FOREST SURVEY MANUAL

PHASE II

INTENSIVE INVENTORY

FOREST SURVEY MANUAL

INTENSIVE

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FOREWORD

This reconnaissance phase of the forest inventory is the most important and time consuming operation of the entire inventory procedure.

It is also the most productive and costly phase of forest inventory.

The basic premise of the forest inventory is to examine and record data that will describe the exact composition and condition of the forest at the time it is being observed.

By summarizing this collected data in various combinations of information the forest land manager is better equipped to make the land management decisions required of him. Both for long range planning and for the decisions that must be made daily.

So that this phase of the forest inventory will be cost effective it is imparative that the field examination and data collection be accomplished efficiently and accurately.

This manual is designed to serve as a guide so personnel may conduct the survey of Minnesota's forest lands in an efficient and accurate manner. It includes definitions, specifications and codes used in the inventory as well as a description of the procedures to be followed in the office and field. Although some instructions are detailed, it is not considered necessary to give specific instructions for the use of equipment since instruction manuals for such equipment are kept on file.

It will be the responsibility of all personnel concerned with this survey to be completely familiar with all methods and procedures outlined in this manual. It will also be their responsibility to see that revisions and additions are entered as soon as possible to insure that a current set of instructions is available at all times.

Problems are sure to arise that are not covered by this manual, in such cases, these problems should be referred to the Forest Inventory Office in Grand Rapids for instruction. The success of an inventory depends upon the accuracy of field measurements and recordings, and high quality office work. In all cases the procedures and standards set forth in this manual are to be followed to insure accuracy and a high quality product.

Forest Inventory, Grand Rapids
218-327-1749

FLOW PROCEDURE FOR A FOREST INVENTORY PROJECT

Including procedure to complete the
Office and Fieldwork for a Township

1. Request for inventory should be made by letter from the
   a. Field to the Regional Forest Supervisor,
   b. The Regional Forest Supervisor then checks his priority list for forests to be inventoried in his region,
   c. He then makes his request to the Director of the Division of Forestry,
   d. If the decision is to inventory the management unit, the Director then refers it to the Resource and Products Section Head,
   e. Who assigns it to the Forest Assets and Inventory Unit to initiate action on the request.

   See Appendix, Page A-1, A-1.1, for a Phase II Inventory Planning Guide.

2. This will be followed by a Region meeting. The meeting will include all resource managers, and will be involved in establishing guidelines for concerns that must be considered in the inventory. These guidelines should be applied to, but do not have to, be limited to the following:
   a. State Forests
   b. Compartments
   c. Game Management Areas
   d. County Forests
   e. Collection of data of special interest to the resource manager. This information could be unique to the area being inventoried (example: dead balsam at Finland State Forest)
   f. A map will be prepared by the region requesting the inventory, showing wildlife management areas, state parks, state forests, county forests, etc., with compartment identification numbers. This will allow field personnel to properly code their sheets to the correct compartment.

3. Before the actual inventory can begin, aerial photos for the townships to be inventoried must be sent to Grand Rapids Forest Inventory Office, so that section corners can be put on them. A township plat (A-22) must also be prepared by the Area or Region involved The township plat should show administrative and acquisition status. See example, Appendix Page A-2. These must be completed eight weeks prior to beginning of actual inventory.

   See Appendix, Page A-19, for an explanation and history of State of Minnesota lands.

   The Forest Inventory Unit in Grand Rapids will place the corners on the aerial photos, using a U.S.G.S. map. Frosted acetate (matex) will be taped to the photos with section, township, and range indicated on the bottom.

   A vegetative cover type map for each section must be drawn on the matex before starting the fieldwork. The same person

should type map a township, tying type lines across section lines. Proper type mapping symbols are to be used. See "Type Mapping Symbols" in the Appendix, Page A-3.

The individual doing the type mapping should meet with the local resource manager to discuss developments (e.g., timber sales, fires, plantations, etc.) that have taken place since the photos were taken. These developments will be incorporated onto the type maps.

All lands in a section will be type mapped if the section is completely or partially in state or county ownership using the following procedure:

A. State and County Ownership:

1. Minimum type size - 5 acres (high value types smaller than five acres may be typed out with stand examination sheets completed for them. Example: walnut),

2. Inclusions can be delineated using a dotted line. An inclusion can be a merchantable or nonmerchantable area within a type. It can be one (1) to five (5) acres in size.

B. Land not in State or County ownership will not have type delineation for types less than ten (10) acres in size. Cover types in these areas will be determined by stereoscopic examination or comparison with types that have been examined on the ground. Size and density codes will be entered by field inventory personnel on the matex using either of these two methods after field work on state and county land has been completed.

No field work will be done on lands not in state or county ownership, also no type examination data sheets will be completed.

C. Once the initial type maps on matex have been completed, the photos and type maps will be delivered to the field inventory forester. See Appendix Page A-4.1.

4. Field Operations

A. Careful preplanning of field work is necessary to take full advantage of available access opportunities. Prior consultation with the local resource manager is important.

B. To assure that accurate and representative data is collected, careful preplanning of field work is necessary. Plan course lines prior to entering the field so that all types are adequately sampled. See Apprendix, Page A4.2.

The course line to be traveled must be planned before entering the field. While in the field, all deviations from this planned course line must be shown on the matex. Completed matexes will be submitted with course lines drawn and plot centers marked in yellow pencil. Use X's to mark plot centers.

See example, Appendix, Page A-4.3.

C. When in the field, the inventory crew will do field measurements and re-establish section corners on the matex if they are different than shown on the matex. (See insert on changing corners, Appendix, Page A-7).

D. The crews will tabulate field data and record it on the front page of the tally sheet.

E. They will edit field sheets (one sheet for each type). Field editing should be completed as soon as possible after the actual field work is completed. See Appendix, Page A-8.

F. The field matex will be completed by placing the proper cover type, size and density codes on the matex along with the proper mapping symbols and type sequence numbers. See Appendix, Page A-4.4.

G. The project leader will check the matexes to make sure that types match up from one section to another. If types do not match, the crews involved in inventorying the adjacent areas will meet with the project leader to adjust their cover types so that they match. It is suggested that each crew be given a large enough area to inventory so that cover type differences will be kept to a minimum.

H. The project leader will office edit completed field sheets and matexes. See Appendix, Page A-8.

I. The final matex that will be submitted to Grand Rapids will then be prepared in the field using the completed field matex. A final matex is needed to maintain compatability with the computer graphics system. This final copy must be clean, follow the proper procedure and use the proper symbols. See Appendix, Pages A-3, A-4.5 and A-5.

Submit both the field matex and final matex to Grand Rapids for processing.

J. The district forester must approve and sign each inventory sheet. The area forester or his assistant, must approve each township by signing the township plat. If any disputes occur, the district forester and the project leader will check cruise the area in dispute to resolve the problem.

For further explanation of Check Cruise Procedure, see Appendix, Pages A-9, A-10, and A-11.

K. Safety of the field inventory crew must be emphasized at all times. Each person must always be conscious of hazards at all times and do their best to prevent accidents. See Appendix, Page A-12.

5. The Forest Inventory Office at Grand Rapids

a. Will combine the individual cover type maps and make one complete township map on a single sheet of polyester,

b. Will compute stand acreages on township map

1. Adjust acreages and land ownership, if necessary, from land records,

2. Enter acreages on stand analysis forms (F-280/rev.)

c. If minor errors are present, correct and process. If major errors, or if field information is not complete or correct, return for correction to the project or crew that did the original field work.

6. St. Paul

a. Will store the data from the field sheets on computer tapes for later summarization. Field analysis forms are returned to the Grand Rapids Inventory Office.

1. Forms will be held in the Grand Rapids Inventory Office until all work for the township is complete.

2. When a township is completed, the St. Paul Office will provide a summary of the field data for that township.

7. The Forest Inventory Office at Grand Rapids

a. Will assemble and deliver the forest inventory package (map, field sheets, and computer printout) to the area forester or county land commissioner.

b. Will deliver summaries of all townships within the unit with an explanation of the computer printouts.

8. The Phase II inventory data must be kept up to date at all times if it is to be effectively used now and in the future. A comprehensive alterations program has been developed which, when followed, will keep the resource data current at all times. See Appendix, Page A-20 and the comprehensive alterations portion of the manual for details.

9. Plots

The number of plots required in a type will depend on the species, area, and density variation within the type. The following table gives the <u>minimum</u>

number of plots to be taken in each forest type.

Area of Type	# of Plots
5 - 10 acres	3
10 - 20 acres	4
20 - 40 acres	5
40+ acres	6

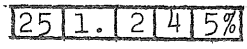
These minimum numbers of plots are to be used as a guide. More plots may be needed in mixed types. Less than the minimum will not be allowed.

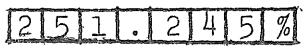
Minimum numbers of plots are established to help maintain minimum accuracy levels while allowing the inventory project to be completed within time and budgetary restraints. Good judgement on the part of the field inventory forester will be needed to determine the actual number of plots taken beyond the minimum required.

When filling out the "Type Examination Data Sheet" the following precautions are very important for good results.

A. Enter the coding clearly and legibly. Make the number to look like the number it is supposed to be. Take care, this is important.

B. Do not enter more than one (1) character or numerical code into each column (square box):

Example: Incorrect way - 

Correct way - 

C. Enter the code into the center of the box.

D. The "Cover Type Examination Data" sheet will have no empty boxes. Enter a code into each box. If no code is applicable, cross out the data field with an "X".

