1 year before being measured, based on growth functions. These growth functions and the functions used to compute probability of mortality are derived from remeasurement plots. Details about these functions for a particular data base can be obtained by contacting the data base manager.

Finally, the data bases also contain projected plot and tree data that are periodically updated using the Stand and Tree Evaluation and Modeling System (STEMS) (Belcher et al. 1982) growth model. The system used to update the data simulates natural growth and mortality but does not account for removals, land-use change, regeneration, fire, management, or any other major changes that could occur. Methods are being developed to incorporate these major changes into the update process.

Not all data were collected for all surveys. For example, shrub data were first collected during the 1980 Michigan survey and are only available for this and subsequent surveys. If a data item is not available for all surveys, this is noted in the codebook (section II).

SECTION II.--CODEBOOK DEFINITION

Codebook Format Explanation

The codebook contains detailed definitions of the variables in the data base. A detailed explanation of this codebook can be found in the SIR user's manual (Robinson et al. 1980). We present a brief explanation of this format using the definition of sample kind as an example.

```
R2.      SAMPKND , Sample Kind
                 FORMAT:  I1
              DATA TYPE:  I*1
           VALUE LABELS:

                 (1) New 10-Point Full
                 (2) Remeasurement
                 (3) Remeasurement NF
                 (4) New 10-Point Full NF
                 (5) Reserve [Phantom]
                 (6) Remeasurement Partial
                 (7) New 10-Point Partial
                 (8) Remeasurement Partial
                 (9) Remeasurement Updated
                 (0) Stereo dots [not gr.ck]
```

Each definition starts with a variable number consisting of a letter (C or R) and one or more digits. A description of the difference between C (common information record) and R (record) variables can be found in Robinson et al. 1980. In the example the variable number is R2. Next is the variable name, one to eight characters all upper case, SAMPKND in the example. The name is followed by the variable label. This label can be of any length and consists of two parts: A short label of up to 40 characters followed by a semi-colon and as many 80-character lines separated by semi-colons as desired. The example has a short label only. This short label is the label transferred with the variable during retrievals. The next line shows the data input format for the variable, in this case a one-digit integer number, followed by the data type and data base storage requirement, in the example an integer variable using one byte of storage. Finally, the value labels are listed. These labels are up to 20 characters long and are listed for each legal value. In the example, we have labels for each of the 10 possible values. In general, if a value label does not exist, it means that the remaining values are illegal for that variable.

NORTH CENTRAL FIA DATA BASE CODEBOOK DEFINITION

TABLE OF CONTENTS

RECORD 1 (PLOTALL)

RECORD 2 (PLOTFOR)

[1/] C = Common Information Record (CIR) variable
R = Record variable.

RECORD 2 (PLOTFOR) -(continued)

Variable name	Variable type & number[1/]	Definition	Page
SZDNPRJ	R22.	Projected Stand Size-Density	14
FORTORG	R23.	Original Forest Type	14
SZDNORG	R24.	Original Stand Size-Density	14
STDAGE	R25.	Stand Age	14
PRJAGE	R26.	Projected Stand Age	14
SITECLS	R27.	Site Class	14
SITEIND	C5.	Site Index	14
SISPP	R28.	Site Index Species	14
EXPVOL	R29.	Volume Expander	14
GSCUVS	R30.	Growing Stock CuFt Volume Softwoods	15
GSCUVH	R31.	Growing Stock CuFt Volume Hardwoods	15
PRJSVOL	R32.	Projected G.S. CuFt Volume Softwoods	15
PRJHVOL	R33.	Projected G.S. CuFt Volume Hardwoods	15
STDAREA	R34.	Stand Area	15
AREACOND	R35.	Stocking Level Class	15
GRSTKPC	R36.	Growing Stock Tree Stocking	15
ROUGHPC	R37.	Rough Tree Stocking	16
ROTENPC	R38.	Rotten Tree Stocking	16
PRJGSPC	R39.	Projected G.S. Tree Stocking	16
PRJRGPC	R40.	Projected Rough Tree Stocking	16
PRJRTPC	R41.	Projected Rotten Tree Stocking	16
SG01	C8.	Presence or Absence of Jack Pine	15
SG02	C9.	Presence or Absence of Red Pine	15
SG03	C10.	Presence or Absence of White Pine	15
SG04	C11.	Presence or Absence of Ponderosa Pine	15
SG05	C12.	Presence or Absence of Loblolly Pine	15
SG06	C13.	Presence or Absence of Shortleaf Pine	15
SG07	C14.	Presence or Absence of Other Yellow Pines	15
SG08	C15.	Presence or Absence of White Spruce	15
SG09	C16.	Presence or Absence of Black Spruce	15
SG10	C17.	Presence or Absence of Balsam Fir	15
SG11	C18.	Presence or Absence of Hemlock	15
SG12	C19.	Presence or Absence of Tamarack	15
SG13	C20.	Presence or Absence of Bald Cypress	15
SG14	C21.	Presence or Absence of E. Red Cedar	15
SG15	C22.	Presence or Absence of N. white-cedar	15
SG16	C23.	Presence or Absence of (not assigned)	15
SG17	C24.	Presence or Absence of Other Softwoods	15
SG18	C25.	Presence or Absence of Select White Oak	15
SG19	C26.	Presence or Absence of Other White Oak	15
SG20	C27.	Presence or Absence of Select Red Oak	15
SG21	C28.	Presence or Absence of Other Red Oak	16
SG22	C29.	Presence or Absence of Select Hickory	16
SG23	C30.	Presence or Absence of Other Hickory	16
SG24	C31.	Presence or Absence of Basswood	16
SG25	C32.	Presence or Absence of Beech	16
SG26	C33.	Presence or Absence of Yellow Birch	16
SG27	C34.	Presence or Absence of Hard Maple	16
SG28	C35.	Presence or Absence of Soft Maple	16
SG29	C36.	Presence or Absence of Elm	16
SG30	C37.	Presence or Absence of Black Ash	16
SG31	C38.	Presence or Absence of White-Green Ash	16
SG32	C39.	Presence or Absence of Sycamore	16
SG33	C40.	Presence or Absence of Cottonwood	16
SG34	C41.	Presence or Absence of Willow	16
SG35	C42.	Presence or Absence of Hackberry	16
SG36	C43.	Presence or Absence of Balsam Poplar	16
SG37	C44.	Presence or Absence of Bigtooth Aspen	16
SG38	C45.	Presence or Absence of Quaking Aspen	16
SG39	C46.	Presence or Absence of Paper Birch	16
SG40	C47.	Presence or Absence of River Birch	16
SG41	C48.	Presence or Absence of Sweetgum	16
SG42	C49.	Presence or Absence of Blackgum and Tupelo	16
SG43	C50.	Presence or Absence of Black Cherry	16

[1/] C = Common Information Record (CIR) variable
R = Record variable

RECORD 2 (PLOTFOR) -(continued)

Variable name	Variable type & number[1/]	Definition	Page
SG44	C51.	Presence or Absence of Black Walnut	16
SG45	C52.	Presence or Absence of Butternut	16
SG46	C53.	Presence or Absence of Yellow Poplar	16
SG47	C54.	Presence or Absence of (not assigned)	16
SG48	C55.	Presence or Absence of (not assigned)	16
SG49	C56.	Presence or Absence of Other Hardwoods	16
SG50	C57.	Presence or Absence of Noncommercial	16

RECORD 3 (TREE)

Variable name	Variable type & number[1/]	Definition	Page
IDENT	C6.	Case Identifier	17
TRNUM	R1.	Tree Number	17
TRHIST	R2.	Tree History-Status	17
PRJHIST	R3.	Projected Tree History-Status	17
SPECIES	R4.	Tree Species	17
DBHORG	R5.	Original Diameter Breast High	17
DBHCUR	R6.	Current Diameter Breast High	17
DBHPRJ	R7.	Projected Diameter Breast High	17
SOUND	R8.	Soundness Code	17
LOGGR	R9.	Log Grade	18
CAVIT	R10.	Cavities Code	18
CRRAT	R11.	Crown Ratio	18
PRJCRRAT	R12.	Projected Crown Ratio	18
CRCLS	R13.	Crown Class	18
DAMDETH	R14.	Damage Cause of Death	18
TRCLS	R15.	Tree Class	18
PRJTRCLS	R16.	Projected Tree Class	18
PTOCC	R17.	Point Occupancy	18
EXPANDR	R18.	Number of Trees Per Acre	18
PRJEXPD	R19.	Projection Factor	18
MORTFAC	R20.	Mortality Factor	18
NCSPGP	R21.	North Central Species Group	19
TRSZCLS	R22.	Tree Size Class	19
PRJTRSZ	R23.	Projected Tree Size Class	19
TRSIND	R24.	Tree Site Index	19
NETCUVL	R25.	Net Cubic Foot Volume in Tree	19
PRJNCVL	R26.	Projected Net CuFt Volume in Tree	19

RECORD 4 (SHRUBT)

			Page
IDENT	C6.	Case Identifier	20
SBTNUM	R1.	Shrub Number-Tall	20
SHRUBSP	R2.	Shrub Species-Tall	20
DIACLS	R3.	Diameter Class	20
COUNT	R4.	Count of Number of Individuals	20
EXPSHUT	R5.	Expander for Shrub Tall	20

RECORD 5 (SHRUBL)

			Page
IDENT	C6.	Case Identifier	20
SBLNUM	R1.	Shrub Number-Low	20
SHUSPL	R2.	Shrub Species-Low	20
COVER	R3.	Percent Ground Cover	21
EXPSHUL	R4.	Expander for Low Shrub	21

RECORD 6 (SITETR)

			Page
IDENT	C6.	Case Identifier	21
TRNUM	R1.	Tree Number	21
DBHSI	R2.	Diameter Breast High Site Index Tre	21
SPPSI	R3.	Species Site Index Tree	21
HTSI	R4.	Height Site Index Tree	21
AGESI	R5.	Total Age Site Index Tree	21
YRSADD	R6.	Years Added to DBH Age for Total Ag	21

[1/] C = Common Information Record (CIR) variable
R = Record variable.

RECORD 7 (POINT)

Variable name	Variable type & number[1/]	Definition	Page
IDENT	C6.	Case Identifier	22
PTNUM	R1.	Point Number	22
PTCLS	R2.	Point Class	22
INDEX			23

1/C = Common Information Record (CIR) variable
R = Record variable.

This data base contains data for an entire State or a portion of State. The code book is the same for the entire State. Each case contains the data from one survey plot in seven record types. Record types 1 and 2 contain plot level data and record types 3 through 7 contain tree and shrub data.

*** RECORD 1 (PLOTALL) DEFINITION ***

Record type 1 (PLOTALL) contains data gathered for all plots.

```
MAXIMUM RECS/CASE:   1
CASE IDENTIFIER:     IDENT (A)

C6.     IDENT    , Case Identifier
                   (XYYYYY where;
                    X = FIA unit number
                    YYYYY = Plot number.
                    Every plot within a data base
                    has a unique case identifier.
                    See appendix for unit codes.)
                FORMAT:  I6
             DATA TYPE:  I*4

R1.     STATE    , State Code
                FORMAT:  I2
             DATA TYPE:  I*2
           VALUE LABELS: (17) Illinois   (26) Michigan    (38) North Dakota
                         (18) Indiana    (27) Minnesota   (46) South Dakota
                         (19) Iowa       (29) Missouri    (55) Wisconsin
                         (20) Kansas     (31) Nebraska

C1.     UNTCO    , Unit and County
                   (XYY where;
                    X = Unit Number
                    YY = County number.
                    See appendix for codes)
                FORMAT:  I3
             DATA TYPE:  I*2

R2.     SAMPKND  , Sample Kind
                FORMAT:  I1
             DATA TYPE:  I*1
           VALUE LABELS:
              (1) New 10-Point Full              (6) Remeasurement Partial
              (2) Remeasurement                  (7) New 10-Point Partial
              (3) Remeasurement NF               (8) Remeasurement Partial
              (4) New 10-Point Full NF           (9) Remeasurement Updated
              (5) Reserve[Phantom]               (0) Stereo dots [not gr.ck]

R3.     DISTURB  , Disturbance Code
                    Not used prior to 1982
                FORMAT:  I1
             DATA TYPE:  I*1
           VALUE LABELS:
              (1) Forest to forest undisturbed   (4) Forest to nonforest
              (2) Nonforest to forest disturbed  (5) Nonforest to nonforest
              (3) Nonforest to forest

R4.     PICODE   , Photo Interpretation Code
                    (See appendix for codes)
                FORMAT:  I2
             DATA TYPE:  I*2
```

R5. PISTRAT , Photo Stratification Code
(See appendix for codes)
FORMAT: I2
DATA TYPE: I*2

C2. GLUCUR , Ground Land Use Current
R6. GLUORG , Ground Land Use Original
R7. GLUPRJ , Ground Land Use Projected
FORMAT: I2
DATA TYPE: I*2
VALUE LABELS:

(20) Commercial Forest	(21) Pastured Com. Fore:
(22) Plantation	(40) Unproductive Forest
(41) Reserved Forest	(45) Reserved For.Prod.
(46) Christmas Tr.Plant.	(51) Cropland With Trees
(52) Pasture With Trees	(53) Wooded Strip
(54) Idle Farmland W-T	(55) Marsh With Trees
(56) Narrow Windbreaks	(57) Wide Windbreaks
(58) Windbreaks	(59) Wooded Pasture
(61) Cropland Wo-T	(62) Improved Pasture Wo-
(64) Idle Farmland Wo-T	(65) Marsh Wo-T
(66) Other Farmland	(67) Urban and Other
(68) Rights-of-way	(69) Nonforest Reserve
(71) Urban For. Reserved	(72) Urban With Trees
(80) Noncensus Water	(90) Census Water

R8. CHANGE , Reason for GLU change
FORMAT: I1
DATA TYPE: I*1

R9. UTREND , Use Trend
See appendix for deff.
FORMAT: I3
DATA TYPE: I*2

R10. STDHIST , Stand History
See appendix for deff.
FORMAT: I2
DATA TYPE: I*2

R11. PRJSTDH , Projected Stand History
See appendix for deff.
FORMAT: I2
DATA TYPE: I*2

R12. PHOTAGE , Photo Age
(years)
FORMAT: I1
DATA TYPE: I*1

R13. SURDATE , Survey Date
FORMAT: A4 WITH DATE MAP: 'MMYY'
DATA TYPE: I*4

R14. PRJDATE , Projected Date
FORMAT: A4 WITH DATE MAP: 'MMYY'
DATA TYPE: I*4

R15. GROPER , Remeasurement Peroid
(years)
FORMAT: I2
DATA TYPE: I*2

R16. USESET , Use Setting-Recreation
Not used prior to 1982
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS:

(1) Primitive	(2) Semi-prim. non-mot
(3) Semi-prim. motor	(4) Roaded natural
(5) Rural	(6) Urban

R17. USEAREA , Use Area-Recreation
Not used prior to 1982
FORMAT: I1
DATA TYPE: I*1

R18. USEPOST , Use Posted-Recreation
Not used prior to 1982
FORMAT: I1
DATA TYPE: I*1

R19. SOILCLS , Soil Classification
Available for future use
FORMAT: I8
DATA TYPE: I*4

C7. EXPAREA , Area Expander
(acres)
FORMAT: I5
DATA TYPE: I*4

R20. PRJAREA1, Projected Area Expander 1
(acres)
FORMAT: I5
DATA TYPE: I*4

R21. PRJAREA2, Projected Area Expander 2
(acres)
FORMAT: I5
DATA TYPE: I*4

R22. UTMZONE , UTM Zone Code
FORMAT: I2
DATA TYPE: I*2

R23. UTMNORTH, UTM Northing To Nearest 1000 Meters
FORMAT: I5
DATA TYPE: I*4

R24. UTMEAST , UTM Easting To Nearest 1000 Meters
FORMAT: I5
DATA TYPE: I*4

R25. TOWNSHIP, Township
FORMAT: A4
DATA TYPE: A*6

R26. RANGE , Range
FORMAT: A4
DATA TYPE: A*6

R27. SECTION , Section
FORMAT: I2
DATA TYPE: I*2

R28. EXPREMEA, Remeasurement Expander
(acres)
FORMAT: I6
DATA TYPE: I*4

RECORD 2 (PLOTFOR) DEFINITION ***

Record type 2 (PLOTFOR) contains data for plots classified as forest, at either measurement occasion for remeasurement plots, or for plots classified as non-forest with trees.