E. Do not confuse cover type codes with specie codes.

F. Note that all volume data is per acre.

FIELD AND OFFICE PROCEDURES

COVER TYPE DATA

CARD #1

COLUMN 1: CARD NUMBER

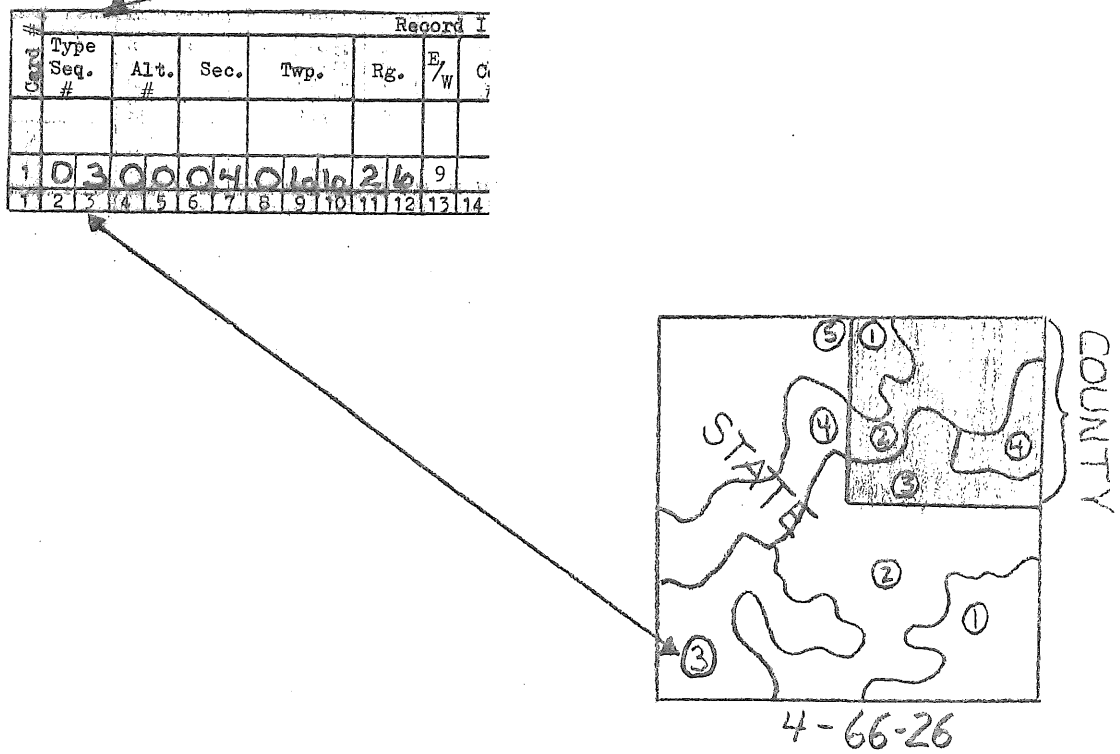
The card number has already been entered. You do nothing in this column.

COLUMNS 2 - 3: COVER TYPE SEQUENCE NUMBER

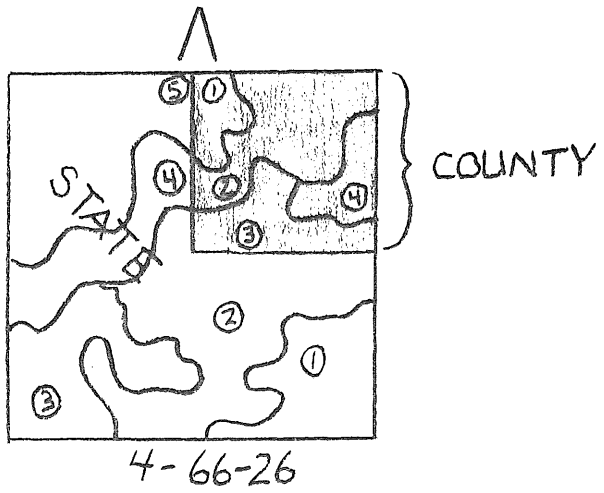
Each individual cover type on State or County land within a section will be assigned a sequence number. This number will always be enclosed in a circle on the matex to avoid confusion with the code number representing the main cover type.

Starting with number one (1), number each of the cover types on State land. Likewise start with number one (1) and number each of the cover types on County land.

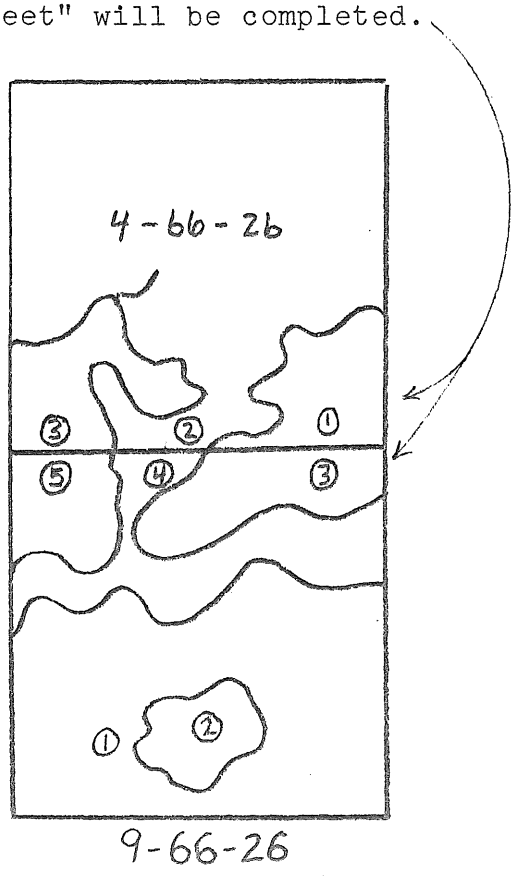
Record the "Cover Type Sequence Number" for the type being examined. Example: Type #3 = 03.



When a portion of a cover type crosses into another administrative or management unit within a section, it is assigned another "Type Sequence Number" and a duplicate "Type Examination Data Sheet" completed for that portion.



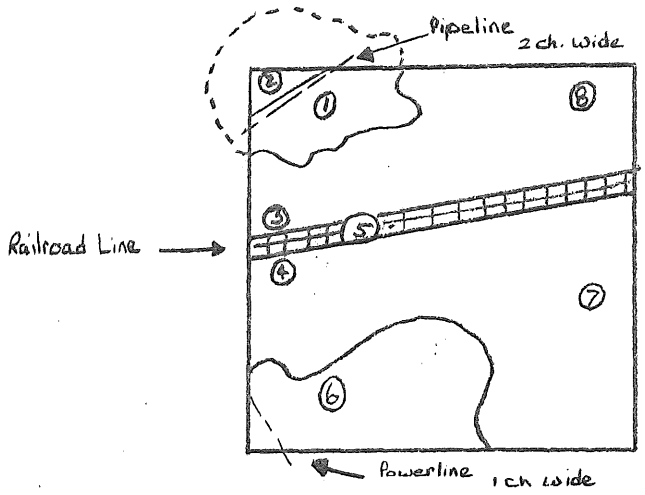
When a cover type crosses a section line (as shown), district boundary, compartment line, state forest boundary, acquisition status; it will be assigned a new "Type Sequence Number" and a duplicate "Type Examination Data Sheet" will be completed.



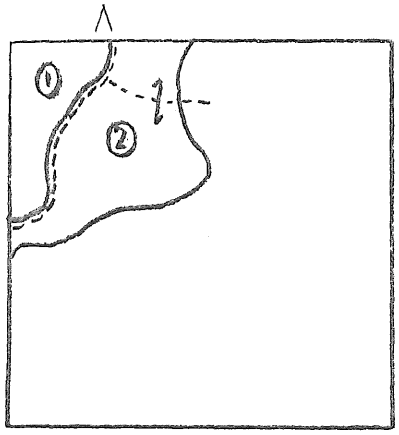
Any time a cover type crosses a pipeline, improved surface road, powerline right-of-way, or railroad line - that exceeds 2 chains in width - that cover type will be assigned a new Type Sequence Number and a duplicate data sheet completed.

When a railroad line, etc., is in excess of 5 acres, it will be assigned a Type Sequence Number and a data sheet completed.

If the right-of-way is less than 2 chains and does not exceed 5 acres, no duplicate data sheets need be completed for a cover type that crosses it.



Similarly, cover types that are to end at an unimproved road, trail, stream or ditch, must have a solid line parallel to one side of that ditch, trail, etc.; otherwise the cover type will be understood to cross them.



COLUMNS 4 - 5: ALTERATION NUMBER

These columns will be used after the original survey has been completed. They are necessary to flag a change (alteration) which has occurred to a type.

For the initial survey, enter "00" in these columns.

The Phase II intensive forest inventory records data which describes the forest land cover type as it is at the time it is inspected.

Any major change from the original cover type description will require a corrected description of that cover type.

When it is determined that the original cover type description is in error or has changed, a corrected cover type description must be recorded as soon as possible.

These alterations of a cover type will be recorded on the yellow form F280/1 "Cover Type Examination Data Sheet".

The recording and submission of alterations can originate with the Game Manager, Park Superintendent, County Land Commissioner, or other land managers. These alterations should, however, be channeled through the local field forester in the Dept. of Natural Resources

Further instructions on submitting alterations are found in this manual as a separate section starting on Page 33.

COLUMNS 6 - 7: SECTION

Record the number of the section of land in which the forest type is located. Example: Section 6 = 0 6.

COLUMNS 8, 9 & 10: TOWNSHIP

Record the number of the township in which the type is located. Example: Twp. 60 = 0 6 0.

COLUMNS 11 - 12: RANGE

Record the number of the range in which the type is located. Example: Range 7 = 0 7.

COLUMN 13:

This column is to differentiate between the east and west ranges:

Code 8 = East

Code 9 = West

The code number has already been entered. You do nothing with this column.

COLUMNS 14 - 15: COUNTY

Record the code number of the county in which the type is located. Example: Beltrami County = 0 4.

COUNTIES

CODE			CODE		
01	Aitkin	(AIT)	45	Marshall	(MRS)
02	Anoka	(ANO)	46	Martin	(MRT)
03	Becker	(BEC)	47	Meeker	(MEE)
04	Beltrami	(BEL)	48	Mille Lacs	(MIL)
05	Benton	(BEN)	49	Morrison	(MOR)
06	Big Stone	(BGS)	50	Mower	(MOW)
07	Blue Earth	(BLE)	51	Murray	(MUR)
08	Brown	(BRO)	52	Nicollet	(NIC)
09	Carlton	(CAR)	53	Nobles	(NOB)
10	Carver	(CRV)	54	Norman	(NOR)
11	Cass	(CAS)	55	Olmstead	(OLM)
12	Chippewa	(CHP)	56	Ottertail	(OTT)
13	Chisago	(CHI)	57	Pennington	(PEN)
14	Clay	(CLA)	58	Pine	(PIN)
15	Clearwater	(CLW)	59	Pipestone	(PIP)
16	Cook	(COO)	60	Polk	(POL)
17	Cottonwood	(COT)	61	Pope	(POP)
18	Crow Wing	(CRW)	62	Ramsey	(RAM)
19	Dakota	(DAK)	63	Red Lake	(RLK)
20	Dodge	(DOD)	64	Redwood	(RDW)
21	Douglas	(DOU)	65	Renviller	(REN)
22	Faribault	(FAR)	66	Rice	(RIC)
23	Fillmore	(FIL)	67	Rock	(ROC)
24	Freeborn	(FRB)	68	Roseau	(ROS)
25	Goodhue	(GDH)	69	St. Louis	(STL)
26	Grant	(GRA)	70	Scott	(SCO)
27	Hennepin	(HEN)	71	Sherburne	(SHE)
28	Houston	(HOU)	72	Sibley	(SIB)
29	Hubbard	(HUB)	73	Stearns	(STN)
30	Isanti	(ISA)	74	Steele	(STE)
31	Itasca	(ITA)	75	Stevens	(STV)
32	Jackson	(JAC)	76	Swift	(SWI)
33	Kanabec	(KNB)	77	Todd	(TOD)
34	Kandiyohi	(KND)	78	Traverse	(TRA)
35	Kittson	(KIT)	79	Wabasha	(WAB)
36	Koochiching	(KOO)	80	Wadena	(WAD)
37	Lac Qui Parle	(LQP)	81	Waseca	(WAS)
38	Lake	(LAK)	82	Washington	(WAH)
39	Lake of Woods	(LOW)	83	Watonwan	(WAT)
40	Le Sueur	(LES)	84	Wilkin	(WIL)
41	Lincoln	(LIN)	85	Winona	(WIN)
42	Lyon	(LYN)	86	Wright	(WRI)
43	McLeod	(MCL)	87	Yellow Medicine	(YEL)
44	Mahnomen	(MAH)			

COLUMNS 16, 17 & 18: REGION - AREA - DISTRICT

Record the code number of the Division of Forestry District in which the forest type is located. Always enter the district code, regardless of who is the administrator of the land.

BEMIDJI REGION	Code
Bemidji Area	
Bemidji Dist.	(111)
Cass Lake Dist.	(112)
Guthrie Dist.	(113)
Itasca Dist.	(114)
Roy Lake Dist.	(115)
Bagley Dist.	(116)
Warroad Area	
Warroad Dist.	(121)
Clear River Dist.	(122)
Wannaska Dist.	(123)
Grygla Dist.	(124)
Greenbush Dist.	(125)
Baudette Area	
Baudette Dist.	(131)
Birchdale Dist.	(132)
Williams Dist.	(133)
Blackduck Area	
Blackduck Dist.	(151)
Kelliher Dist.	(152)
Waskish Dist.	(153)
Northome Dist.	(154)
Park Rapids Area	
Park Rapids Dist.	(161)
Alexandria Dist.	(162)
Perham Dist.	(163)
Smoky Hills Dist.	(164)
Elbow Lake Dist.	(165)

CLOQUET REGION	Code
Cloquet Area	
Cloquet Dist.	(211)
Cromwell Dist.	(212)
Floodwood Dist.	(213)
Cotton Dist.	(214)

CLOQUET REGION (CONT)	Code
Deer River Area	
Bowstring Dist.	(221)
Effie Dist.	(222)
Thistledew Dist.	(223)
Grand Rapids Dist.	(224)
Deer River Dist.	(225)
Hibbing Area	
Hibbing Dist.	(231)
Link Lake Dist.	(232)
Side Lake Dist.	(233)
Virginia Dist.	(234)
Orr Area	
Orr Dist.	(241)
Kabetogama Lake Dist.	(242)
Crane Lake Dist.	(243)
Tower Dist.	(244)
Cook Dist.	(245)
Duluth Area	
Cloquet Valley Dist.	(252)
Two Harbors Dist.	(253)
Finland Dist.	(254)
Grand Marais Dist.	(255)
Hovland Dist.	(256)
Littlefork Area	
Littlefork Dist.	(261)
Int'l Falls Dist.	(262)
Big Falls Dist.	(263)
Pine Island Dist.	(264)
Loman Dist.	(265)
Hill City Area	
Hill City Dist.	(271)
Jacobson Dist.	(272)
Sandy Lake Dist.	(273)
Aitkin Dist.	(274)
McGrath Dist.	(275)

Column 16, 17 & 18 (Cont)

BRAINERD REGION	Code
Brainerd Area	
Brainerd Dist.	(311)
Little Falls Dist.	(312)
Pillager Dist.	(313)
Crosby	(318)
Backus Area	
Backus Dist.	(321)
Washburn Lake Dist.	(322)
Pequot Lakes Dist.	(323)
Nimrod Dist.	(324)
Moose Lake Area	
Moose Lake Dist.	(341)
Nickerson Dist.	(342)
Eaglehead Dist.	(343)
Hinckley Dist.	(344)
Mora Dist.	(345)
Cambridge Area	
Cambridge Dist.	(351)
Zimmerman Dist.	(352)
St. Cloud Dist.	(353)
Onamia Dist.	(354)

NEW ULM REGION	
New Ulm Area	
Mankato Dist.	(411)
Redwood Falls Dist.	(412)
Willmar Dist.	(413)

ROCHESTER REGION	
Lake City Area	
Lake City Dist.	(511)
Faribault Dist.	(512)
Red Wing Dist.	(513)
Lewiston Area	
Lewiston Dist.	(531)
Caledonia Dist.	(532)
Preston Dist.	(533)
Rochester Area	
Rochester Dist.	(541)

METRO REGION	
Metro Area	
Carlos Avery Dist.	(611)
Hastings Dist.	(612)
Waconia Dist.	(613)

COLUMNS 19 - 20: STATE FOREST

Record the code number of the state forest in which the stand is located. If the land is within the boundary of a state forest, regardless of ownership, enter the code for the state forest. Example: Bear Island = 0 4.

STATE FORESTS

Code			Code		
00	Outside State Forest	(OTHR)	29	Lake Isabella	(ISAB)
01	Admin Site & Misc. SF	(MISC)	30	Lake Jeanette	(LJNE)
02	Badoura	(BDOR)	31	Land O'Lakes	(LOLO)
03	Battleground	(BTLG)	32	Lyons	(LYON)
04	Bear Island	(BEAR)	33	Minn. Mem. Hardwood	(MHWD)
05	Beltrami Island	(BLIS)	34	Mississippi Hdwtrs.	(MHWT)
06	Bigfork	(BIGF)	35	Nemadji	(NMDJ)
07	Birch Lake	(BIRL)	36	Northwest Angle	(NWAN)
08	Blackduck	(BLDK)	37	Pat Bayle	(BAYL)
09	Bowstring	(BOWS)	38	Paul Bunyan	(PAUL)
10	Buena Vista	(BU.V)	39	Pillsbury	(PILL)
11	Burntside	(BURN)	40	Pine Island	(P.IS)
12	Chengwatana	(CHWA)	41	Red Lake	(REDL)
13	Cloquet Valley	(CLOQ)	42	Remer	(REMR)
14	Crow Wing	(CROW)	43	Rum River	(RUMR)
15	D.A.R.	(DAR.)	44	St. Croix	(ST.C)
16	Emily	(EMLY)	45	Sand Dunes	(SAND)
17	Finland	(FINL)	46	Savanna	(SAVA)
18	Fond Du Lac	(FDUL)	47	Smokey Bear	(SMOB)
19	Foot Hills	(FHIL)	48	Smoky Hills	(SMOH)
20	General C. C. Andrews	(GENA)	49	Solana	(SOLA)
21	George Washington	(GWAS)	50	Sturgeon River	(STUR)
22	Golden Anniversary	(GOLD)	51	Two Inlets	(TWOI)
23	Grand Portage	(GRPO)	52	Wealthwood	(WLTH)
24	Hill River	(HILR)	53	Welsh Lake	(WELS)
25	Huntersville	(HUNT)	54	White Earth	(W.EA)
26	Insula Lake	(INSL)	55	Whiteface River	(FACE)
27	Kabetogama	(KABT)	56	Snake River	(SNAK)
28	Koochiching	(KOOC)			

COLUMNS 21, 22 & 23: OTHER MANAGEMENT UNITS

Record the code number of any management unit, other than a state forest, in which the stand is located. This may be a state or county park, game management area, school forest, or a municipal forest, including any unit which requires a separation of data for management. State parks have a code sequence established. These codes must be used. See Page 7.1

Management Units that do not have an indentifying code number must have a code number assigned before the field work begins. This will be done at the regional meeting prior to beginning the inventory. Consultation with park supervisors, game managers, and other public land administrators will be done at this meeting.