MAXIMUM RECS/CASE: 1
CASE IDENTIFIER: IDENT (A)

C6. IDENT , Case Identifier
(Unit & Seq.Plot Num.)
FORMAT: I6
DATA TYPE: I*4

R1. DWT , Distance to Water Type
Not used prior to 1974
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) Streams (2) Lakes
(3) Swamps (4) Farm ponds

R2. DWS , Distance to Water Size of Water
(acres)
Not used prior to 1982
FORMAT: I3
DATA TYPE: I*2

R3. DWV , Distance to Water Value
(chains)
Not used prior to 1974
FORMAT: I4
DATA TYPE: I*2

R4. DRT , Distance to Road Type of Road
Not used prior to 1974
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) Paved-4 lane (2) Paved-2 lane
(3) Improved-gravel

R5. DRV , Distance to Road Value
(chains)
Not used prior to 1974
FORMAT: I4
DATA TYPE: I*2

R6. NATFOR , National Forest Code
FORMAT: I3
DATA TYPE: I*2
VALUE LABELS: (902) Chequamegon (903) Chippewa
(904) Huron-Manistee (906) Nicolet
(907) Ottawa (908) Shawnee
(909) Superior (910) Hiawatha
(911) Wayne-Hoosier (918) Mark Twain

R7. RANDIST , Ranger District
FORMAT: I2
DATA TYPE: I*2

C3. OWNGP , Ownership Group
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) National forest (2) Other public
(3) Private

R8. PRJOWN , Projected Owner Group
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) National forest (2) Other public
(3) Private

R9. ASPECT , Aspect of Plot Center
(degrees)
Not used prior to 1973
FORMAT: I3
DATA TYPE: I*2

R10. POSITION, Position on Slope
Not used prior to 1973
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) Top quarter (2) Upper quarter
(3) Lower quarter (4) Level or lowest quarter

R11. SLOPE , Slope Angle at Plot Center
(percent)
Not used prior to 1973
FORMAT: I2
DATA TYPE: I*2

R12. PHYCLS , Physiographic Class
(Degree of Wet-Dryness)
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (3) Xeric (4) Xeromesic
(5) Mesic (6) Hydromesic
(7) Hydric

R13. STDORG , Stand Origin
(Planted-Natural)

FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) Natural (2) GE 40 percent artificial
(3) LT 40 percent artificial

R14. SEEDSOR , Seed Source
(Degree of Conifer Seed Source)
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS (1) Adequate softwood (2) Adequate hardwood
(3) Adeq.soft & hard (4) Inadequate all spp.

R15. CUNCOND , Conifer Understory Condition
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) None or inadequate (2) Planted adequate
(3) Planted needs treat. (4) Natural adequate
(5) Natural needs treat.

R16. CUNSPP , Conifer Understory Species
(See appendix for codes)
FORMAT: I3
DATA TYPE: I*2

R17. BACUR , Basal Area Current Value
(sq feet)
FORMAT: I3
DATA TYPE: I*2

R18. BAORG , Basal Area Original Value
(sq feet)
FORMAT: I3
DATA TYPE: I*2

R19. BAPRJ , Basal Area Projected Value
(sq feet)
FORMAT: I3
DATA TYPE: I*2

C4. FORTCUR , Current Forest Type
(See appendix for codes)
FORMAT: I2
DATA TYPE: I*2

R20. FORTPRJ , Projected Forest Type
(See appendix for codes)
FORMAT: I2
DATA TYPE: I*2

R21. SZDNCUR , Current Stand Size-Density

R22. SZDNPRJ , Projected Stand Size-Density
FORMAT: I2
DATA TYPE: I*2
VALUE LABELS:

(11) Sawtimber-Good	(21) Poletimber-Good
(12) Sawtimber-Medium	(22) Poletimber-Medium
(13) Sawtimber-Poor	(23) Poletimber-Poor
(31) Seed-Saps-Good	(40) Nonstocked
(32) Seed-Saps-Medium	
(33) Seed-Saps-Poor	

R23. FORTORG , Original Forest Type
(See appendix for codes)
FORMAT: I2
DATA TYPE: I*2

R24. SZDNORG , Original Stand Size-Density
FORMAT: I2
DATA TYPE: I*2
VALUE LABELS:

(10) Sawtimber	(20) Poletimber
(30) Sapling & seedling	(40) Nonstocked

R25. STDAGE , Stand Age
(years)
FORMAT: I3
DATA TYPE: I*2

R26. PRJAGE , Projected Stand Age
(years)
FORMAT: I3
DATA TYPE: I*2

R27. SITECLS , Site Class
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS:
(1) 225+ cu.ft.
(2) 165 to 225 cu.ft.
(3) 120 to 165 cu.ft.
(4) 85 to 120 cu.ft.
(5) 50 to 85 cu.ft.
(6) Less than 50 cu.ft.

C5. SITEIND , Site Index
(feet at age 50)
FORMAT: I2
DATA TYPE: I*2

R28. SISPP , Site Index Species
(See appendix for codes)
FORMAT: I3
DATA TYPE: I*2

R29. EXPVOL , Volume Expander
(acres)
FORMAT: I5
DATA TYPE: I*4

R30. GSCUVS , Growing Stock CuFt Volume Softwoods
(cubic feet per acre)
FORMAT: I6
DATA TYPE: I*4

R31. GSCUVH , Growing Stock CuFt Volume Hardwoods
(cubic feet per acre)
FORMAT: I6
DATA TYPE: I*4

R32. PRJSVOL , Projected G.S. CuFt Volume Softwoods
(cubic feet per acre)
FORMAT: I6
DATA TYPE: I*4

R33. PRJHVOL , Projected G.S. CuFt Volume Hardwoods
(cubic feet per acre)
FORMAT: I6
DATA TYPE: I*4

R34. STDAREA , Stand Area
(acres)
FORMAT: I3
DATA TYPE: I*2

R35. AREACOND, Stocking Level Class
(See appendix for codes)
FORMAT: I2
DATA TYPE: I*2

R36. GRSTKPC , Growing Stock Tree Stocking
(percent)
FORMAT: I3
DATA TYPE: I*2

Variables C8 (SG01) through C57 (SG50) indicate the presence or absence of a particular species group on the plot. For example, SG01 indicates the presence or absence of jack pine on the plot. If SG01 is 0, then no jack pine was found on the plot. SG01 is 1 when jack pine seedling and/or sapling trees were found, but jack pine poletimber or sawtimber was not. SG01 is 2, jack pine poletimber, but not sawtimber, was present; if SG01 is 3, jack pine sawtimber was present.

C8. SG01 , Presence or Absence of Jack Pine
C9. SG02 , Presence or Absence of Red Pine
C10. SG03 , Presence or Absence of White Pine
C11. SG04 , Presence or Absence of Ponderosa Pine
C12. SG05 , Presence or Absence of Loblolly Pine
C13. SG06 , Presence or Absence of Shortleaf Pine
C14. SG07 , Presence or Absence of Other Yellow Pine
C15. SG08 , Presence or Absence of White Spruce
C16. SG09 , Presence or Absence of Black Spruce
C17. SG10 , Presence or Absence of Balsam Fir
C18. SG11 , Presence or Absence of Hemlock
C19. SG12 , Presence or Absence of Tamarack
C20. SG13 , Presence or Absence of Bald Cypress
C21. SG14 , Presence or Absence of E. Red Cedar
C22. SG15 , Presence or Absence of N. White-cedar
C23. SG16 , Presence or Absence of (not assigned)
C24. SG17 , Presence or Absence of Other Softwoods
C25. SG18 , Presence or Absence of Select White Oak
C26. SG19 , Presence or Absence of Other White Oak
C27. SG20 , Presence or Absence of Select Red Oak

C28. SG21 , Presence or Absence of Other Red Oak
C29. SG22 , Presence or Absence of Select Hickory
C30. SG23 , Presence or Absence of Other Hickory
C31. SG24 , Presence or Absence of Basswood
C32. SG25 , Presence or Absence of Beech
C33. SG26 , Presence or Absence of Yellow Birch
C34. SG27 , Presence or Absence of Hard Maple
C35. SG28 , Presence or Absence of Soft Maple
C36. SG29 , Presence or Absence of Elm
C37. SG30 , Presence or Absence of Black Ash
C38. SG31 , Presence or Absence of White-Green Ash
C39. SG32 , Presence or Absence of Sycamore
C40. SG33 , Presence or Absence of Cottonwood
C41. SG34 , Presence or Absence of Willow
C42. SG35 , Presence or Absence of Hackberry
C43. SG36 , Presence or Absence of Balsam Poplar
C44. SG37 , Presence or Absence of Bigtooth Aspen
C45. SG38 , Presence or Absence of Quaking Aspen
C46. SG39 , Presence or Absence of Paper Birch
C47. SG40 , Presence or Absence of River Birch
C48. SG41 , Presence or Absence of Sweet Gum
C49. SG42 , Presence or Absence of Black Gum and Tupelo
C50. SG43 , Presence or Absence of Black Cherry
C51. SG44 , Presence or Absence of Black Walnut
C52. SG45 , Presence or Absence of Butternut
C53. SG46 , Presence or Absence of Yellow Poplar
C54. SG47 , Presence or Absence of (not assigned)
C55. SG48 , Presence or Absence of (not assigned)
C56. SG49 , Presence or Absence of Other Hardwoods
C57. SG50 , Presence or Absence of Noncommercial
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) Sapling & seedling (2) Poletimber (3) Sawtimber

R37. ROUGHPC , Rough Tree Stocking
(percent)
FORMAT: I3
DATA TYPE: I*2

R38. ROTENPC , Rotten Tree Stocking
(percent)
FORMAT: I3
DATA TYPE: I*2

R39. PRJGSPC , Projected G.S. Tree Stocking
(percent)
FORMAT: I3
DATA TYPE: I*2

R40. PRJRGPC , Projected Rough Tree Stocking
(percent)
FORMAT: I3
DATA TYPE: I*2

R41. PRJRTPC , Projected Rotten Tree Stocking
(percent)
FORMAT: I3
DATA TYPE: I*2

*** RECORD 3 (TREE) DEFINITION ***

Record type 3 (TREE) contains the individual tree data tallied on each plot. The species group variable is set at 1, 2, or 3 on the CIR if a species group is present on the plot; otherwise it is blank or missing, indicating that the species is not present.

```
MAXIMUM RECS/CASE:    250
CASE IDENTIFIER:      IDENT (A)
SORT IDENTIFIER: (1) TRNUM (A)

C6.     IDENT    , Case Identifier
                   (Unit & Seq.Plot Num.)
                 FORMAT:  I6
              DATA TYPE:  I*4

R1.     TRNUM    , Tree Number
                 FORMAT:  I4
              DATA TYPE:  I*2

R2.     TRHIST   , Tree History-Status
                   On remeasurement plots the first
                   digit is original status, the
                   second digit is current status
                 FORMAT:  I2
              DATA TYPE:  I*2
            VALUE LABELS: (0) No status          (1) Growing stock live
                          (2) Cull live          (3) Ingrowth
                          (4) Dead[salvable]     (5) Dead[mortality]
                          (6) Ongrowth           (7) Stump[salvaged]
                          (8) Stump[utilized]    (9) Stump[not utilized]

R3.     PRJHIST , Projected Tree History-Status
                 FORMAT:  I1
              DATA TYPE:  I*1
            VALUE LABELS: (0) No status          (1) Growing stock live
                          (2) Cull live          (3) Ingrowth
                          (5) Dead[mortality]    (8) Stump[utilized]

R4.     SPECIES , Tree Species
                  (See appendix for codes)
                 FORMAT:  I3
              DATA TYPE:  I*2

R5.     DBHORG   , Original Diameter Breast High
                   (inches)
                 FORMAT:  D4.2
              DATA TYPE:  R*8

R6.     DBHCUR   , Current Diameter Breast High
                   (inches)
                 FORMAT:  D4.2
              DATA TYPE:  R*8

R7.     DBHPRJ   , Projected Diameter Breast High
                   (inches)
                 FORMAT:  D4.2
              DATA TYPE:  R*8

R8.     SOUND    , Soundness Code
                 FORMAT:  I1
              DATA TYPE:  I*1

R9.     LOGGR    , Log Grade
                 FORMAT:  I1
              DATA TYPE:  I*1
```

R10. CAVIT , Cavities Code not used prior to 1981
(See appendix for codes)
FORMAT: I2
DATA TYPE: I*2

R11. CRRAT , Crown Ratio
(percent live crown)
FORMAT: I1
DATA TYPE: I*1

R12. PRJCRRAT, Projected Crown Ratio
(percent live crown)
FORMAT: I1
DATA TYPE: I*1

R13. CRCLS , Crown Class
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS:

(1) Open grown	(2) Dominant
(3) Codominant	(4) Intermediate
(5) Overtopped	

R14. DAMDETH , Damage Cause of Death
FORMAT: I2
DATA TYPE: I*2
VALUE LABELS:

(0) None	(10) Insect
(11) Poplar borer	(20) Disease
(21) Phellinus tremulae	(22) Hypoxylon canker
(23) Other cankers	(24) Blister rust
(25) Dwarf mistletoe	(26) Shoot blights
(27) Butternut canker	(28) Nectria canker
(29) Eutypella canker	(30) Fire
(40) Animal	(41) Beaver
(42) Cattle	(43) Deer
(44) Porcupine	(45) Sapsuckers
(50) Weather	(60) Suppression
(70) Unknown	(71) Missing or dead top
(72) Poor form	(80) Logging
(81) Logging	(82) Timber stand imp.
(84) Land clearing	(85) Conversion

R15. TRCLS , Tree Class
R16. PRJTRCLS, Projected Tree Class
FORMAT: I2
DATA TYPE: I*2
VALUE LABELS:

(10) Growing stock des.	(20) Growing stock acc.
(30) Cull rough	(31) Cull short-log
(40) Cull rotten	

R17. PTOCC , Point Occupancy
FORMAT: I1
DATA TYPE: I*1

R18. EXPANDR , Number of Trees Per Acre
FORMAT: D4.2
DATA TYPE: R*8

R19. PRJEXPD , Projection Factor
(num. trees per acre)
FORMAT: D4.2
DATA TYPE: R*8

R20. MORTFAC , Mortality Factor
(num. trees per acre per year)
FORMAT: D4.2
DATA TYPE: R*8

R21. NCSPGP , North Central Species Group

FORMAT: I2

VALUE LABELS:

(1) Jack pine	(2) Red pine
(3) White pine	(4) Ponderosa pine
(5) Loblolly pine	(6) Shortleaf pine
(7) Other yellow pines	(8) White spruce
(9) Black spruce	(10) Balsam fir
(11) Hemlock	(12) Tamarack
(13) Bald cypress	(14) Eastern redcedar
(15) Northern white-cedar	(16)
(17) Other softwoods	(18) Select white oak
(19) Other white oak	(20) Select red oak
(21) Other red oak	(22) Select hickory
(23) Other hickory	(24) Basswood
(25) Beech	(26) Yellow birch
(27) Hard maple	(28) Soft maple
(29) Elm	(30) Black ash
(31) White & green ash	(32) Sycamore
(33) Cottonwood	(34) Willow
(35) Hackberry	(36) Balsam poplar
(37) Bigtooth aspen	(38) Quaking aspen
(39) Paper birch	(40) River birch
(41) Sweetgum	(42) Blackgum and tupelo
(43) Black cherry	(44) Black walnut
(45) Butternut	(46) Yellow poplar
(47)	(48)
(49) Other hardwoods	(50) Noncommercial spp.

R22. TRSZCLS , Tree Size Class

FORMAT: I1

DATA TYPE: I*1

VALUE LABELS: (1) Sapling & seedling (2) Poletimber
(3) Sawtimber

R23. PRJTRSZ , Projected Tree Size Class

FORMAT: I1

DATA TYPE: I*1

VALUE LABELS: (1) Seeds & saps
(2) Poletimber
(3) Sawtimber

R24. TRSIND , Tree Site Index
(feet age 50)

FORMAT: I2

DATA TYPE: I*2

R25. NETCUVL , Net Cubic Foot Volume in Tree
(cubic feet per acre)

FORMAT: I6

DATA TYPE: I*4

R26. PRJNCVL , Projected Net CuFt Volume in Tree
(cubic feet per acre)

FORMAT: I6

DATA TYPE: I*4

RECORD 4 (SHRUBT) DEFINITION ***

Record type 4 (SHURBT) contains the data tallied for tall woody shrubs on forest plots.

```
MAXIMUM RECS/CASE:   100
CASE IDENTIFIER:     IDENT (A)
SORT IDENTIFIER: (1) SBTNUM (A)

C6.     IDENT    , Case Identifier
                   (Unit & Seq.Plot Num.)
                 FORMAT:  I6
              DATA TYPE:  I*4

R1.     SBTNUM   , Shrub Number-Tall
                 FORMAT:  I4
              DATA TYPE:  I*2

R2.     SHRUBSP  , Shrub Species-Tall
                   (See appendix for codes)
                 FORMAT:  I3
              DATA TYPE:  I*2

R3.     DIACLS   , Diameter Class
                   (inches)
                 FORMAT:  I2
              DATA TYPE:  I*2
            VALUE LABELS: (1) 0.0-0.19        (2) 0.2-0.29
                          (3) 0.3-0.39        (4) 0.4-0.49
                          (5) 0.5-0.99        (10) 1.0-1.49
                          (15) 1.5-1.99       (20) 2.0-2.49
                          (25) 2.5-2.99       (30) 3.0-3.49
                               etc.

R4.     COUNT    , Count of Number of Individuals
                 FORMAT:  I3
              DATA TYPE:  I*2

R5.     EXPSHUT  , Expander for Shrub Tall
                   (shrubs per acre)

                 FORMAT:  D4.2
              DATA TYPE:  R*8
```

*** RECORD 5 (SHRUBL) DEFINITION ***

Record type 5 (SHRUBL) contains the data tallied for low herbaceous shrubs on forest plots.

```
MAXIMUM RECS/CASE:   30
CASE IDENTIFIER:     IDENT (A)

SORT IDENTIFIER: (1) SBLNUM (A)

C6.     IDENT    , Case Identifier
                   (Unit & Seq.Plot Num.)
                 FORMAT:  I6
              DATA TYPE:  I*4

R1.     SBLNUM   , Shrub Number-Low
                 FORMAT:  I4
              DATA TYPE:  I*2

R2.     SHUSPL   , Shrub Species-Low
                   (See appendix for codes)
                 FORMAT:  I3
              DATA TYPE:  I*2
```

R3. COVER , Percent Ground Cover
FORMAT: I1
DATA TYPE: I*1
VALUE LABELS: (1) Solitary Plant (2) Few Plants LT 5 percent
(3) Numerous Plants (4) 5-25 percent
(5) 25-50 percent (6) 50-90 percent
(7) 90-100 percent

R4. EXPSHUL , Expander for Low Shrub
(shrubs per acre)
FORMAT: D4.2
DATA TYPE: R*8

*** RECORD 6 (SITETR) DEFINITION ***

Record type 6 (SITETR) contains data tallied for site trees on forest plots.

MAXIMUM RECS/CASE: 10
CASE IDENTIFIER: IDENT (A)

SORT IDENTIFIER: (1) TRNUM (A)

C6. IDENT , Case Identifier
(Unit & Seq.Plot Num.)
FORMAT: I6
DATA TYPE: I*4

R1. TRNUM , Tree Number
FORMAT: I4
DATA TYPE: I*2

R2. DBHSI , Diameter Breast High Site Index Tree
(inches)
FORMAT: D3.1
DATA TYPE: R*8

R3. SPPSI , Species Site Index Tree
(See appendix for codes)
FORMAT: I3
DATA TYPE: I*2

R4. HTSI , Height Site Index Tree
(feet)
FORMAT: I3
DATA TYPE: I*2

R5. AGESI , Total Age Site Index Tree
(years)
FORMAT: I3
DATA TYPE: I*2

R6. YRSADD , Years Added to DBH Age for Total Age
FORMAT: I2
DATA TYPE: I*2

RECORD 7 (POINT) DEFINITION ***

Record type 7 (POINT) contains data tallied for nonstocked points on forest plots.

```
MAXIMUM RECS/CASE:    10
CASE IDENTIFIER:      IDENT (A)

SORT IDENTIFIER: (1) PTNUM (A)

C6.      IDENT    , Case Identifier
                      (Unit & Seq.Plot Num.)
                 FORMAT:  I6
              DATA TYPE:  I*4

R1.      PTNUM    , Point Number
                 FORMAT:  I4
              DATA TYPE:  I*2

R2.      PTCLS    , Point Class
                 FORMAT:  I2
              DATA TYPE:  I*2
            VALUE LABELS: (50) Inhibiting Vegetation
                          (51) Inhib. Veg.-Grass
                          (52) Inhib. Veg.-Shrubs
                          (53) Inhib. Veg.-Vines
                          (54) Inhib. Veg.-Other
                          (60) Nonstocked
                          (70) Overtopped
                          (80) Nonstockable
                          (81) Nonstockable-Rocks
                          (82) Nonstockable-Water
                          (83) Nonstockable-Other
```

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SECTION III.--STORED PROCEDURES

The Procedure File is a part of a SIR data base. "This file contains members which may be texts of commands, data or anything a user wishes to store with the data base. Typically, these texts will be frequently used SIR retrieval programs or other SIR command sequences.

"Each member in the Procedure File is identified by a member name and, optionally, a family name. Members are said to belong to a family and must have a unique name within the family." (Robinson et al. 1980).

We have created three families of procedures that we believe will be useful to users: COEF, LABEL, and VOLUME. Family COEF contains the coefficients needed to compute gross and net volumes using the equations presented by Hahn 1984, Smith and Weist 1982, Hahn 1976, Hahn 1975. Family LABEL contains procedures useful in making tables indexed by various data items. Family VOLUME contains the procedures for computing volumes in board feet, cubic feet, or green tons.

Procedure	
COEF.BDFT:T	
COEF.CUFT:T	
COEF.CUSL:T	
COEF.GRTONS:T	
COEF.HEIGHT:T	
VOLUME.BDFT20:T	These volume procedures compute the gross and net
VOLUME.BDFT31:T	cubic or board foot volume for the indicated tree
VOLUME.CUFT20:T	class from the tree d.b.h., top diameter outside bark
VOLUME.CUFT30:T	and species group. They are implemented by
VOLUME.CUFT40:T	CALL VOLUME.xxxxxx(Dbh,tdob,sp.gp.)
VOLUME.GRTONS:T	Computes biomass in green tons.
VOLUME.HEIGHT:T	Computes total or merchantable height.

Procedure	Description
LABEL.BACLASS:T	Computes an index and labels in variable BACLS for stand basal area using the variable BACUR.
LABEL.CONUNS:T	Computes an index and labels in variable CONUN for conifer understory using the variable CUNCOND.
LABEL.DBHCLS:T	Computes an index and labels in variables DIACLS1, DIACLS5, and DIACLS9 for 2-inch diameter class using the variable DBHCUR.
LABEL.DEATH:T	Computes an index and labels in variable DEATH for cause of death using the variable DAMDETH.
LABEL.LANDCLS:T	Computes an index and labels in variable LANDUSE for ground land use using the variables GLUCUR and FORTCUR.
LABEL.LIVE:T	Computes an index and labels in variable LIVE for tree history of live trees using the variable TRHISTCU.
LABEL.LOGGRD:T	Computes an index and labels in variable LOGGRD for tree log grade using the variable LOGGR.
LABEL.OWNER:T	Computes an index and labels in variable OWNER for stand owner class using the variable OWNGP.
LABEL.SICLS:T	Computes an index and labels in variable SICLS for stand site index using the variable SITEIND.
LABEL.SPECIES:T	Computes an index and labels in variables SPECIEC and SPECIESN for individual tree species of commercial and noncommercial species, respectively, using the variable SPECIES.
LABEL.STCLGR:T	Computes an index and labels in variable BACLS for stand basal area using the variable BACUR.
LABEL.STDAGE:T	Computes an index and labels in variable STDAGECL for stand age using the variable STDAGE.
LABEL.STDVOL:T	Computes an index and labels in variable STDVOLCL for stand volume class using the variables GSCUVS and GSCUVH.
LABEL.SWDHWD:T	Computes an index and labels in variable SWDHWD for major tree species group using the variable SPECIES.
LABEL.TRCLASS:T	Computes an index and labels in variable TRCLASS for tree class using the variable TRCLS.

LABEL.TYPESZ:T	Computes an index and labels in variables FORTYPE and SZCLS for forest type and stand size class, respectively, using the variables FORTCUR and SZDNCUR.
LABEL.U1COUNTY:T LABEL.U2COUNTY:T LABEL.U3COUNTY:T LABEL.U4COUNTY:T LABEL.U5COUNTY:T	These procedures compute an index and labels in variable COUNTY for county code using the variable UNTCO.

SECTION IV.--EXAMPLE RETRIEVALS

The following is a simple retrieval that will produce a table of area of commercial forest land by ownership group and forest type for a five-county area in central Wisconsin. The submit file shown below has two main parts, the Cyber control statements and the SIR retrieval statements. The Cyber control statements are the first part of the file, up through "/EOR" statement. These statements identify the user number, set time limits, execute SIR, save output files, and send the output files to the printer. This part of the submit file will be basically the same for all retrievals. For information on these commands, see the University of Minnesota Computer Center User's Manual. The remainder of the submit file contains SIR retrieval statements that are used to retrieve the needed data and construct the output table. This part of the submit file will be different for every retrieval. For information on these commands, see the SIR Version 2 User's Manual and SIR/DBMS TABLE Procedure Reference Guide.

```
**************************************************************************************
/JOB
/NOSEQ
MHH,T20.
/USER
FETCH,SIR.
SIR.
RETAIN,EXAM1TB.
GOFO,COST.
EXIT.
COST.
DAYFILE.
RETAIN,OUTPUT=EXAM1OT.
ROUTE,OUTPUT,DC=PR,TID=BC,BIN=R69,EC=A9.
ROUTE,EXAM1OT,DC=PR,TID=BC,BIN=R69,EC=A9.
/EOR
OLD FILE        WISSOU
PASSWORD        WISSOU
SECURITY        WISSOU,WISSOU
PAGESIZE        63,89
RETRIEVAL
PROCESS CASE    LIST = 300000 THRU 399999
INCLUDE         FORTYPE,OWNGP,EXPAREA


.  IF      (GLUCUR GT 22) NEXT CASE
.  IFNOT   (UNTCO EQ 301 OR 308 OR 310 OR 311 OR 312 ) NEXT CASE
.  PROCESS REC 2
.    MOVE VARS OWNGP,EXPAREA
.    CALL LABEL.TYPESZ
.  END PROCESS REC
.  PERFORM PROCS
END PROCESS CASE
TABLE FORTYPE.T, OWNGP.T BY EXPAREA.O/
      FILENAME=EXAM1TB/
      PAGELENGTH=63/PAGEWIDTH=89/HEADERWIDTH=12/
      STUBTITLE = 'Forest type'/
      WAFERTITLE =
    'Example 1.--Area of commercial forest land by ownership'
    'and forest type, Adams, Marquette, Portage, Waupaca, and'
    'Waushara counties, Wisconsin, 1983.'
    'North Central Forest Experiment Station FI&A Data Base.'
    '     '
    '(In acres)'/
      NOOVERPRINTING/NOBOLDPRINTING
END RETRIEVAL
FINISH
```

The following table was produced by this retrieval and retained in the file EXAM1TB.