STATE PARKS

Code		Code		Code	
001	Administration	088	Glacial Lakes	094	O. L. Kipp
072	Acton Monument	017	Gooseberry Falls	036	Old Croosing Treaty
089	Afton	099	Hayes Lake	037	Old Mill
086	Banning	004	Helmer Myre	055	Ray Berglund
053	Baptism River	057	Hinckley Monument	095	Rice Lake
069	Bear Head Lake	019	Inspiration Peak	041	St. Croix
003	Beaver Creek Valley	020	Interstate	085	St. Croix Islands
066	Big Stone Lake	021	Itasca	024	St. Croix Wild River
005	Birch Coulee	022	Jay Cooke	081	Sam Brown Monument
034	Blue Mounds	023	John Latsch	096	Sakatah Lake
006	Brook Park Monument	056	Joseph R. Brown	068	Savanna Portage
007	Buffalo River	071	Judge C. R. Magney	042	Scenic
008	Camden	025	Kilen Woods	067	Schoolcraft
009	Camp Release	079	Kodonce River	082	Schwandt Monument
073	Caribou Falls	026	Lac Qui Parle	043	Sibley
078	Carley	027	Lake Bemidji	045	Split Rock Creek
061	Cascade River	028	Lake Bronson	083	Split Rock Lighthouse
010	Charles A. Lindbergh	029	Lake Carlos	059	Temperance River
038	Chippewa Lac Qui Parle	090	Lake Louise	097	Tower Soudan
011	Count Beltrami	091	Lake Maria	047	Traverse Des Sioux
074	Cross River	030	Lake Shetek	098	Upper Sioux Agency
065	Crow Wing	092	Little Elbow Lake	048	Whitewater
075	Devil's Track	031	McCarthy Beach	049	William O'Brien
013	Father Hennepin	093	Maplewood	058	Wood Lake Monument
014	Flandrau	080	Milford Monument	063	Zippel Bay
076	Flood Bay	060	Mille Lacs Kathio	052	North West Region
087	Forestville	016	Minnesota Valley	046	North East Region
015	Fort Ridgely	032	Minneopa	070	Central Region
077	Fort Snelling	033	Monson Lake	051	South West Region
002	Franz Jevne	054	Moose Lake Monument	044	South East Region
062	Frontenac	018	Moose Lake Rec. Area	040	Metro Region
064	George Crosby Manitou	035	Nerstrand Woods	100	Wild River
				101	Tettagouche

WILDLIFE MANAGEMENT AREAS

COLUMN 24: COMPARTMENT

Compartmentation of forest lands may be necessary to accomplish the overall forest management objectives within the framework of existing administrative boundaries and their separate work assignments.

Compartmentation is the responsibility of the land managers in the region and area.

Compartments must be designated before the survey starts and be outlined on a map which will include a compartment identity number.

Record the number that has been assigned to identify the compartment in which the type is located.

If no compartmentation is indicated, code as a 0.

COLUMN 25: ACQUISITION STATUS

Record the code number for the acquisition status of the land upon which the type is located.

Code	Abbreviation
0 - None of the Below	(NONE)
1 - Trust Fund (School or Swamp)	(TRUS)
2 - Acquired Land	(ACQ.)
3 - Consolidated Conversation	(CONS)
4 - L.U.P. (Leased)	(LUP.)
5 - 50 - 50 Lands	(5050)
6 - University	(UNIV)
7 - Volstead	(VOL.)
8 - Salt Spring	(SALT)
9 - Tax Forfeited	(TAXF)

Use the table on Page 7.4 to relate the Land Ownership Records with the Forest Inventory "Acquisition Status" Codes.

Table relating Land Ownership Classifications with Forest Inventory Acquisition Status Codes.

LAND STATUS (Page 8 of Land Ownership Classification Book)			FOREST INV. ACQUISITION STATUS CODE
First Letter	Second Letter	=	Numerical Code
A	All (A - N)	=	1
B	All (A - N)	=	1
C	All (A - N)	=	1
D	All (A - N)	=	0
E	All (A - N)	=	6
F	All (A - N)	=	0
G	All (A - N)	=	0
H	All (A - N)	=	0
I	All (A - N)	=	0
K	All (A - N)	=	3
L	F	=	5
L	All Except F	=	2
M	All (A - N)	=	9
N	All (A - N)	=	4
O	All (A - N)	=	4
P	All (A - N)	=	7

COLUMN 26: ADMINISTRATOR

Record the code number of the administrator of the land upon which the type is located.

Code	Abbreviation
0 - None of the Below	(NONE)
1 - State Forestry	(FOR.)
2 - State Fish & Wildlife	(F.W.)
3 - State Parks & Rec.	(PARK)
4 - Other State Agencies	(OTHR)
5 - County	(CO.)
6 - Private	(PRIV)

COLUMN 27 & 28: COVER TYPES

A high degree of accuracy is required in cover type determination. Many stands can be classified to type by observation, but it usually will be determined by a measurement of the volume of wood in trees over 5" D.B.H. or a count of stems for trees less than 5" D.B.H. See Appendix for flow chart, Page A-13.

A stand of trees with a volume of wood less than three cords per acre (10%) or 1,250 board feet per acre cannot be shown as the main cover type. In this case the understory or ground cover will be recorded as the main cover type (in Columns 27 & 28).

When there is a volume of merchantable size timber in a non-merchantable type, the merchantable volume will be recorded by specie in Card #2.

The volume of wood in trees larger than 5" D.B.H. will be recorded by specie on Card #2, "Stand Composition".

The number of stems in trees less than 5" D.B.H. will be recorded by specie on Card #3, "Stand Composition".

Enter the applicable code for the correct forest type from the cover types listed.

If, within a type, the following conditions exist -

1. Size class differs by more than one code,
2. Density class differs by more than two codes,
3. Site index differs by ten or more,
4. Management prescriptions differ,

the type will be separated into two or more types.

COMMERCIAL FOREST TYPES

Code	Type	Symbol	Description
01	Ash	Ash	A bottomland type composed of ash
06	Willow	Wil	A bottomland type which attains merch. size in the southern portion of the state
09	Lowland Hardwoods	LH	Bottomland hardwoods (Ash, Elm, Balm of Gilead, etc.)
12	Aspen	A	Trembling or large tooth Aspen or Paper Birch; Aspen predom.
13	Birch	Bi	Paper Birch usually with Aspen. Paper Birch predominating
14	Balm of Gilead	Bg	A type composed almost entirely of Balm of Gilead, or of Balm of Gilead and Aspen with Balm of Gilead predom.
15	Cottonwood	Cot	Cottonwood; usually in southern portion of state
20	Northern Hardwoods	NH	Northern or upland hardwood species (Maple, Yellow Birch, Basswood, Oaks)
25	Walnut	WAL	Walnut
30	Oak	O	Oak
40	Central Hardwoods	CH	Dense hardwoods, with Oak, Hickory, Cherry, Butternut
51	White Pine	WP	Pine with White Pine outweighing Norway and Jack Pine

Commercial Forest Types (Cont.)

Code	Type	Symbol	Description
52	Norway Pine	NP	Pine with Norway Pine outweighing White and Jack Pine
53	Jack Pine	JP	Pine with Jack Pine outweighing White and Norway Pine
54	Scotch Pine	SCP	A type usually a plantation entirely Scotch Pine
61	White Spruce	WS	A type with White Spruce predom.
62	Balsam Fir	BF	A type with Balsam Fir predominating
71	Black Spruce; Lowland	BSL	Swamp conifers with Black Spruce outweighing other species
72	Tamarack	T	Swamp conifers with Tamarack outweighing other species
73	Northern White Cedar	C	Swamp conifers with White Cedar outweighing other species.
74	Black Spruce; Upland	BSU	A type usually on high rocky ridges, often in mixture with Jack Pine
81	Red Cedar	RC	A type usually found on dry sites in the south half of the state, seldom attains a large size

NON-STOCKED COMMERCIAL FOREST TYPES (Non-Productive)

Code	Type	Symbol	Description
75	Stagnant Spruce	SX	A Spruce, Tamarack
76	Stagnant Tamarack	TX	or Cedar type below
77	Stagnant Cedar	CX	site index 23
78	Offsite Aspen	AX	An Aspen type below site index 35
79	Offsite Oak	OX	A scrubby Oak type below site index 40

The volume of wood in trees larger than 5" D.B.H. must be recorded on Card #2, "Stand Composition", by specie.

The number of stems in trees less than 5" D.B.H. must be recorded on Card #3, "Stand Composition", by specie.