****

/DBMS Table Procedure

Example 1.--Area of commercial forest land by ownership and forest type, Adams, Marquette, Portage, Waupaca, and Waushara counties, Wisconsin, 1983.

North Central Forest Experiment Station FI&A Data Base.

(In acres)

Forest type	TOTAL	National forest	Other public	Private
	Area expander		Area expander	
TOTAL.....	821100	0	31600	789500
Jack pine.....	51500	0	0	51500
Red pine.....	85700	0	0	85700
White pine.....	25100	0	2300	22800
Balsam fir.....	7200	0	0	7200
White spruce.....	0	0	0	0
Black spruce.....	0	0	0	0
Northern white-cedar	13900	0	0	13900
Tamarack.....	13700	0	0	13700
Oak-hickory.....	290300	0	11500	278800
Elm-ash-soft maple..	100400	0	2200	98200
Maple-birch.....	103400	0	4400	99000
Aspen.....	91100	0	11200	79900
Paper birch.....	18300	0	0	18300
Exotic.....	2200	0	0	2200
Nonstocked.....	18300	0	0	18300

The following listing was produced in example 1 and retained in the file EXAM1OT.

```
*******************************************************************************

 R / D B M S  2 . 1 . 1       (SIR/DBMS 2.1.1)    01/12/84  16:15:52  PAGE    1

          OLD FILE          WISSOU
          PASSWORD       XXXXXXXXXXXXXXX
          SECURITY       XXXXXXXXXXXXXXX
          PAGESIZE          63,89
    5     RETRIEVAL
          PROCESS CASE      LIST = 300000 THRU 399999
          INCLUDE           FORTYPE,OWNGP,EXPAREA
          .  IF     (GLUCUR GT 22) NEXT CASE
          .  IFNOT  (UNTCO EQ 301 OR 308 OR 310 OR 311 OR 312 ) NEXT CASE
   10     .  PROCESS REC 2
          .    MOVE VARS OWNGP,EXPAREA
          .    CALL LABEL.TYPESZ
1.10      .    RECODE       FORTYPE=FORTCUR(1=1)(2=2)(3=3)(6=14)(13=4)(12=6)
1.20                                       (16=5)(14=7)(15=8)(50=9)(70=10)
1.30                                       (80=11)(91=12)(92=13)
1.40      .    IF           (SZDNCUR EQ 40) FORTYPE = 15
1.50      .    COMPUTE      STDSZCLS = TRUNC(SZDNCUR/10)
1.60      .    VAR RANGES   STDSZCLS(1,4)/
1.70                        FORTYPE(1,15)
1.80      .    VAR LABELS   STDSZCLS Stand size class/
1.90                        FORTYPE  Forest type
1.100     .    VALUE LABELS STDSZCLS (1) Sawtimber
1.110                                  (2) Poletimber
1.120                                  (3) Sapling & seedling
1.130                                  (4) Nonstocked/
1.140                       FORTYPE  (1) Jack pine
1.150                                (2) Red pine
1.160                                (3) White pine
1.170                                (4) Balsam fir
1.180                                (5) White spruce
1.190                                (6) Black spruce
1.200                                (7) Northern white-cedar
1.210                                (8) Tamarack
1.220                                (9) Oak-hickory
1.230                                (10) Elm-ash-soft maple
1.240                                (11) Maple-birch
1.250                                (12) Aspen
1.260                                (13) Paper birch
1.270                                (14) Exotic
1.280                                (15) Nonstocked
          .  END PROCESS REC
          .  PERFORM PROCS
    15    END PROCESS CASE
          TABLE FORTYPE.T, OWNGP.T BY EXPAREA.O/

                FILENAME=EXAM1TB/
                PAGELENGTH=63/PAGEWIDTH=89/HEADERWIDTH=12/
                STUBTITLE = 'Forest type'/
    20          WAFERTITLE =
              'Example 1.--Area of commercial forest land by ownership'
              'and forest type, Adams, Marquette, Portage, Waupaca, and'
              'Waushara counties, Wisconsin, 1983.'
              'North Central Forest Experiment Station FI&A Data Base.'
    25        '     '
              '(In acres)'/
                NOOVERPRINTING/NOBOLDPRINTING
          END RETRIEVAL
          FINISH
```

```
FULL  DAYFILE.  84/01/12. 16.19.19.* AKZIBDK* PAGE    1

 AKZIBDK. 84/01/12.UOFM CYBER A (01/02-BO).
16.15.44.MHH,T20.
16.15.44.$USER(WXL6007,)
16.15.44. FAMILY PARAMETER MISSING.  FAMILY CA ASSUMED.
16.15.46.FETCH,SIR.
16.15.52.SIR.
16.15.53.*** REMARK ***  BEGIN SIR/DBMS 2.1.1 RUN.
16.15.55.*** REMARK ***  TASK TABLE SPACE USED:    126
16.15.55.*** REMARK ***  TOTAL CPU TIME USED (MS): 37
16.15.56.*** REMARK ***   START RETRIEVAL TRANSLATION.
16.16.05.*** REMARK ***   START RETRIEVAL EXECUTION.
16.19.17.*** REMARK ***   RETRIEVAL COMPLETE.
16.19.18.*** REMARK ***  TASK TABLE SPACE USED:    4355
16.19.18.*** REMARK ***  TOTAL CPU TIME USED (MS): 7845
16.19.18.*** REMARK ***  END SIR RUN:          0
16.19.18.*** REMARK ***  TOTAL CPU TIME (MS): 7855
16.19.18.*** REMARK ***  TABLE SPACE    USED: 4355
16.19.18.*** REMARK ***  FIELD LENGTH   USED: 36800
16.19.19.RETAIN,EXAM1TB.
16.19.19. EXAM1TB PURGED.
16.19.19. PERMANENT FILE EXAM1TB, 7 PRUS.
16.19.19.GOFO,COST.
16.19.19.COST.
16.19.19. ACCUMULATED JOB COST - UNIVERSITY RATE.
16.19.19. CP       7.906 SEC.
16.19.19. MS      57.732 KUN.
16.19.19. PF        .108 KUN.
16.19.19. CM      69.470 KWD.
16.19.19. SR      21.555 UNS.
16.19.19. CURRENT JOB COST =     $ 3.23
16.19.19.DAYFILE.
```

****

Example 1.

This is a simple retrieval that produces a commonly requested table for a specific area. The retrieval uses the PROCESS CASE command to restrict the retrieval to the desired forest survey unit. An IF statement is used to further restrict the retrieval to only commercial forest land and an IFNOT statement is used to restrict it to the desired five-county area. Becasuse the retrieval requires only data stored in record type 2 , only that record is accessed. Two of the variables required to construct the table (OWNGP and AREAEXP) are stored as needed in the data base and can be moved to the summary record with a MOVE VARS command. A stored procedure TYPESZ is called to compute FORTYPE from FORTCUR to reduce the space needed to produce the output table. The cost shown for this example is based on daytime rates for university or affiliated users. Higher rates are charged to private and corporate users; lower rates are charged for jobs submitted to be run in the evening or overnight.

Two more example retrievals follow. Although these retrievals are more complicated, they are basically extensions of the first example. Only the SIR retrieval statements section of the submit file are shown for these examples because the Cyber control statements do not differ.

Example 2.

This retrieval produces two different outputs, a table and a data file, for a single county. The table presents number of ground plots, area of commercial forest land, and average softwood and hardwood volume per acre by forest type. The data file contains two types of records: (1) a plot record that is identified by a 1 in the first column and (2) tree records that have a 2 in column one.

```
**************************************************************************************

OLD FILE          WISSOU
PASSWORD          WISSOU
SECURITY          WISSOU,WISSOU
PAGESIZE          63,89
RETRIEVAL
PROCESS CASE      LIST = 300000 THRU 399999
INCLUDE           IDENT,FORTCUR,EXPAREA,OWNGP,SITEIND,
                  TRNUM,DBHCUR,TRHIST,NCSPGP,EXPANDR,GSCUVS,GSCUVH
.  IFNOT  (UNTCO EQ 302) NEXT CASE
.  IF     (GLUCUR GT 22) NEXT CASE
.  PROCESS REC 2
.    MOVE VARS IDENT,FORTCUR,OWNGP,SITEIND,GSCUVS,GSCUVH,EXPAREA
COMMENT ========== COMPUTE FOREST TYPE ====================
.    CALL LABEL.TYPESZ
COMMENT ========== ROUND ACRES FOR TABLE ====================
.    COMPUTE    MACRES = RND(EXPAREA/100)/10
.    VAR LABEL  MACRES Area (Thousand acres)/
COMMENT ========== GENERATE A PLOT RECORD ==================
.    WRITE       '1 ' IDENT (I6), UNTCO (I3), FORTCUR (I4), EXPAREA (I7),
                 OWNGP (I3), SITEIND (I5)
.  END PROCESS REC
.  PROCESS REC   3
.    MOVE VARS    IDENT,TRNUM,DBHCUR,TRHIST,NCSPGP,EXPANDR
COMMENT ========== GENERATE A TREE RECORD ==================
.    WRITE       '2 ' IDENT (I6), TRNUM (I5), DBHCUR (F5.1), TRHIST (I3),
                  NCSPGP (I3), EXPANDR (I3)
.  END PROCESS REC
.  PERFORM PROCS
END PROCESS CASE
TABLE FORTYPE THEN TOTFT, N THEN MACRES.0 THEN (GSCUVS THEN GSCUVH) BY MEAN/
      FILENAME=EXAM2TB/
      PRINTFORMAT = N(C,0) MACRES(C,1) CSUVS(C,0) GSCUVH(C,0)/
      TOTAL= N 'Number of plots' TOTFT 'All types'/
      MEAN = MEAN '(cubic feet per acre)'/
      PAGETITLE = 'Example 2.'/
          PAGELENGTH = 63/
      PAGEWIDTH = 89/
      HEADERDIVIDER = ' '/
      STUBDIVIDER = '-'/
      STUBFILLER = ' '/
      HEADERWIDTH = 12/
      STUBTITLE = 'Forest type'/
      WAFERTITLE =
      'Example 2.--Number of plots, area of commercial forest land,'
      'and average softwood and hardwood volume per acre,'
      'Chippewa County, Wisconsin, 1983'/
      NOLEFTBORDER/NORIGHTBORDER/
      NOZEROS/NOEMPTYROWS/
      NOOVERPRINTING/NOBOLDPRINTING
END RETRIEVAL
FINISH
```

The following table was produced by this retrieval and retained in the file EXAM2TB.

****

Example 2. Page 1

Example 2.--Number of plots, area of commercial forest land, and average softwood and hardwood volume per acre, Chippewa County, Wisconsin, 1983

Forest type	Number of plots	Area (Thousand acres)	Growing stock cubic foot volume softwood (cubic feet per acre)	Growing stock cubic foot volume hardwood (cubic feet per acre)
Jack pine	1	2.5	631	-
White pine	2	5.0	1496	148
Black spruce	1	2.4	72	-
Tamarack	3	7.3	520	263
Oak-hickory	11	27.1	87	1,071
Elm-ash-soft maple	16	39.4	15	596
Maple-birch	32	77.8	31	938
Aspen	19	47.0	34	1,040
Paper birch	6	14.7	114	749
Nonstocked	1	2.5	-	133
All types	92	225.7	95	835

The following listing was produced in example 2 and retained in the file EXAM2OT. The data file was written by the two WRITE statements and is part of this output file. Only a portion of the data file is shown.

****

```
S I R / D B M S  2 . 1 . 1          (SIR/DBMS 2.1.1)        01/23/84  16:25:07  PAGE     1

          OLD FILE          WISSOU
          PASSWORD       XXXXXXXXXXXXXXX
          SECURITY       XXXXXXXXXXXXXXX
          PAGESIZE          63,89
    5     RETRIEVAL
          PROCESS CASE      LIST = 300000 THRU 399999
          INCLUDE           IDENT,FORTCUR,EXPAREA,OWNGP,SITEIND,
                            TRNUM,DBHCUR,TRHIST,NCSPGP,EXPANDR,GSCUVS,GSCUVH
          .  IFNOT  (UNTCO EQ 302) NEXT CASE
   10     .  IF     (GLUCUR GT 22) NEXT CASE
          .  PROCESS REC 2
          .    MOVE VARS IDENT,FORTCUR,OWNGP,SITEIND,GSCUVS,GSCUVH,EXPAREA
          COMMENT ========== COMPUTE FOREST TYPE ====================
          .    CALL LABEL.TYPESZ
               .    CALL LABEL.TYPESZ
  1.10 .  RECODE        FORTYPE=FORTCUR(1=1)(2=2)(3=3)(6=14)(13=4)(12=6)
  1.20                                 (16=5)(14=7)(15=8)(50=9)(70=10)
  1.30                                 (80=11)(91=12)(92=13)
  1.40 .  IF            (SZDNCUR EQ 40) FORTYPE = 15
  1.50 .  COMPUTE       STDSZCLS = TRUNC(SZDNCUR/10)
  1.60 .  VAR RANGES    STDSZCLS(1,4)/
  1.70                  FORTYPE(1,15)
  1.80 .  VAR LABELS    STDSZCLS Stand size class/
  1.90                  FORTYPE  Forest type
  1.100 . VALUE LABELS STDSZCLS (1) Sawtimber
  1.110                         (2) Poletimber
```

```
1.120                              (3) Sapling & seedling
1.130                              (4) Nonstocked/
1.140                    FORTYPE   (1) Jack pine
1.150                              (2) Red pine
1.160                              (3) White pine
1.170                              (4) Balsam fir
1.180                              (5) White spruce
1.190                              (6) Black spruce
1.200                              (7) Northern white-cedar
1.210                              (8) Tamarack
1.220                              (9) Oak-hickory
1.230                              (10) Elm-ash-soft maple
1.240                              (11) Maple-birch
1.250                              (12) Aspen
1.260                              (13) Paper birch
1.270                              (14) Exotic
1.280                              (15) Nonstocked

  15        COMMENT ========== ROUND ACRES FOR TABLE ====================
            .    COMPUTE    MACRES = RND(EXPAREA/100)/10
            .    VAR LABEL  MACRES Area (Thousand acres)/
            COMMENT ========== GENERATE A PLOT RECORD ====================
            .    WRITE       '1 ' IDENT (I6), UNTCO (I3), FORTCUR (I4), EXPAREA (I7),
  20                         OWNGP (I3), SITEIND (I5)
            .  END PROCESS REC
            .  PROCESS REC   3
            .    MOVE VARS    IDENT,TRNUM,DBHCUR,TRHIST,NCSPGP,EXPANDR
            COMMENT ========== GENERATE A TREE RECORD ====================
  25        .    WRITE       '2 ' IDENT (I6), TRNUM (I5), DBHCUR (F5.1), TRHIST (I3),
                              NCSPGP (I3), EXPANDR (I3)
            .  END PROCESS REC
            .  PERFORM PROCS
            END PROCESS CASE

  30        TABLE FORTYPE THEN TOTFT, N THEN MACRES.0 THEN (GSCUVS THEN GSCUVH) BY MEAN/
                  FILENAME=EXAM2TB/
                  PRINTFORMAT = N(C,0) MACRES(C,1) CSUVS(C,0) GSCUVH(C,0)/
                  TOTAL= N 'Number of plots' TOTFT 'All types'/
                  MEAN = MEAN '(cubic feet per acre)'/
  35              PAGETITLE = 'Example 2.'/
                  PAGELENGTH = 63/
                  PAGEWIDTH = 89/
                  HEADERDIVIDER = ' '/
                  STUBDIVIDER = '-'/
  40              STUBFILLER = ' '/
                  HEADERWIDTH = 12/
                  STUBTITLE = 'Forest type'/
                  WAFERTITLE =
                  'Example 2.--Number of plots, area of commercial forest land,'
  45              'and average softwood and hardwood volume per acre,'
                  'Chippewa County, Wisconsin, 1983'/
                  NOLEFTBORDER/NORIGHTBORDER/
                  NOZEROS/NOEMPTYROWS/
                  NOOVERPRINTING/NOBOLDPRINTING
  50        END RETRIEVAL
1 300197302  50   2500  4   84
2 300197  101  6.0  1 20 19
2 300197  102  4.3  1 20100
2 300197  201 13.3  1 38  4
2 300197  202  7.3  1 21 13
2 300197  203  6.0  1 18 19
2 300197  301 13.9  1 38  4
2 300197  302  9.1  1 21  8
2 300197  401  1.5  2 50  0
2 300197  402  1.7  2 50  0
            .
            .
            .
1 354220302  91   2400  4   64
```

```
 2 354220   101   0.0 31 38100
 2 354220   102   0.0 31 38100
 2 354220   201   1.0 31 38100
 2 354220   301   0.0 31 38100
 2 354220   302   0.0 31 38100
 2 354220   303   0.0 31 38100
 2 354220   401   0.0 31 38   0
 2 354220   402   2.2 31 38   0
 2 354220   601   1.6 61 38   0
 2 354220   701   0.0 31 38   0
 2 354220   702   0.0 31 38   0
 2 354220   703   0.0 31 38   0
 2 354220   704   0.0 31 38   0
 2 354220   705   0.0 31 38   0
 2 354220   706   0.0 31 38   0
 2 354220   707   0.0 31 38   0
 2 354220   801   1.7 61 38   0
 2 354220   901   0.0 31 39   0
 2 354220   902   0.0 31 28   0
 2 354220   903   0.0 31 28   0
           FINISH

*************************************************************************************
```

This example was run at normal rates, used 10.995 seconds of central processing time, and cost $4.21 at university rates.

Example 3.

The following retrieval extracts the data for all plots located in a geographic area defined as a circle or a convex polygon, using Universal Transverse Mercator (UTM) coordinates. This retrieval also demonstrates the use of arrays, a FOR loop, and a WHILE loop to extract data for a pentagon-shaped area in the Upper Peninsula of Michigan. Only the retrieval is shown; any appropriate tables could be constructed using the selected plots and the previously described TABLE procedures.

```
*************************************************************************
OLD FILE            MICHUP
PASSWORD            MICHUP
SECURITY            MICHUP,MICHUP
PAGESIZE            58,136
RETRIEVAL
CALL COEF.HEIGHT
CALL COEF.CUFT
.  EXCLUDE          C2A1 TO C2A50,C2B1 TO C2B50,C2C1 TO C2C50,C3C1 TO C3C50,
                    C4C1 TO C4C50,HTA1 TO HTA50,HTB1 TO HTB50,HTC1 TO HTC50,
                    HTD1 TO HTD50,HTE1 TO HTE50,HTF1 TO HTF50
COMMENT Procedure to determine if a given UTM location is within
            a specified circle or convex polygon. The following
            variables are used.
            NCORNER = The number of sides(corners/vertices) of the
                      polygon. If NCORNER = 1 a circle is assumed.
                      If NCORNER = 0 a county retrieval is assumed.
```

```
            NZONE    = The UTM zone for the supplied coordinates.
            XCORD1 TO XCORD10 = Up to 10 values for the EASTING

                       coordinate of each of the verticies.
            YCORD1 TO YCORD10 = Up to 10 values for the NORTHING

                       coordinate of each of the verticies.
            If NCORNER = 1 XCORD1, YCORD1 is the coordinate of

                         the center of the circle.
               NCORNER = 0 XCORD contains Unit,County(UNTCO) codes

                         for counties to be retrieved and RADIUS

                         contains the number of counties to be retrieved.

            RADIUS = Radius of the circle in kilometers for a circle

                     retrieval or the number of counties for a county

                     retrieval.

.  SET             NCORNER,RADIUS,XCORD1 TO XCORD10,YCORD1 TO YCORD10,
                   XMAX,XMIN,YMAX,YMIN,XT1 TO XT3,YT1 TO YT3,A1 TO A3,
                   B1 TO B3,V1 TO V3(0)
COMMENT Enter data to define search area.
.  COMPUTE         NCORNER = 5;
                   RADIUS = 80;
                   NZONE = 16
COMMENT Enter coordinates of verticies XCORD are Easting and
        YCORD are northing.
.  COMPUTE         XCORD1 =  323;YCORD1 = 5194;
                   XCORD2 =  350;YCORD2 = 5160;
                   XCORD3 =  330;YCORD3 = 5101;
                   XCORD4 =  200;YCORD4 = 5140;
                   XCORD5 =  290;YCORD5 = 5180;
                   XCORD6 =    0;YCORD6 =    0;
                   XCORD7 =    0;YCORD7 =    0;
                   XCORD8 =    0;YCORD8 =    0;
                   XCORD9 =    0;YCORD9 =    0;
                   XCORD10=    0;YCORD10=    0
.  IFTHEN          (NCORNER GE 3)
COMMENT Define square containing subject polygon.
.    COMPUTE       XMAX = XCORD1; YMAX = YCORD1;
                   XMIN = XCORD1; YMIN = YCORD1
.    FOR           I = 2,NCORNER
.      COMPUTE     XTEST = XCORD1 TO XCORD10(I);
                   YTEST = YCORD1 TO YCORD10(I)
.      IF          (XTEST GT XMAX) XMAX = XTEST
.      IF          (XTEST LT XMIN) XMIN = XTEST
.      IF          (YTEST GT YMAX) YMAX = YTEST
.      IF          (YTEST LT YMIN) YMIN = YTEST
.    END FOR
.  ELSE
.  ENDIF
SET                NPLTS,NTRS,NSUM(0)
PROCESS CASES      SAMPLE=.20,31
COMMENT Select commercial forest plots only.
.  IFNOT           (GLUCUR LE 29) NEXT CASE
.  PROCESS REC     1
.    COMPUTE       UTME=UTMEAST;UTMN=UTMNORTH
.    MOVE VARS     UNTCO
COMMENT OUT = 1 is true; 0 is false.
.    IFTHEN        (NCORNER EQ 0)
```

```
COMMENT Search is a county retrieval.
.       COMPUTE     OUT = 1
.       FOR         I = 1,RADIUS
.         IF        (UNTCO EQ XCORD1 TO XCORD10(I)) OUT = 0
.       END FOR
.     ELSEIF        (NCORNER EQ 1)
COMMENT Search area is a circle.
    Correct easting for zone change. 460 kilometers used for
     northern Michigan and Wisconsin.
.       IFTHEN      (UTMZONE NE NZONE)
.         IFTHEN    (UTMZONE LT NZONE)
.           COMPUTE UTME = UTME - 460
.         ELSE
.           COMPUTE UTME = UTME + 460
.         ENDIF
.       ELSE
.       ENDIF
.       COMPUTE     OUT = 1
.       COMPUTE     DISTANCE = (UTME-XCORD1)**2 + (UTMN-YCORD1)**2
.       IF          ((RADIUS - DISTANCE) GE 0.0) OUT = 0
.     ELSE
COMMENT Search area is a polygon.
      Correct easting for zone change. 460 kilometers used for
      northern Michigan and Wisconsin.
.       IFTHEN      (UTMZONE NE NZONE)
.         IFTHEN    (UTMZONE LT NZONE)
.           COMPUTE UTME = UTME - 460
.         ELSE
.           COMPUTE UTME = UTME + 460
.         ENDIF
.       ELSE
.       ENDIF
.       IFTHEN      (UTME GT XMAX OR UTME LT XMIN OR
                     UTMN GT YMAX OR UTMN LT YMIN)
.         COMPUTE   OUT = 1
.       ELSE
.         COMPUTE   OUT = 1;
                    ICOUNT = 0;
                    NCORNERT = NCORNER-2
.         WHILE     (ICOUNT LT NCORNERT AND OUT EQ 1)
.           COMPUTE ICOUNT = ICOUNT + 1;
                    ICOUN1 = ICOUNT + 1;
                    ICOUN2 = ICOUNT + 2;
                    XT1 = XCORD1;
                    XT2 = XCORD1 TO XCORD10(ICOUN1);
                    XT3 = XCORD1 TO XCORD10(ICOUN2);
                    YT1 = YCORD1;
                    YT2 = YCORD1 TO YCORD10(ICOUN1);
                    YT3 = YCORD1 TO YCORD10(ICOUN2);
                    A1 = (YT3-YT2) / (XT2*YT3 - XT3*YT2);
                    A2 = (YT3-YT1) / (XT1*YT3 - XT3*YT1);
                    A3 = (YT2-YT1) / (XT1*YT2 - XT2*YT1);
                        B1 = (XT3-XT2) / (XT2*YT3 - XT3*YT2);
                    B2 = (XT3-XT1) / (XT1*YT3 - XT3*YT1);
                    B3 = (XT2-XT1) / (XT1*YT2 - XT2*YT1);
                    V1 = (A1*UTME + B1*UTMN - 1.0) *
                         (A1*XT1 + B1*YT1 - 1.0);
                    V2 = (A2*UTME + B2*UTMN - 1.0) *
                         (A2*XT2 + B2*YT2 - 1.0);
                    V3 = (A3*UTME + B3*UTMN - 1.0) *
                        (A3*XT3 + B3*YT3 - 1.0)
.           IF      (V1 GE 0.0 AND V2 GE 0.0 AND V3 GE 0.0) OUT = 0
.         END WHILE
.       ENDIF
.     ENDIF
COMMENT If plot is not in specified region reject case.
.     IFNOT         (OUT EQ 0) NEXT CASE
.   END PROCESS REC
.   PROCESS REC     2
.     MOVE VARS     BACUR,SITEIND
```

```
.  END PROCESS REC
.  PROCESS REC      3
.    COMPUTE        STATUS = MOD(TRHIST,10)
COMMENT Select live trees only
.    IFNOT          (STATUS LE 2) NEXT REC
COMMENT Select pole sized and larger trees only
.    IFNOT          (TRSZCLS GE 2) NEXT REC
.    COMPUTE        NTRS = NTRS + 1
.    IFTHEN         (TRCLS LE 20)
.      COMPUTE      CUFTORG = 0.0
CALL VOLUME.CUFT20(DBHORG,4.0,NCSPGP)
.      COMPUTE      CUFTORG = CUFTNET
CALL VOLUME.CUFT20(DBHCUR,4.0,NCSPGP)
COMMENT Compute net growth
.      COMPUTE      NETGRO = ((CUFTNET-CUFTORG)*EXPANDR-CUFTNET*MORTFAC)*EXPAREA
.    ELSEIF         (TRCLS EQ 40)
CALL VOLUME.CUFT40(DBHCUR,4.0,NCSPGP)
.    ELSE
CALL VOLUME.CUFT30(DBHCUR,4.0,NCSPGP)
.    ENDIF
COMMENT Compute number of trees
.    COMPUTE        NUMTRS = EXPANDR*EXPAREA
COMMENT Compute cubic foot volume
.    COMPUTE        NETVOL = CUFTNET*EXPANDR*EXPAREA
.    COMPUTE        NSUM = NSUM + 1
.    PERFORM PROCS
.  END PROCESS REC
END PROCESS CASES
BLANK LINES     10
COMMENT List records processed in retrieval
WRITE 10X'PLOTS PROCESSED = ',NPLTS/10X,'TREES PROCESSED = ',NTRS
     /10X'SUMMARY RECORDS = ',NSUM
```

APPENDIX A.--DEFINITION OF CODES

Codes for variable C1 UNTCO

State = Michigan State code = 26
Data base number and name (I) MICHUP

Code	County name	Code	County name	Code	County name	Code	County name
Eastern Upper Peninsula							
(101)	Alger	(102)	Chippewa	(103)	Delta	(104)	Luce
(105)	Mackinac	(106)	Menominee	(107)	Schoolcraft		
Western Upper Peninsula							
(201)	Baraga	(202)	Dickinson	(203)	Gogebic	(204)	Houghton
(205)	Iron	(206)	Keweenaw	(207)	Marquette	(208)	Ontonagon