NON-STOCKED COMMERCIAL FOREST TYPES (Deforested)

Code	Type	Symbol	Description
82	Cutover Area	COA	Cutover within the last 3 years since the close of the timber sale with no representative timber present or visible - usually in the process of regeneration
83	Lowland Grass	LG	A lowland grass area capable of supporting a commercial forest
84	Upland Grass	UG	An upland grass or weed area less than 10% stocked with a commercial tree species
85	Lowland Brush	LB	A lowland brush area on potential commerical land, less than 10% stocked with a commercial tree species
86	Upland Brush	UB	Upland brush such as; Hazel, Willow, Pin Cherry, Raspberry, etc, less than 10% stocked with a commercial tree specie
87	Duff	D	Low herbaceous cover only, or litter and herbaceous cover (ferns or annuals). Generally only used as an understory designation
88	Moss	M	Sphagnum or feather. Generally only used as an understory designation

NON-FOREST TYPES

Code	Type	Symbol	Description
91	Agricultural	Agr	Land being actively used for agricultural purposes, includes cropland, orchard, pasture, etc.
92	Industrial & Urban Devel.	IDev	Areas used for industry or residences - leased land, gravel pits, power lines, pipelines, etc.
93	Recreation Development	Rec	Recreational areas less than 10% stocked with a commercial tree species including forest lands where timber is reserved from cutting
94	Roads	Rd	Roads, railroads, cut out road right-of-way
95	Rock Outcrop	RO	Rock ridges or knobs either bare or only sparsely covered with vegetation
96	Permanent Water	L	*Non-meandered lakes, ponds, & ditches, which are managed for the primary purpose of containing water perpetually (during drought periods may be dry)
97	Non-Permanent Water	LF	Temporary areas of water such as beaver flowages, etc.
98	Marsh	Mh	Marsh land incapable of supporting a commercial forest. Incudes wild grass, cattails, cane, some willow or other scattered lowland brush
99	Muskeg	Ms	Peat land with a vegetation consisting of mosses and low shrubs such as; Leatherleaf, Laurel, Laborador Tea, Cranberries, bog birch, etc., but <u>not</u> tall willows, alder, dogwood, etc., often characterized by scattered severely stunted black spruce & tamarack of less than site index 23, with a stocking below 10%

*Non-meandered - Bodies of water that do <u>not</u> have permanent traverse lines marking the high water mark of that permanent body of water.

COLUMN 29: COVER TYPE SIZE CLASS (DIAMETER)

Record the code for the classification into which the average diameter of the main cover type specie falls into (D.B.H.)

Code			
0	Not applicable for the type		
1	0 to .9 inches	-	stems per acre
2	1 to 2.9 inches	-	stems per acre
3	3 to 4.9 inches	-	stems per acre
4	5 to 8.9 inches	-	cords per acre
5	9 to 14.9 inches	-	cords per acre
6	15 to 19.9 inches	-	board feet per acre
7	20 to 24.9 inches	-	board feet per acre
8	25+ inches	-	board feet per acre

Codes 1, 2 and 3 are based on stems per acre. The size class selected must contain the highest percentage of stems.

Codes 4 through 8 are based on volume per acre. In determining the size class, the larger size class always takes precidence. Except where the cordwood volume (code 4 & 5) exceeds the sawtimber volume by two (2) or more density classes.

Example: Code 4 (size class 5" - 8.9") contains 15 cords per acre. In the density table (Page 10) this volume is Code 3.

Code 6 (size class 15" to 19.9") contains 3000 board feet per acre. In the density table (Page 10) this volume is Code 1.

Applying the above rule, the size class will be Code 4 (size class 5" - 8.9"), because the volume in that size class is two (2) densities greater than the volume in Code 6 (size class 15" to 19.9").

If the cover type is a "deforested" type, size class will be entered as 0, not applicable.

COLUMN 30: COVER TYPE DENSITY

Merchantable (5"+ D.B.H.) types will be classified according to volume per acre.

Seedlings and saplings (less than 5" D.B.H.) will be classified according to the number of stems per acre. Count the stems in a 1/100 acre plot which has a plot radius of 11.8 feet to arrive at number of stems per acre.

Record the code number which best represents the density of the stand from the table below:

	Seedlings & Saplings (0" - 4.9")	Cordwood (5" - 14.9")	Sawtimber (15" & Larger)
Code	Stems/Acre	Cords/Acre	Bd. Ft./Acre
0	0 - 250	0.0 - 2.9	0 (625) 1250
1	251 (500) 750	3.0 (5) 7.5	1251 (2500) 3750
2	751 (1000) 1250	7.6 (10) 12.5	3751 (5000) 6250
3	1251 (1500) 1750	12.6 (15) 17.5	6251 (7500) 8750
4	1751 (2000) 2250	17.6 (20) 22.5	8751 (10000) 11250
5	2251 (2500) 2750	22.6 (25) 27.5	11251 (12500) 13750
6	2751 (3000) 3250	27.6 (30) 32.5	13751 (15000) 16250
7	3251 (3500) 3750	32.6 (35) 37.5	16251 (17500) 18750
8	3751 (4000) 4250	37.6 (40) 42.5	18751 (20000) 21250
9	4251+	42.6 (45) +	21251 (22500) +

When the size class is determined to be a cordwood size class (Code 4 or 5, Table Page 9), the volume in board feet will be converted to cords (500 bf = 1 cord) and added to the cordwood volume. The density code is determined from that volume.

Likewise, when the size class is determined to be a sawtimber size class (Code 6 - 7 or 8, Table Page 9) the volume in cords will be converted to board feet (2 cds = 1,000 bf), the sum of the two will then determine the density class.

If the cover type is a "deforested" type, density code will be entered as 0, not applicable.

COLUMN 31 - 32: UNDERSTORY TYPE

Determine the understory and record the proper code number from the same code sheet as used for cover type. (Column 27 & 28, Page 8.1, 8.2, and 8.3)

In commerical forest types consisting of trees larger than 5" in D.B.H., an understory will always be shown. The understory will be the type classification that would exist if the main stand were removed. The understory will always be less than 5" D.B.H., that is, the understory cannot be a merchantable size class.

Where there is no layering of a timber type, or the understory is less than 250 stems per acre, the understory will be shown as one of the "Deforested" cover types (codes 83 through 88).

If the main cover type (Column 27 & 28) is a forest type with a size class less than 5" D.B.H., deforested, or non-forest types, no understory will be shown. Code as 0 0.

COLUMN 33: UNDERSTORY SIZE CLASS

Will be recorded only when the understory is a commercial forest type in the seedling and sapling size class (4.9" or less).

Record the code that best represents the average diameter of the stems in the understory, using the same table of codes as for Column 29, Page 9.

If the understory is a deforested, or non-forest type no size class will be indicated. Code as 0.

COLUMN 34: UNDERSTORY DENSITY

Will be classified according to the number of stems per acre. (1/100 acre = 11.8' radius). Record the code that best represents the density indicated for seedlings and saplings using the same table of codes as for Column 30, Page 10. The density of the understory will not influence your density rating of the overstory.

If the understory is a deforested, or non-forest type, no density will be indicated. Code as 0.

COLUMN 35, 36 & 37: ACRES

Record the area of the forest type being examined. Each type in the section will have an individual acreage. No fractional acreage will be recorded. Code from the right using zeroes where necessary: Example - 0 2 0.

When making the initial "Phase II" intensive inventory of the cover type, it will not be necessary for the field forester to enter the acres.

The acres in the type will be determined and entered onto the field sheet at the Forest Inventory Office in Grand Rapids.

COLUMN 38 & 39: YEAR

Record the last two digits of the year in which the survey is being done. Example - 1981 = 8 1.

COLUMN 40: TOPOGRAPHY

Record the code number which best represents the overall topography of the land upon which the type is situated. Pertains to all types.

Code	Topography	Description
0	Not Applicable	Lakes, etc.
1	Level	Flat terrain such as; bogs, marshes, swamps, etc.
2	Rolling	Gently rolling terrain such as; hills or ridges, which will not seriously hamper management efforts.
3	Steep	Abrupt peaks, sharply dropping hills or ridges which will seriously hamper management efforts.

COLUMNS 41 - 42: SITE INDEX

Record the actual site index number as obtained from the enclosed site index curves.

To evaluate site index a number of sample trees in a type will be measured for age and total height.

Measure only dominant or co-dominant trees.

One tree, representative of the type, will have its site index taken on the first plot. A second site index, of the main cover type species, will also be taken in the type. If there is a discrepancy of 10 points between the two indexes more site indexes will be taken. In addition, one site index will be taken on the preferred management species, if applicable.

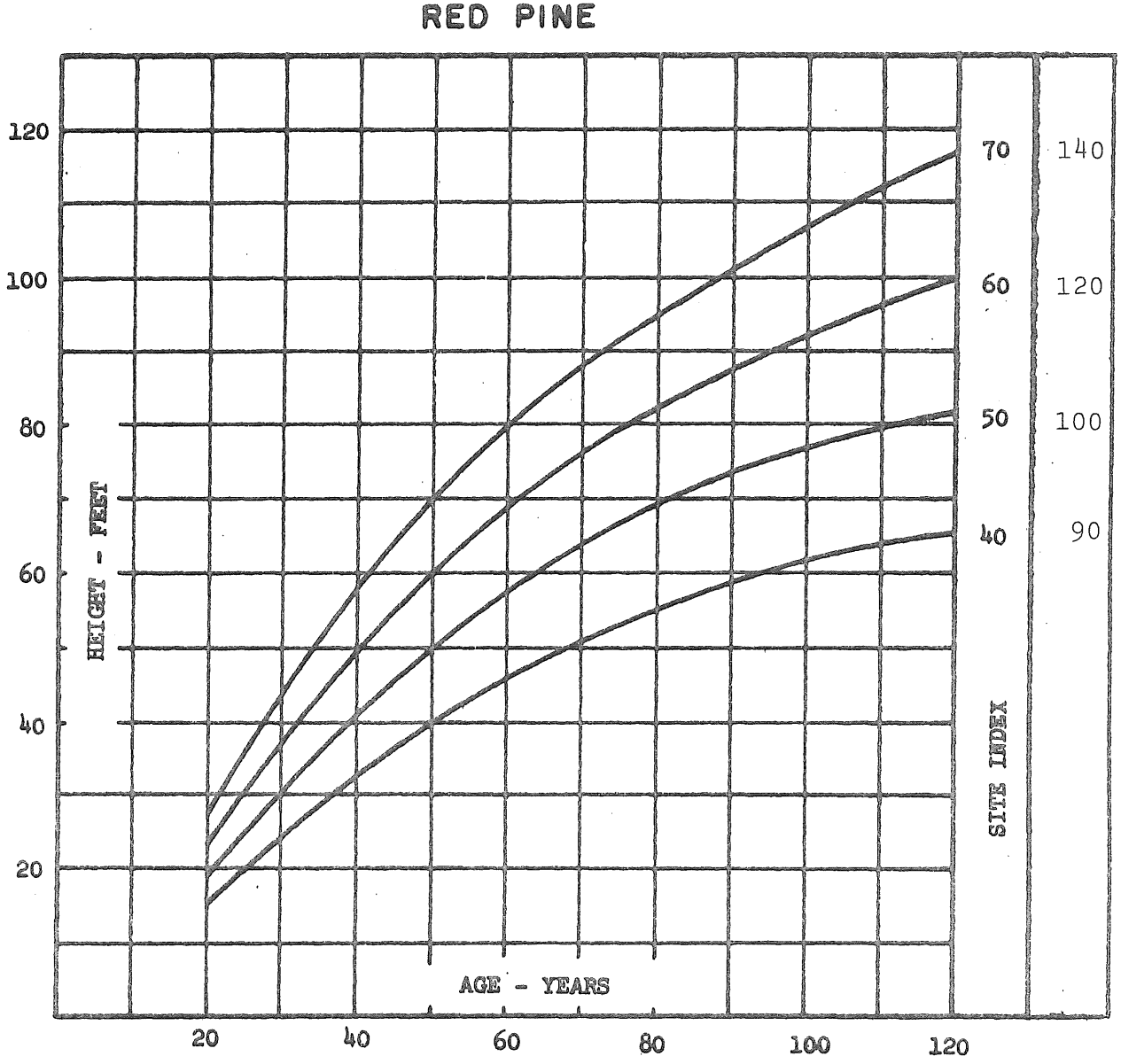
By referring these measurements to the site curves the capacity of the type to grow trees is measured and recorded.

For pine stands composed of trees less than 25 feet in height use the five year intercept method to determine site (See Page 13.12). For dense hardwoods use the Red Oak curves on Page 13.9. For Balm of Gilead use the Aspen curves on Page 13.11 For Birch, use Birch curve on Page 13.10. For Basswood, use the Basswood curve on Page 13.12.

Dense hardwoods will be defined as having a specific gravity of .40 and above.

Site Index for Red Pine in the Lake States

This site index graph is one of a series prepared by the North Central Experiment Station for commercially important species in the Lake States. It has been developed through years of research.



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Site Index for White Pine in the Lake States

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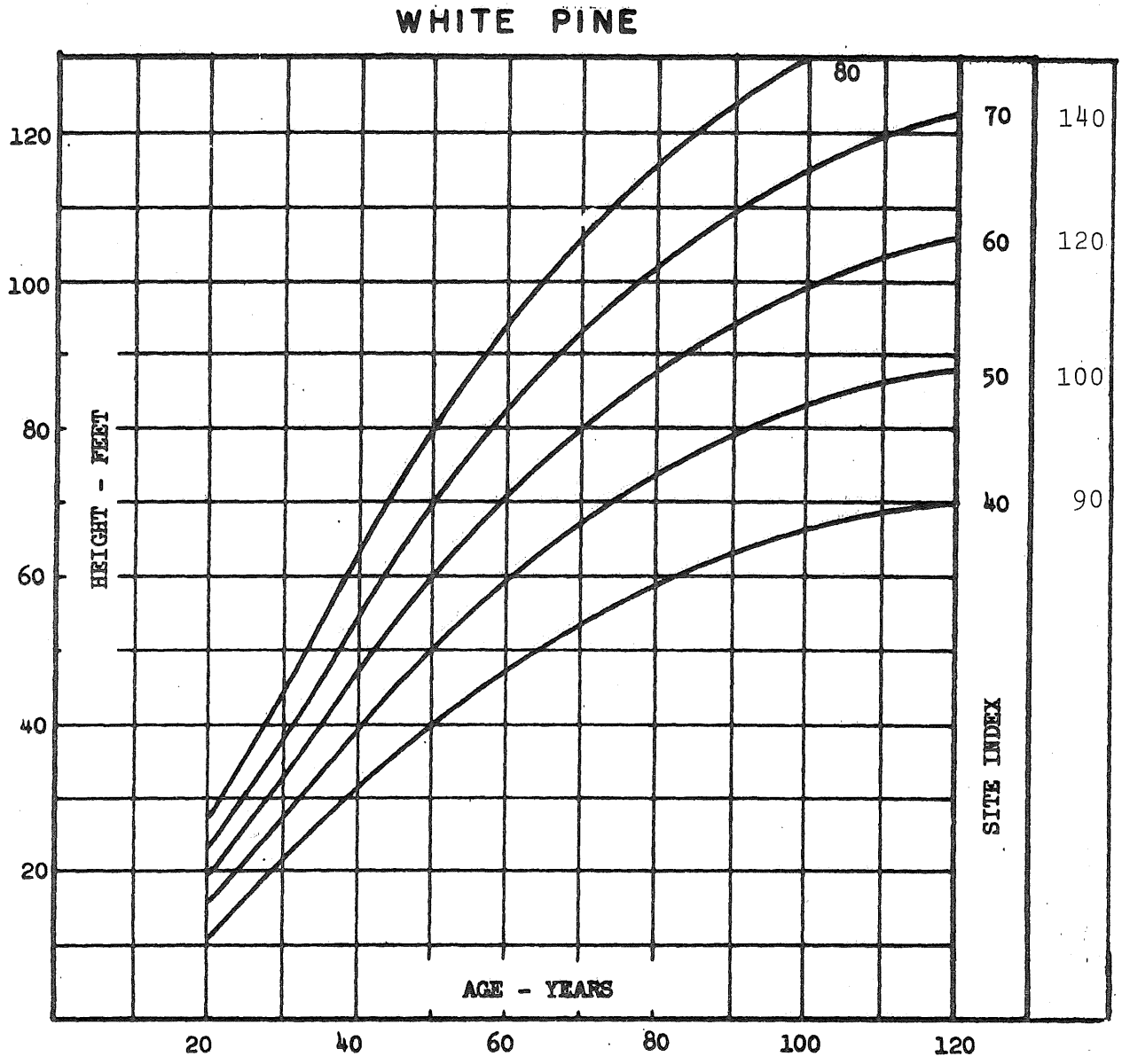

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Site Index for Jack Pine in the Lake States

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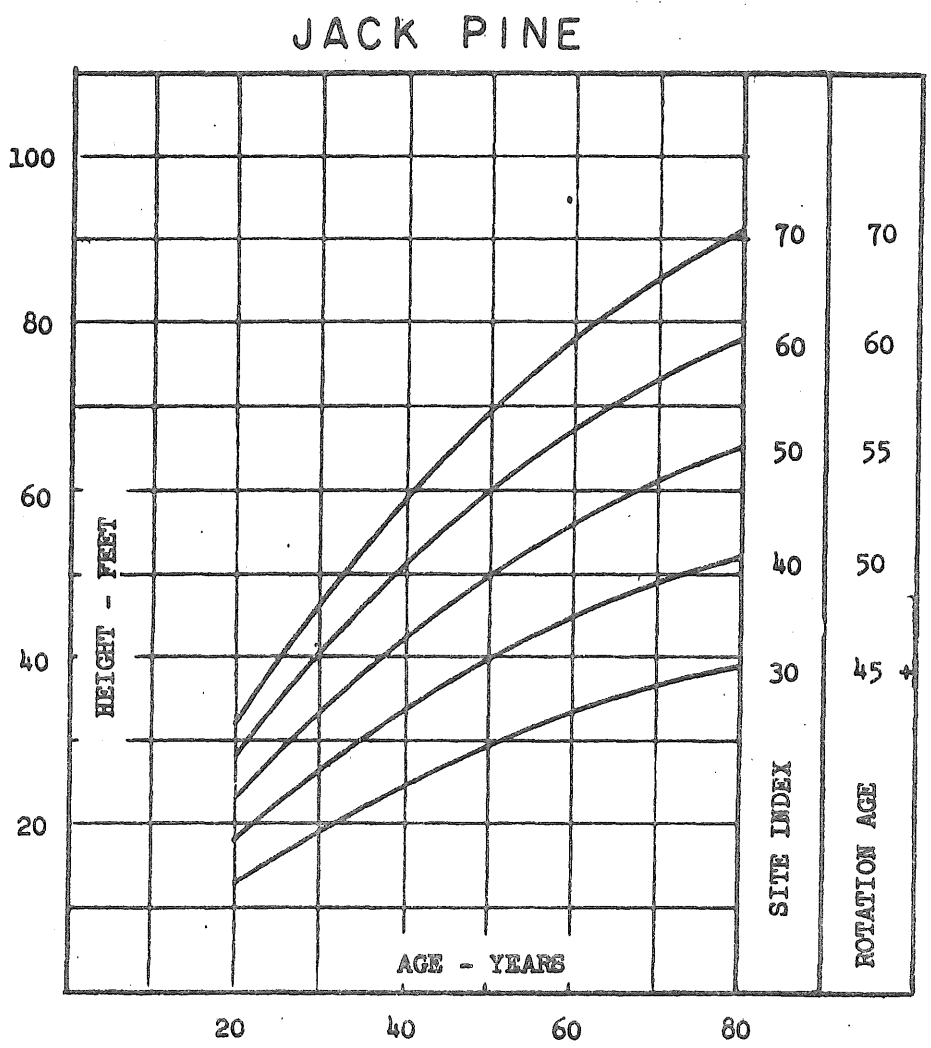