Data base number and name (II) MICHLP

Northern Lower Peninsula							
(301)	Alcona	(302)	Alpena	(303)	Antrim	(304)	Arenac
(305)	Bay	(306)	Benzie	(307)	Charlevoix	(308)	Cheboygan
(309)	Clare	(310)	Crawford	(311)	Emmet	(312)	Gladwin
(313)	Grand Traverse	(314)	Iosco	(315)	Isabella	(316)	Kalkaska
(317)	Lake	(318)	Leelanau	(319)	Manistee	(320)	Mason
(321)	Mecosta	(322)	Midland	(323)	Missaukee	(324)	Montmorency
(325)	Newaygo	(326)	Oceana	(327)	Ogemaw	(328)	Osceola
(329)	Oscoda	(330)	Otsego	(331)	Presque Isle	(332)	Roscommon
(333)	Wexford						
Southern Lower Peninsula							
(401)	Allegan	(402)	Barry	(403)	Berrien	(404)	Branch
(405)	Calhoun	(406)	Cass	(407)	Clinton	(408)	Eaton
(409)	Genesee	(410)	Gratiot	(411)	Hillsdale	(412)	Huron
(413)	Ingham	(414)	Ionia	(415)	Jackson	(416)	Kalamazoo
(417)	Kent	(418)	Lapeer	(419)	Lenawee	(420)	Livingston
(421)	Macomb	(422)	Monroe	(423)	Montcalm	(424)	Muskegon
(425)	Oakland	(426)	Ottawa	(427)	Saginaw	(428)	St. Clair
(429)	St. Joseph	(430)	Sanilac	(431)	Shiawassee	(432)	Tuscola
(433)	Van Buren	(434)	Washtenaw	(435)	Wayne		

State = Wisconsin State code = 55
Data base number and name (III) WISNOR

Northeast Unit							
(101)	Florence	(102)	Forest	(103)	Langlade	(104)	Lincoln
(105)	Menominee	(106)	Marinatte	(107)	Oconto	(108)	Oneida
(109)	Shawano	(110)	Vilas				
Northwest Unit							
(201)	Ashland	(202)	Barron	(203)	Bayfield	(204)	Burnett
(205)	Douglas	(206)	Iron	(207)	Polk	(208)	Price
(209)	Rusk	(210)	Sawyer	(211)	Taylor	(212)	Washburn

Code	County name	Code	County name	Code	County name	Code	County name

Data base number and name (IV) WISSOU

Central Unit

(301) Adams	(302) Chippewa	(303) Clark	(304) Eau Claire
(305) Jackson	(306) Juneau	(307) Marathon	(308) Marquette
(309) Monroe	(310) Portage	(311) Waupaca	(312) Waushara
(313) Wood			

Southwest Unit

(401) Buffalo	(402) Crawford	(403) Dunn	(404) Grant
(405) Iowa	(406) La Crosse	(407) Lafayette	(408) Pepin
(409) Pierce	(410) Richland	(411) St. Croix	(412) Sauk
(413) Tempeleau	(414) Vernon		

Southeast Unit

(501) Brown	(502) Calumet	(503) Columbia	(504) Dane
(505) Dodge	(506) Door	(507) Fond du Lac	(508) Green
(509) Green Lake	(510) Jefferson	(511) Kenosha	(512) Kewaunee
(513) Manitowoc	(514) Milwaukee	(515) Outagamie	(516) Ozaukee
(517) Racine	(518) Rock	(519) Sheboygen	(520) Walworth
(521) Washington	(522) Waukesha	(523) Winnebago	

State = Minnesota State code = 27

Data base number and name (V) MINNOR

Aspen-Birch Unit

(101) Carlton	(102) Cook	(103) Koochiching	(104) Lake
(105) St. Louis			

Northern Pine Unit

(201) Aitkin	(202) Becker	(203) Beltrami	(204) Cass
(205) Clearwater	(206) Crow Wing	(207) Hubbard	(208) Itasca
(209) Lake of the Woods		(210) Mahnomen	(211) Roseau
(212) Wadena			

Data base number and name (VI) MINSOU

Central Hardwood Unit

(301) Anoka	(302) Benton	(303) Carver	(304) Chisago
(305) Dakota	(306) Douglas	(307) Fillmore	(308) Goodhue
(309) Hennepin	(310) Houston	(311) Isanti	(312) Kanabec
(313) Le Sueur	(314) Mille Lacs	(315) Morrison	(316) Olmsted
(317) Otter tail	(318) Pine	(319) Ramsey	(320) Rice
(321) Scott	(322) Sherburne	(323) Stearns	(324) Todd
(325) Wabasha	(326) Washington	(327) Winona	(328) Wright

Prairie Unit

(401) Big Stone	(402) Blue Earth	(403) Brown	(404) Chippewa
(405) Clay	(406) Cottonwood	(407) Dodge	(408) Fairbault
(409) Freeborn	(410) Grant	(411) Jackson	(412) Kandiyohi
(413) Kittson	(414) Lac qui Parle	(415) Lincoln	(416) Lyon
(417) McLeod	(418) Marshall	(419) Martin	(420) Meeker
(421) Mower	(422) Murray	(423) Nicollet	(424) Nobles
(425) Norman	(426) Pennington	(427) Pipestone	(428) Polk
(429) Pope	(430) Red Lake	(431) Redwood	(432) Renville
(433) Rock	(434) Sibley	(435) Steele	(436) Stevens
(437) Swift	(438) Traverse	(439) Waseca	(440) Watonwan
(441) Wilkin	(442) Yellow Medicine		

Code	County name	Code	County name	Code	County name	Code	County name

State = North Dakota State code = 38
Data base number and name (VII) NDAKOTA

(101) Adams	(102) Barnes	(103) Benson	(104) Billings
(105) Bottineau	(106) Bowman	(107) Burke	(108) Burleigh
(109) Cass	(110) Cavalier	(111) Dickey	(112) Divide
(113) Dunn	(114) Eddy	(115) Emmons	(116) Foster
(117) Golden Valley	(118) Grand Forks	(119) Grant	(120) Griggs
(121) Hettinger	(122) Kidder	(123) LaMoure	(124) Logan
(125) McHenry	(126) McIntosh	(127) McKenzie	(128) McLean
(129) Mercer	(130) Morton	(131) Mountrail	(132) Nelson
(133) Oliver	(134) Pembina	(135) Pierce	(136) Ramsey
(137) Ransom	(138) Renville	(139) Richland	(140) Rolette
(141) Sargent	(142) Slope	(143) Sheridan	(144) Sioux
(145) Stark	(146) Steele	(147) Stutsman	(148) Towner
(149) Traill	(150) Walsh	(151) Ward	(152) Wells
(153) Williams			

State = South Dakota State code = 46
Data base number and name (VIII) SDAKOTA

Eastern Unit

(101) Aurora	(102) Beadle	(103) Bennet	(104) Bon Homme
(105) Brookings	(106) Brown	(107) Brule	(108) Buffalo
(109) Campbell	(110) Charles	(111) Clark	(112) Clay
(113) Codington	(114) Corson	(115) Custer	(116) Davison
(117) Day	(118) Deuel	(119) Dewey	(120) Douglas
(121) Edmunds	(122) Faulk	(123) Grant	(124) Gregory
(125) Haakon	(126) Hamlin	(127) Hand	(128) Hanson
(129) Hughes	(130) Hutchinson	(131) Hyde	(132) Jackson
(133) Jerauld	(134) Jones	(135) Kingsbury	(136) Lake
(137) Lincoln	(138) Lyman	(139) Marshall	(140) McCook
(141) McPherson	(142) Mead	(143) Mellette	(144) Miner
(145) Minnehaha	(146) Woody	(147) Pennington	(148) Perkins
(149) Potter	(150) Roberts	(151) Sanborn	(152) Shannon
(153) Spink	(154) Stanley	(155) Sully	(156) Todd
(157) Tripp	(158) Turner	(159) Union	(160) Walworth
(161) Washabaugh	(162) Yankton	(163) Ziebach	

Code	County name	Code	County name	Code	County name	Code	County name

State = Nebraska State code = 31
Data base number and name (IX) NEBRASK

Eastern Unit

(101) Adams	(102) Boone	(103) Buffalo	(104) Burt
(105) Butler	(106) Cass	(107) Cedar	(108) Clay
(109) Colfax	(110) Cuming	(111) Custer	(112) Dakota
(113) Dawson	(114) Dixon	(115) Dodge	(116) Douglas
(117) Fillmore	(118) Franklin	(119) Frontier	(120) Furnas
(121) Gage	(122) Gosper	(123) Greeley	(124) Hall
(125) Hamilton	(126) Harlan	(127) Hitchcock	(128) Howard
(129) Jefferson	(130) Johnson	(131) Kearney	(132) Lancaster
(133) Madison	(134) Merrick	(135) Nance	(136) Nemaha
(137) Nuckolls	(138) Otoe	(139) Pawnee	(140) Phelps
(141) Pierce	(142) Platte	(143) Polk	(144) Red Willow
(145) Richardson	(146) Saline	(147) Sarpy	(148) Saunders
(149) Seward	(150) Sherman	(151) Stanton	(152) Thayer
(153) Thurston	(154) Valley	(155) Washington	(156) Wayne
(157) Webster	(158) York		

Western Unit

(201) Antelope	(202) Arthur	(203) Banner	(204) Blaine
(205) Box Butte	(206) Boyd	(207) Brown	(208) Chase
(209) Cherry	(210) Cheyenne	(211) Dawes	(212) Deuel
(213) Dundy	(214) Garden	(215) Garfield	(216) Grant
(217) Hayes	(218) Holt	(219) Hooker	(220) Keith
(221) Keya Paha	(222) Kimball	(223) Knox	(224) Lincoln
(225) Logan	(226) Loup	(227) McPherson	(228) Morrill
(229) Perkins	(230) Rock	(231) Scotts Bluff	(232) Sheridan
(233) Sioux	(234) Thomas	(235) Wheeler	

Data base number and name (XI) IOWA

Northeast Unit

(101) Allamakee	(102) Benton	(103) Black Hawk	(104) Bremer
(105) Buchanan	(106) Butler	(107) Cedar	(108) Chicksaw
(109) Clayton	(110) Clinton	(111) Delaware	(112) Dubuque
(113) Fayette	(114) Floyd	(115) Grundy	(116) Howard
(117) Jackson	(118) Johnson	(119) Jones	(120) Linn
(121) Mitchell	(122) Scott	(123) Tama	(124) Winneshiek

Southeast Unit

(201) Appanoose	(202) Boone	(203) Clark	(204) Dallas
(205) Davis	(206) Decatur	(207) Des Moines	(208) Guthrie
(209) Hamilton	(210) Hardin	(211) Henry	(212) Iowa
(213) Jasper	(214) Jefferson	(215) Keokuk	(216) Lee
(217) Louisa	(218) Lucas	(219) Madison	(220) Mahaska
(221) Marion	(222) Marshall	(223) Monroe	(224) Muscatine
(225) Polk	(226) Poweshiek	(227) Story	(228) Van Buren
(229) Wapello	(230) Warren	(231) Washington	(232) Wayne
(233) Webster			

Southwest Unit

(301) Adair	(302) Adams	(303) Audubon	(304) Carroll
(305) Cass	(306) Crawford	(307) Fremont	(308) Greene
(309) Harrison	(310) Mills	(311) Monona	(312) Montgomery
(313) Page	(314) Pottawattami	(315) Ringgold	(316) Shelby
(317) Taylor	(318) Union	(319) Woodbury	

Northwest Unit

(401) Buena Vista	(402) Calhoun	(403) Cerro Sordo	(404) Cherokee
(405) Clay	(406) Dickinson	(407) Emmet	(408) Franklin
(409) Hancock	(410) Humboldt	(411) Ida	(412) Kossuth
(413) Lyon	(414) O'Brien	(415) Osceola	(416) Palo Alto
(417) Plymouth	(418) Pocahontas	(419) Sac	(420) Sioux
(421) Winnebago	(422) Worth	(423) Wright	

Code	County name	Code	County name	Code	County name	Code	County name

State = Missouri State code = 29
Data base number and name (XII) MOZARK

Eastern Ozarks Unit

(101) Bollinger	(102) Butler	(103) Carter	(104) Crawford
(105) Dent	(106) Iron	(107) Madison	(108) Oregon
(109) Reynolds	(110) Ripley	(111) St.Francois	(112) Shannon
(113) Washington	(114) Wayne		

Southwest Ozarks Unit

(201) Barry	(202) Christian	(203) Douglas	(204) Howell
(205) McDonald	(206) Newton	(207) Ozark	(208) Stone
(209) Taney	(210) Texas	(211) Webster	(212) Wright

Northwest Ozarks Unit

(301) Benton	(302) Camden	(303) Cedar	(304) Dallas
(305) Hickory	(306) Laclede	(307) Maries	(308) Miller
(309) Morgan	(310) Phelps	(311) Polk	(312) Pulaski
(313) St.Clair			

Data base number and name (XIII) MORBNW

Prairie Unit

(401) Adair	(402) Andrew	(403) Atchison	(404) Audrain
(405) Barton	(406) Bates	(407) Buchanan	(408) Caldwell
(409) Carroll	(410) Cass	(411) Chariton	(412) Clark
(413) Clay	(414) Clinton	(415) Cooper	(416) Dade
(417) Daviess	(418) De Kalb	(419) Gentry	(420) Greene
(421) Grundy	(422) Harrison	(423) Henry	(424) Holt
(425) Jackson	(426) Jasper	(427) Johnson	(428) Knox
(429) Lafayette	(430) Lawrence	(431) Lewis	(432) Lincoln
(433) Linn	(434) Livingston	(435) Macon	(436) Marion
(437) Mercer	(438) Monroe	(439) Nodaway	(440) Pettis
(441) Pike	(442) Platte	(443) Putnam	(444) Rallis
(445) Randolph	(446) Ray	(447) Saline	(448) Schuyler
(449) Scotland	(450) Shelby	(451) Sullivan	(452) Vernon
(453) Worth			

Riverborder Unit

(501) Boone	(502) Callaway	(503) Cape Girardeau	(504) Cole
(505) Dunkin	(506) Franklin	(507) Gasconade	(508) Howard
(509) Jefferson	(510) Mississippi	(511) Moniteau	(512) Montgomery
(513) New Madrid	(514) Osage	(515) Pemiscot	(516) Perry
(517) Saint Charles	(518) Saint Louis	(519) Sainte Genevie	
(520) Scott	(521) Stoddard	(522) Warren	
(523) City of Saint Louis			

Southern Unit

(101) Alexander	(102) Franklin	(103) Gallatin	(104) Hamilton
(105) Hardin	(106) Jackson	(107) Johnson	(108) Massac
(109) Perry	(110) Pope	(111) Pulaski	(112) Randolph
(113) Saline	(114) Union	(115) White	(116) Williamson

Claypan Unit

(201) Bond	(202) Calhoun	(203) Clark	(204) Clay
(205) Clinton	(206) Crawford	(207) Cumberland	(208) Edwards
(209) Effingham	(210) Fayette	(211) Greene	(212) Jasper
(213) Jefferson	(214) Jersey	(215) Lawrence	(216) Macoupin
(217) Madison	(218) Marion	(219) Monroe	(220) Montgomery
(221) Richland	(222) St. Clair	(223) Shelby	(224) Wabash
(225) Washington	(226) Wayne		

Code	County name	Code	County name	Code	County name	Code	County name
Prairie Unit							
(301)	Adams	(302)	Boone	(303)	Brown	(304)	Bureau
(305)	Carroll	(306)	Cass	(307)	Champaign	(308)	Christian
(309)	Coles	(310)	Cook	(311)	De Kalb	(312)	Dewitt
(313)	Douglas	(314)	Dupage	(315)	Edgar	(316)	Ford
(317)	Fulton	(318)	Grundy	(319)	Hancock	(320)	Henderson
(321)	Henry	(322)	Iroquois	(323)	Jo Daviess	(324)	Kane
(325)	Kankakee	(326)	Kendall	(327)	Knox	(328)	Lake
(329)	La Salle	(330)	Lee	(331)	Livingston	(332)	Logan
(333)	Macon	(334)	Marshall	(335)	Mason	(336)	McDonough
(337)	McHenry	(338)	McLean	(339)	Menard	(340)	Mercer
(341)	Morgan	(342)	Moultrie	(343)	Ogle	(344)	Peoria
(345)	Piatt	(346)	Pike	(347)	Putnam	(348)	Rock Island
(349)	Sangamon	(350)	Schuyler	(351)	Scott	(352)	Stark
(353)	Stephenson	(354)	Tazewell	(355)	Vermillion	(356)	Warren
(357)	Whiteside	(358)	Will	(359)	Winnebago	(360)	Woodford

State = Indiana State code = 18
Data base number and name (XV) INDIANA

Lower Wabash Unit							
(101)	Clay	(102)	Daviess	(103)	Gibson	(104)	Greene
(105)	Knox	(106)	Martin	(107)	Parke	(108)	Pike
(109)	Posey	(110)	Putnam	(111)	Sullivan	(112)	Vanderburg
(113)	Vermillion	(114)	Vigo				
Knobs Unit							
(201)	Brown	(202)	Clark	(203)	Crawford	(204)	Dubois
(205)	Floyd	(206)	Harrison	(207)	Jackson	(208)	Lawrence
(209)	Monroe	(210)	Morgan	(211)	Orange	(212)	Owen
(213)	Perry	(214)	Scott	(215)	Spencer	(216)	Warrick
(217)	Washington						
Upland Flats Unit							
(301)	Dearborn	(302)	Fayette	(303)	Franklin	(304)	Jennings
(305)	Jefferson	(306)	Ohio	(307)	Ripley	(308)	Switzerland
(309)	Union						
Northern Unit							
(401)	Adams	(402)	Allen	(403)	Bartholomew	(404)	Benton
(405)	Blackford	(406)	Boone	(407)	Carroll	(408)	Cass
(409)	Clinton	(410)	Decatur	(411)	De Kalb	(412)	Delaware
(413)	Elkhart	(414)	Fountain	(415)	Fulton	(416)	Grant
(417)	Hamilton	(418)	Hancock	(419)	Hendricks	(420)	Henry
(421)	Howard	(422)	Huntington	(423)	Jasper	(424)	Jay
(425)	Johnson	(426)	Kosciusko	(427)	La Grange	(428)	Lake
(429)	La Porte	(430)	Madison	(431)	Marion	(432)	Marshall
(433)	Miami	(434)	Montgomery	(435)	Newton	(436)	Noble
(437)	Porter	(438)	Pulaski	(439)	Randolph	(440)	Rush
(441)	St. Joseph	(442)	Shelby	(443)	Starke	(444)	Steuben
(445)	Tippecanoe	(446)	Tipton	(447)	Wabash	(448)	Warren
(449)	Wayne	(450)	Wells	(451)	White	(452)	Whitley

Codes for variables R4 PICODE, R5 PISTRAT

The use of these variables was described in section I sampling and estimation procedures. The actual codes vary from State to State. PICODE generally indicates a broad land use category such as (10 or 20) forest, (50 or 60) nonforest, (30) questionable, and (80 or 90) water. PISTRAT indicates a broad forest type and stand-size density class using codes similar to but not identical to variables C4 FORTCUR and R21 SZDNCUR.

Codes for variable R9 UTREND

The first two digits describe the land class change that took place between surveys or the change since the date of photography. Codes to be used for the first two digits are divided into the following two categories:

When land class is not commercial forest on both occasions:

First two digits--The first digit is the code for the present land class. The second digit is the code of the land class at the time of the last survey or the date of photography.

Code	Land Use Class
1	Commercial forest
2	Productive reserved forest
3	Unproductive forest
4	Cropland
5	Pasture, rangeland
6	Idle farmland
7	Wooded pasture
8	Urban, recreation, wooded strips, rights of way, other
9	Water and marsh

For commercial forest land on both occasions:

First two digits--The codes are used to indicate any major changes in the stand since the last survey or the date of photography.

If there has been a disturbance in the sampling area since the date of photography but the forest type or stand-size class has not changed, it will be recorded as no change. This disturbance could be recorded under stand history.

Code	Stand changes
10	No change
01	Forest type change
02	Stand-size change
03	Forest type and size change

The third digit indicates the process that caused the change and uses one of the following codes:

Code	Cause of Land Use Change
0	No change
1	Definition
2	Legislation
3	Natural
4	Herbicide
5	Clearing (land cleared by mechanical or hand means but timber not utilized)
6	Clearcut (includes land clearing where timber is utilized)

7 Partial cut
8 Planting
9 Other man (includes fencing to exclude livestock)

Examples: 1. Commercial forest land (Red Pine Plantation) now, on the photo was idle farmland, use trend code 168.

2. Marsh without trees now, on photo was marsh with trees, use trend code 990.

3. Cleared powerline right of way now, on photo was commercial forest land. Timber utilized, use trend code 816.

Codes for variables R10 STDHIST, R11 PRJSTDH

Stand history reflects the kind of disturbance on five or more of the sample points within the last 20 years.

Explain the kind and extent of any disturbance in the "Notes" on the back of the plot sheet. Use the following 2-digit code to record stand history:

First digit (what happened)		Second digit (how long ago)	
1	No disturbance	0	No disturbance
2	Timber stand improvement	1	1-4 years
3	Clearcut	2	5-10 years
4	Partial harvest cut	3	11-15 years
5	Natural--fire, insects, disease	4	15-20 years
6	Man caused--drainage, spraying		
7	Planting of forest land		
8	Planting of nonforest land		
9	Natural regeneration of non-forest land		

Codes for variable R35 AREACOND

(10) Areas fully stocked with desirable trees but not overstocked.

(20) Areas fully stocked with desirable trees but overstocked with all live trees.

(30) Areas medium to fully stocked with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

(40) Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

(50) Areas poorly stocked with desirable trees but fully stocked with growing-stock trees.

(60) Areas poorly stocked with desirable trees but with medium to full stocking of growing-stock trees.

(70) Areas poorly stocked with desirable trees and poorly stocked with growing-stock trees.

Codes for variable R10 CAVIT

At each sample point, each live tree 5.0 inches DBH and larger is examined for cavities used for nesting, resting or storage by birds or mammals. For the largest cavity a 2-digit code is recorded to indicate the size of the cavity entrance hole and location of the cavity in the tree. The first digit indicates the cavity hole size, the second digit indicates the location of the cavity.

To qualify as a cavity, the entrance hole must be 1.0 inch or larger in the main stem, fork, or larger limb. (A large limb must be greater than 8.0 inch in diameter o.b.). If no cavity is present, this item is zero or missing.

missing.

First digit		Second digit	
Code	Size of opening (inches)	Code	Location of cavity (feet)
1	1	1	0-1
2	2	2	2-5
3	3	3	6-9
4	4	4	10-19
5	5	5	20-29
6	6	6	30-39
7	7	7	40-49
8	8	8	50-59
9	9+	9	60+

Codes for variables C4 FORTCUR, R20 FORTPRJ, R23 FORTORG

(For detailed definitions of these forest types see page 14)

States = Michigan, Wisconsin, Minnesota
Data base numbers and names
(I)MICHUP, (II)MICHLP, (III)WISNOR, (IV)WISSOU,
(V)MINNOR, (VI)MINSOU

Code	Forest type	Code	Forest type
(1)	Jack pine	(2)	Red pine
(3)	White pine	(6)	Exotic
(12)	Black spruce	(13)	Balsam fir
(14)	Northern white-cedar	(15)	Tamarack
(16)	White spruce	(50)	Oak-hickory
(70)	Elm-ash-soft maple	(80)	Maple-birch
(91)	Aspen	(92)	Paper birch

States = North Dakota, South Dakota, Nebraska, Kansas
Data base numbers and names
(VII)NDAKOTA, (VIII)SDAKOTA, (IX)NEBRASK,
(X)KANSAS

(42)	Cedar-hardwood	(50)	Oak-hickory
(51)	Post-blackjack oak	(59)	Upland plains hwds.
(70)	Elm-ash-cottonwood		
(73)	Cottonwood	(74)	Willow
(77)	Lowland plains hwds.	(87)	Upland elm-ash-loc.

State = Iowa
Data base number and name (XI)IOWA

(42)	E.redcedar-hardwood	(50)	Oak-hickory
(54)	White oak	(59)	Bur oak
(70)	Elm-ash-cottonwood	(73)	Cottonwood
(80)	Maple-basswood	(91)	Aspen

State = Missouri
Data base numbers and names (XII)MOZARK,
(XIII)MORBNW

Code	Forest type	Code	Forest type
(32)	Shortleaf pine	(35)	Eastern redcedar
(42)	Redcedar-hardwood	(44)	Shortleaf pine-oak
(51)	Post-blackjack oak	(54)	White oak
(53)	Black-scarlet oak	(70)	Elm-ash-cottonwood
(60)	Oak-gum-cypress		
(73)	Cottonwood		
(80)	Maple-beech		

States = Illinois,Indiana
Data base numbers and names (XIV)ILLINI,
(XV)INDIANA

(30)	Loblolly-shortleaf pine	(40)	Oak-pine
(50)	Oak-hickory	(60)	Oak-gum-cypress
(70)	Elm-ash-cottonwood		
(80)	Maple-beech-birch		
(90)	Aspen-birch		

Codes for species variables R16 CUNSPP, R28 SISPP, R4 SPECIES, R3 SPPSI

Commercial species

Code	Common name	Scientific name
012	Balsam fir	Abies balsamea var.
068	Eastern redcedar	Juniperus virginiana
070	European larch	Larix decidua
071	Tamarack	Larix laricina
091	Norway spruce	Picea abies
093	Engelmann spruce	Picea engelmannii
094	White spruce	Picea glauca
095	Black spruce	Picea mariana
096	Col. blue spruce	Picea pungens
105	Jack pine	Pinus banksiana
113	Limber pine	Pinus flexilis
122	Ponderosa pine	Pinus ponderosa
125	Red pine	Pinus resinosa
129	White pine	Pinus strobus
130	Scotch pine	Pinus sylvestris
133	Austrian pine	Pinus nigra
202	Douglas fir	Pseudotsuga menziesii
241	N. white-cedar	Thuja occidentalis
261	Hemlock	Tsuga canadensis
300	Acacia	Acacia spp.
313	Boxelder	Acer negundo
314	Black maple	Acer nigrum
316	Red maple	Acer rubrum
317	Silver maple	Acer saccharinum
318	Sugar maple	Acer saccharum
331	Ohio buckeye	Aesculus glabra
371	Yellow birch	Betula alleghaniensis
372	Sweet birch	Betula lenta
373	River birch	Betula nigra
374	Water birch	Betula occidentalis
375	Paper birch	Betula papyrifera
402	Bitternut hickory	Carya cordiformis
403	Pignut hickory	Carya glabra
404	Pecan	Catya illinoensis
405	Shellbark hickory	Carya laciniosa
407	Shagbark hickory	Carya ovata
408	Black hickory	Carya texana
409	Mockernut hickory	Carya tomentosa
421	American chestnut	Castanea dentata
452	Northern catalpa	Catalpa speciosa
461	Sugarberry	Celtis laevigata
462	Hackberry	Celtis occidentalis
491	Flowering dogwood	Cornus florida
521	Persimmon	Diospyros virginiana
531	Beech	Fagus grandifolia
541	White ash	Fraxinus americana
543	Black ash	Fraxinus nigra
544	Green ash	Fraxinus pennsylvanica
546	Blue ash	Fraxinus quadrangulata
552	Honeylocust	Gleditsia triacanthus
571	Ky. coffee tree	Gymnocladus dioicus
601	Butternut	Juglans cinerea
602	Black walnut	Juglans nigra
621	Yellow poplar	Liriodendron tulipifera
660	Apple	Malus spp.
681	White mulberry	Morus alba
682	Red mulberry	Morus rubra
693	Black tupelo	Nyssa sylvatica
731	Sycamore	Platanus occidentalis
741	Balsam poplar	Populus balsamifera
742	East. cottonwood	Populus deltoides
743	Bigtooth aspen	Populus grandidentata
745	Plains cottonwood	Populus sargentii
746	Quaking aspen	Populus tremuloides
752	Silver poplar	Populus alba

Code	Common name	Scientific name
753	Narrowleaf ctnwd.	Populus angustifolia
762	Black cherry	Prunus serotina
802	White oak	Quercus alba
804	Swamp white oak	Quercus bicolor
806	Scarlet oak	Quercus coccinea
809	Northern pin oak	Quercus ellipsoidalis
817	Shingle oak	Quercus imbricaria
823	Bur oak	Quercus macrocarpa
824	Blackjack oak	Quercus marilandica
826	Chinkapin oak	Quercus muehlenbergii
830	Pin oak	Quercus palustris
832	Chestnut oak	Quercus prinus
833	Northern red oak	Quercus rubra
834	Shumard oak	Quercus shumardii
835	Post oak	Quercus stellata
837	Black oak	Quercus velutina
901	Black locust	Robinia pseudoacacia
922	Black willow	Salix nigra
931	Sassafras	Sassafras albidum
951	American basswood	Tilia americana
972	American elm	Ulmus americana
974	Siberian elm	Ulmus pumila
975	Slippery elm	Ulmus rubra
977	Rock elm	Ulmus thomasii