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Site Index for Balsam Fir in the Lake States

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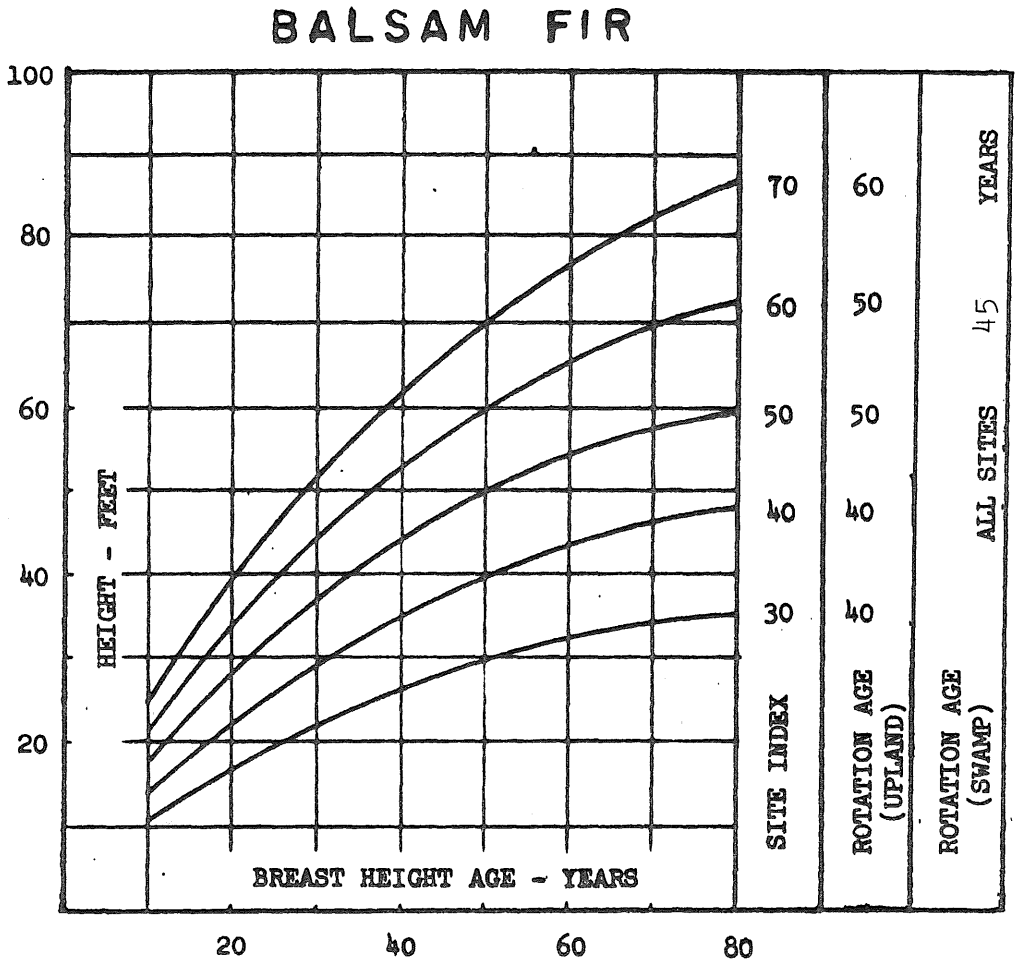

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Site Index for Black Spruce in the Lake States

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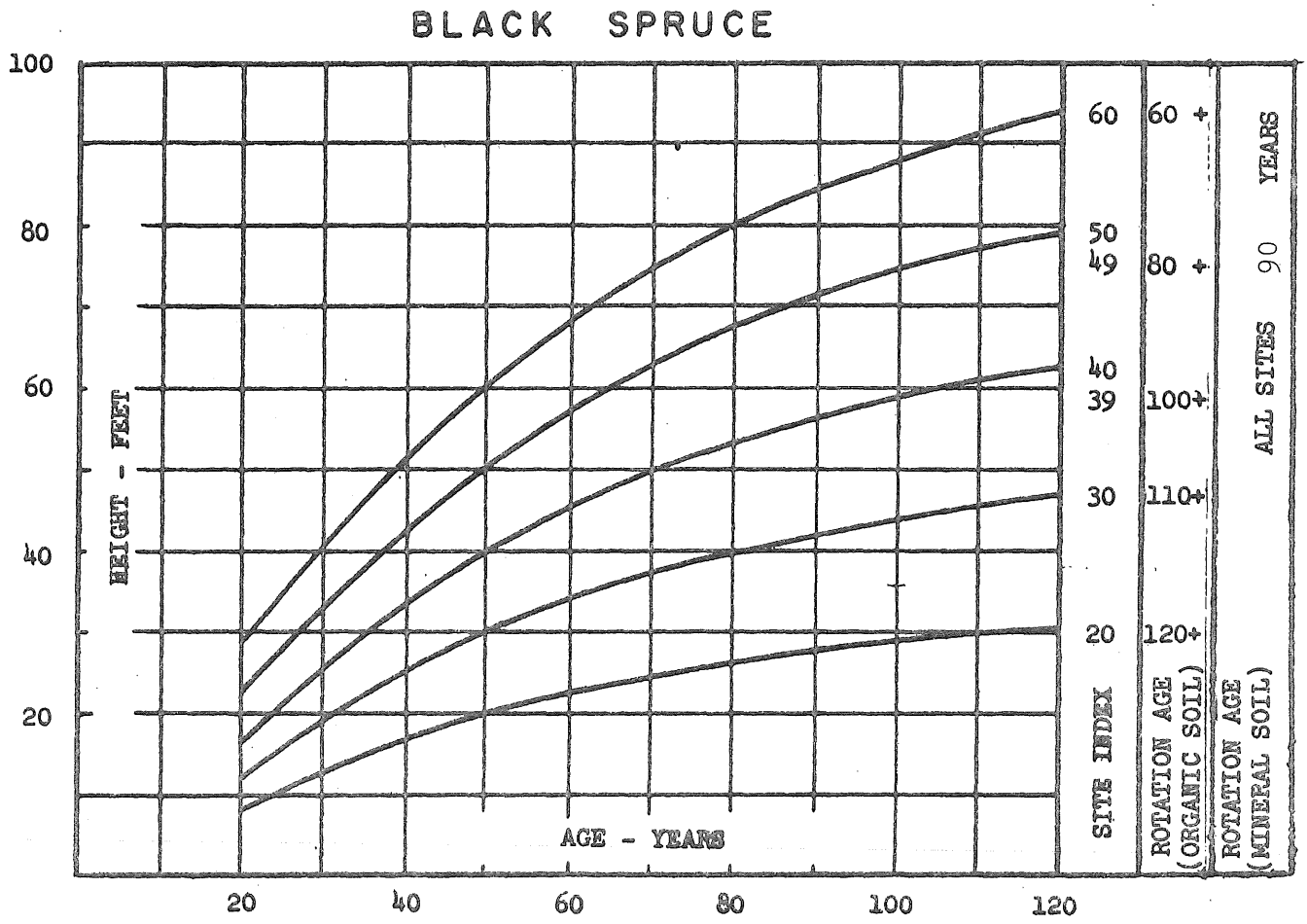

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Site Index for White Spruce in the Lake States