Noncommercial species

066	Rocky mt. juniper	Juniperus scorplorum
315	Striped maple	Acer pensylvanicum
319	Mountain maple	Acer spicatum
321	Rocky mt. maple	Acer glabrum
333	Western buckeye	Aesculus glabra
341	Ailanthus	Ailanthus altissima
391	Am. hornbeam	Carpinus caroliniana
471	Eastern redbud	Cercis canadensis
500	Hawthorn	Crataegus species
641	Osage orange	Maclura pomifera
701	Ironwood	Ostrya virginiana
761	Pincherry	Prunus pensylvanica
763	Chokecherry	Prunus virginiana
765	Canada plum	Prunus nigra
766	Wild plum	Prunus americana
851	Mountain ash	Sorbus
921	Peachleaf willow	Salix amygdaloides
923	Diamond willow	Salix eriocephala

Codes for record type 4 variable R2 SHRUBSP tall woody shrubs

Code	Common name	Scientific name
351	Red alder	Alnus rubra
352	Green alder	Alnus crispa
353	Speckled alder	Alnus rugosa
380	Swamp birch	Betula pumila
381	Dwarf birch	Betula glandulosa
463	Dwarf hackberry	Celtis tenuiflolia
490	Dogwood	Cornaceae
592	Black alder	Ilex verticillata
593	Mountain holly	Nemopanthus mucronata
594	Deciduous holly	Ilex decidua
603	Spice bush	Lindera benzoin
764	Sandcherry	Prunus pumila
767	Pawpaw	Asimina triloba
768	Devils wlk. stick	Asimina triloba
769	Chickasaw plum	Prunus angustifolia
850	Sweet gale	Myrica gale
852	Common barberry	Berberis vulgaris

853	Witch hazel	Hamamelis virginiana
854	Common ninebark	Physocarpus opulifolius
855	Juneberry	Amelanchier
856	Beaked hazenut	Corylus cornuta
857	Prickly ash	Zanthoxylum americanum
859	Buckthorn	Rhamnus
860	Mountain laurel	Ceanothus sanguineus
861	Leatherwood	Dirca palustris
862	Vibernum	Viburnum
863	Elderberry	Sambucus
864	Sumac	Rhus
869	Shrubby trefoil	Ptelea trifoliata
880	Buffaloberry	Shepherdia canadensus
903	Poison sumac	Rhus vernix
907	New Jersey tea	Ceanothus americanus
912	Buttonbush	Cephalanthus occidentalis
913	Russian olive	Elaeagnus
915	Wild crabapple	Pyrus ioensis
916	Lead plant	Amorpha
917	Wahoo	Euonymus atropurpurea
919	Soapberry	Sapindus drummondii
920	Willow	Salicaceae
925	Tamarisk	Amarix gallica
926	Buckthorn	Umelia lanuginosa
927	Rabbitbush	Chrysothamnus pulchell
997	Other species	(tall, perennials)

Codes for record type 5 variable R2 SHUSPL low herbaceous shrubs.

059	Creeping juniper	Juniperus horizontalis
069	Common juniper	Juniperus communis
230	Yew	Taxus canadensis
590	Holly	Ilex
712	Virginia creeper	Parthenocissus
748	Spirea	Spiraea
749	Labrador tea	Ledum groenlandicum
750	Leatherleaf	Chamaedaphne calyculat
751	Bog laurel	Kalmia polifolia
849	Sweetfern	Comptonia peregrina
865	Gooseberry	Ribes
866	Chokeberry	Aronia
867	Rasp.-blackberry	Rubus
868	Rose	Rosa
870	Am. bladdernut	Staphylea trifolia
871	Willow herb	Decodon verticillatus
872	Privet andromeda	Lyonia liqustrina
873	Black huckleberry	Gaylussacia baccata
874	Bil.-blueberry	Vaccinium
875	Bush honeysuckle	Diervilla lonicera
876	Honeysuckle	Lonicera
877	Buckbrush	Symphoricarpus
878	Shrb. cinquefoil	Potentilla fruticosa
902	Poison ivy	Rhus radicans
908	St.johns wort	Hypericum
909	Bearberry	Arctosttaphylos uva-ur
918	Bittersweet	Celastrus scandens
924	Raccoon grape	Ampelopsis cordata
929	Sandhill sage	Artemisia filifolia
932	Greenbriar	Smilax
978	Bog rosemary	Andromeda glaucophylla
982	Grape	Vitis
983	Clematis	Vitis
984	Strawberry	Fragaria spp.
998	Other species	(other perennials)

APPENDIX B.--GLOSSARY OF TERMS

Acceptable trees.--Growing-stock trees of commercial species that meet specified standards of size and quality but do not qualify as desirable trees.

Basal area.--The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Biomass.--The above-ground volume of all live trees (including bark and foliage) reported in green tons. Biomass is made up of five components:

Growing-stock bole.--Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.--Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.--Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.--Biomass of a cull tree from a 1-inch stump minus the cull bole.

1- to 5-inch trees.--Biomass of all live trees 1 to 5 inches in diameter at breast height.

Commercial forest land.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land are capable of producing more than 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for producing industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.--Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.--Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cull.--Portions of a tree that are unusable for industrial wood products, because of rot, form, or other defect.

Desirable tree.--Growing-stock tree that has no serious defects in quality limiting present or prospective use, having relatively high vigor, and containing no pathogens that may kill or seriously deteriorate it before rotation age. These trees would be favored by forest managers in silvicultural operations.

Diameter classes.--A classification of trees based on diameter outside bark, measured at breast height (4.5 feet above the ground). (Note: d.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.)

Farm.--Either a place operated as a unit or 10 or more acres from which the sale of agricultural products totals $50 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products for a year amounts to at least $250. Places having less than the $50 or $250 minimum estimated sales in a given year are also counted as farms if they can normally be expected to produce goods in sufficient quantity to meet the requirements of the definition.

Farmer-owned land.--Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparison of basal area and/or number of trees, by age or size and spacing with specified standards.) The minimum area for classification of forest land is one acre. Roadside, streamside, and shelterbelt strips of timber must have a a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.--Land owned by companies or individuals operating primary wood-using plants.

Forest trees.--Woody plants having a well-developed stem and usually more than 12 feet tall at maturity.

Forest type.--A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types are:

Jack pine.--Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and maple.)

Red pine.--Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and maple.)

White pine.--Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, jack pine, aspen, birch, and maple.)

Balsam fir.--Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and tamarack.)

White spruce.--Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, northern white-cedar, and tamarack.)

Black spruce.--Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack and northern white-cedar.)

Northern white-cedar.--Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include tamarack and black spruce.)

Tamarack.--Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce and northern white-cedar.)

Shortleaf pine.--Forests in which shortleaf pine comprises a plurality of the stocking. (Common associates include oak, hickory, and gum.)

Loblolly-shortleaf pine.--Forests in which loblolly, shortleaf, and Virginia pines, singly or in combination, comprise a plurality of the stocking. (Common associates include gum, hickory, sassafras, and yellow-poplar.)

Eastern redcedar.--Forests in which eastern redcedar comprises a plurality of the stocking. (Common associates are oak and hickory.)

Eastern redcedar-hardwood.--Forests in which hardwoods comprise a plurality of the stocking but in which eastern redcedar comprises 25 percent or more of the stocking. Found on dry uplands, usually abandoned pastures or fields.

Shortleaf pine-oak.--Forests in which upland oaks comprise a plurality of the stocking, but in which shortleaf pine comprises 25 to 50 percent of the stocking.

Oak-hickory.--Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, beech, yellow-poplar, elm, and maple.)

Post-blackjack oak.--Forests in which post oak or blackjack oak, singly or in combination, comprise a majority of the stocking. Occurs on dry uplands and ridges.

Black-scarlet oak.--Forests in which upland oaks or hickory, singly or in combination, comprises a plurality of the stocking except where shortleaf pine or redcedar comprises 25 to 50 percent, or where white oak or post and blackjack oak comprise a plurality. (Common associates include yellow-poplar, elm, maple, and black walnut.)

White oak.--Forests in which white oak comprises more than 50 percent of the primary typing species for the oak-hickory type. (Common associates are black oak, northern red oak, bur oak, shagbark and bitternut hickories, white ash, and bigtooth aspen.)

Bur oak.--Forests in which bur oak comprises more than 50 percent of the stocking of the primary typing species for the oak-hickory type. (Common associates are northern pin oak, northern red oak, white oak, black oak, basswood, American elm, green ash, boxelder, hackberry, cottonwood, and hophornbeam.)

Upland plains hardwoods.--Forests in which black walnut, hackberry, and bur oak, singly or in combination, comprise a plurality of the stocking. Commonly found on slopes and uplands.

Oak-gum-cypress.--Bottomland forests in which bottomland oaks such as pin, swamp white, and shingle oaks, along with tupelo, blackgum, sweetgum, and cypress, singly or in combination, comprise a plurality of the stocking. (Common associates include cottonwood, willow, ash, elm, hackberry, and maple.)

Elm-ash-soft maple.--Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include birches, spruce, and balsam fir.)

Elm-ash-cottonwood.--Lowland forests in which elm, ash, cottonwood, and willow, singly or in combination, comprise a plurality of the stocking, except for those in which cottonwood or willow comprise a majority of the stocking. Found on first or second bottoms of major streams.

Cottonwood.--Forests in which cottonwood comprises a majority of the stocking.

Willow.--Forests in which willow comprises a majority of the stocking.

Lowland plains hardwoods.--Forests in which black walnut, hackberry, bur oak, soft maple, and boxelder, singly or in combination comprise a plurality of the stocking. Commonly found in coves and bottomlands.

Maple-birch.--Forests in which sugar maple, basswood, yellow birch, upland American elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Maple-beech.--Forests in which hard maple or beech, singly or in combination, comprises a plurality of the stocking. (Common associates include elm and basswood.)

Hard maple-basswood.--Forests in which sugar maple or basswood, singly or in combination, comprise a plurality of the stocking. (Common associates are American elm, green ash, yellow birch, white pine, and northern red oak.)

Upland elm-ash-locust.--Upland forests in which elm, ash, and honeylocust, singly or in combination, comprise a plurality of the stocking. Includes shelterbelts and windbreaks on sites drier than those commonly associated with lowland species.

Aspen.--Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include balsam poplar, balsam fir, and paper birch.) and red maple, singly

or in combination, comprise a plurality of the stocking. (Common associates include birches, spruce, and balsam fir.)

Paper birch.--Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.--Forests in which species not native to the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

Gross area.--The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.--Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.--Net volume in cubic feet of growing-stock trees 5.0 inches d.b.h. and over, from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to cords by dividing by 79 cubic feet per solid wood cord.

Hardwoods.--Dicotyledonous trees, usually broad-leaved and deciduous.

Idle farmland.--Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.--Land currently improved for grazing by cultivating, seeding, irrigating or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.--All lands held in trust by the United States for individual Indians or tribes, or all lands, titles to which are held by individual Indians or tribes, subject to Federal restrictions against alienation.

Land area.--A. Bureau of the Census. The area area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. Forest Inventory and Analysis.--The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.--Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.--A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.--The unused growing stock portions of trees cut or killed by logging.

Maintained road.--Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.--Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.--Refers to a pulpwood or saw log section that meets pulpwood or saw log specfications, respectively.

Miscellaneous federal land.--Federal land other than National Forest, land administered by the Bureau of Land Management, and Indian land.

Miscellaneous private land.--Privately owned land other than forest-industry and farmer-owned land.

Mortality.--The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.--Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing-stock.--The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.--The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.--Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.--(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.--Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.--Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. Nonforest land without trees.--Nonforest land with no live trees present.

b. Nonforest land with trees.--Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.--Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.--Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultura operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.--Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.--The amount of commmercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.--The length of time a property has been held by the owner.

Physiographic class.--A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.--Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.--Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.--Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.--Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.--Very wet sites where excess water seriously limits both growth and species occurrence. Example: extra spruce wet, frequently flooded river bottoms and spruce bogs.

Plant byproducts.--Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.--Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.--(See stand-size class.)

Poletimber trees.--Growing-stock trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Productive-deferred.--Forest land sufficiently productive to qualify as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness system.

Rotten trees.--Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications cations for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.--(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.--Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.--Standing or down dead trees that are considered merchantable by regional standards.

Saplings.--Live trees 1- to 5 inches d.b.h.

Sapling-seedling stands.--(See stand-size class.)

Saw log.--A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.--That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.--The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.--(See stand-size class.)

Sawtimber trees.--Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.--Net volume of the saw log portion of live sawtimber in board feet, International 1/4-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.--Live trees less than 1 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).--Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Shrub biomass.--The total aboveground weight (including the bark) of selected shrubs and trees less than 1 inch d.b.h.

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.--An expression of forest site quality based on the total height of free-growing dominant or codominant trees of a representative species in the forest type at age 50.

Softwoods.--Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.--A growth of trees on a minimum of 1 acre

of forest land that is stocked by forest trees of any size.

Stand-age class.--Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.--The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.--A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

a. Sawtimber stands.--Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. Poletimber stands.--Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. Sapling-seedling stands.--Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. Nonstocked stands.--Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.--Land owned by States, or land leased to these governmental units for 50 years or more.

Stocking.--The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard. A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h. Stands are grouped into the following stocking classes:

Overstocked stands.--Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.--Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.--Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.--Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.--Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.--The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.--The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.--All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.--The total aboveground weight (including the bark) of all trees from 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.--A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.--Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soils, dry climate, poor drainage, high elevation, steepness, and rockiness).

Upper stem portion.--That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.--Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards, cemeteries, roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.--(a) Bureau of the Census.--Permanent inland water surfaces, such as lakes, reservoirs, and ponds having 40 acres or more of area; streams, sloughs, estuaries, and canals one-eighth of a statute mile or more in width.

(b) Noncensus.--Permanent inland water surfaces, such as lakes, reservoirs, and ponds having 1 to 39.9 acres of area; streams, sloughs estuaries, and canals 120 feet to one-eighth of a statute mile wide.

Wooded pasture.--Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.--An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide.

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Data bases for forest inventory in the North-Central Region. Gen. Tech. Rep. NC-101. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1985. 57 p.

Describes the data collected by the Forest Inventory and Analysis (FIA) Research Work Unit at the North Central Forest Experiment Station. Explains how interested parties may obtain information from the data bases either through direct access or by special requests to the FIA data base manager.

KEY WORDS: Forest survey, data retrieval, sampling procedures, data base management system.