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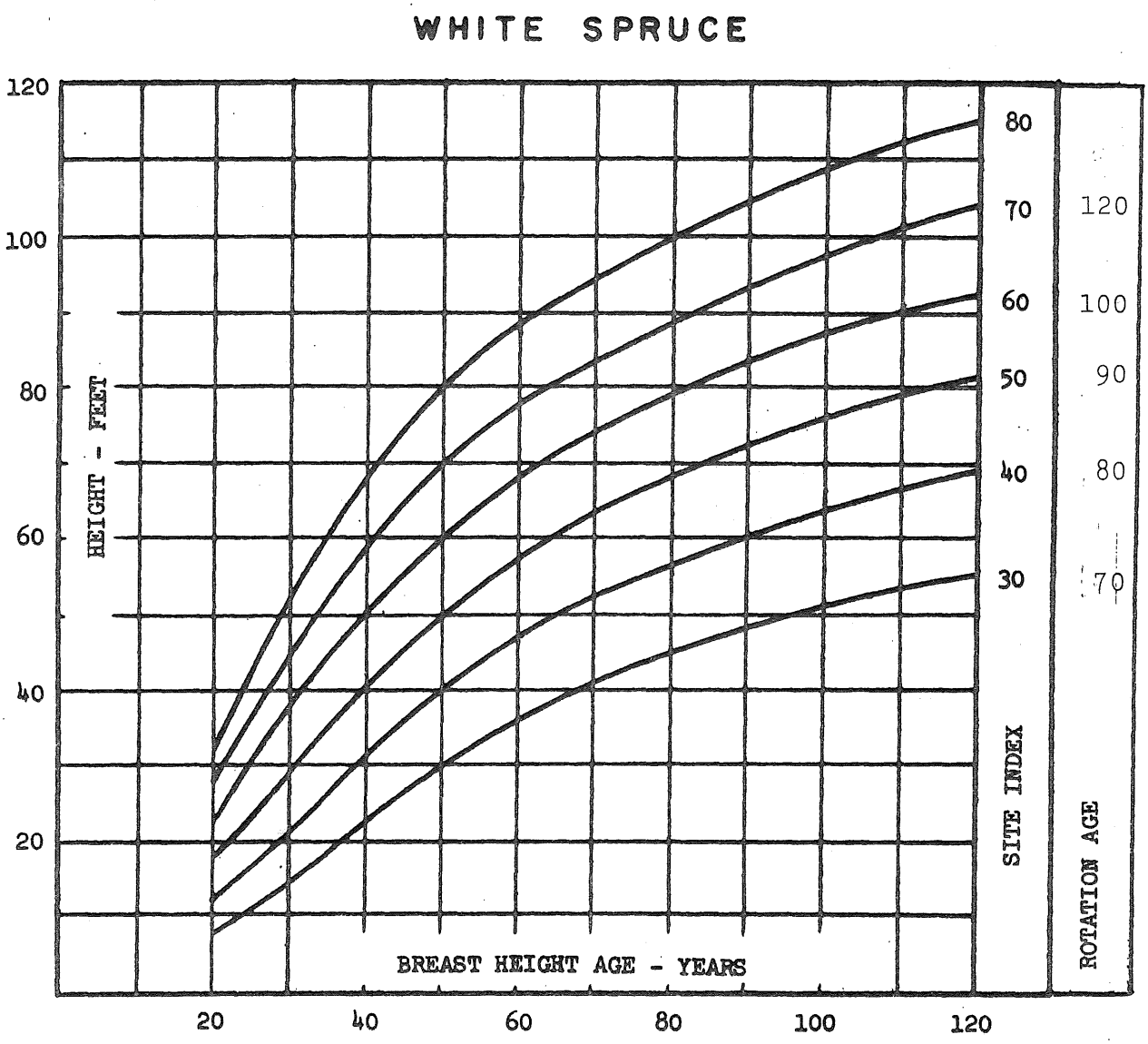

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Site Index for Tamarack in the Lake States

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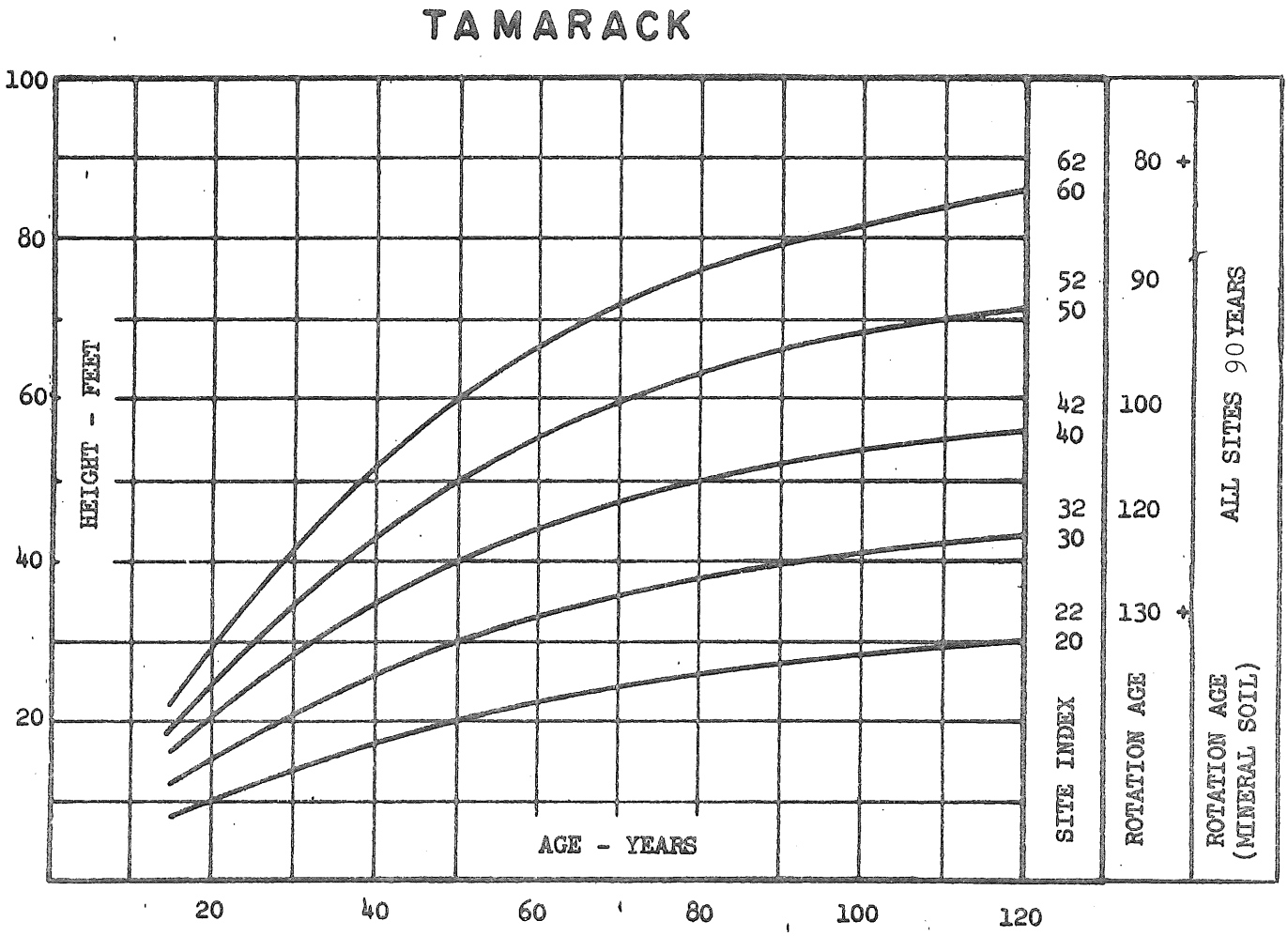

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Site Index for White - Cedar in the Lake States

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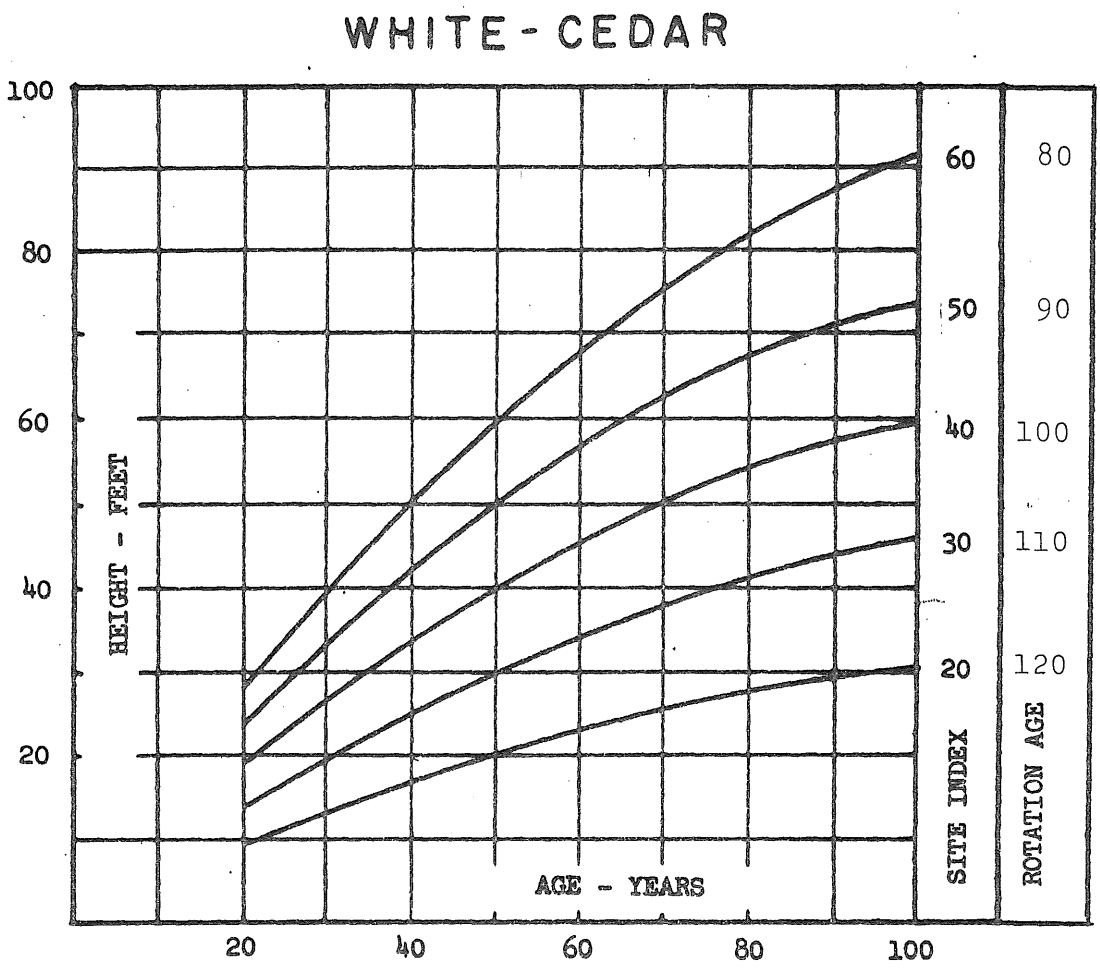

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Site Index for Red Oak in the Lake States

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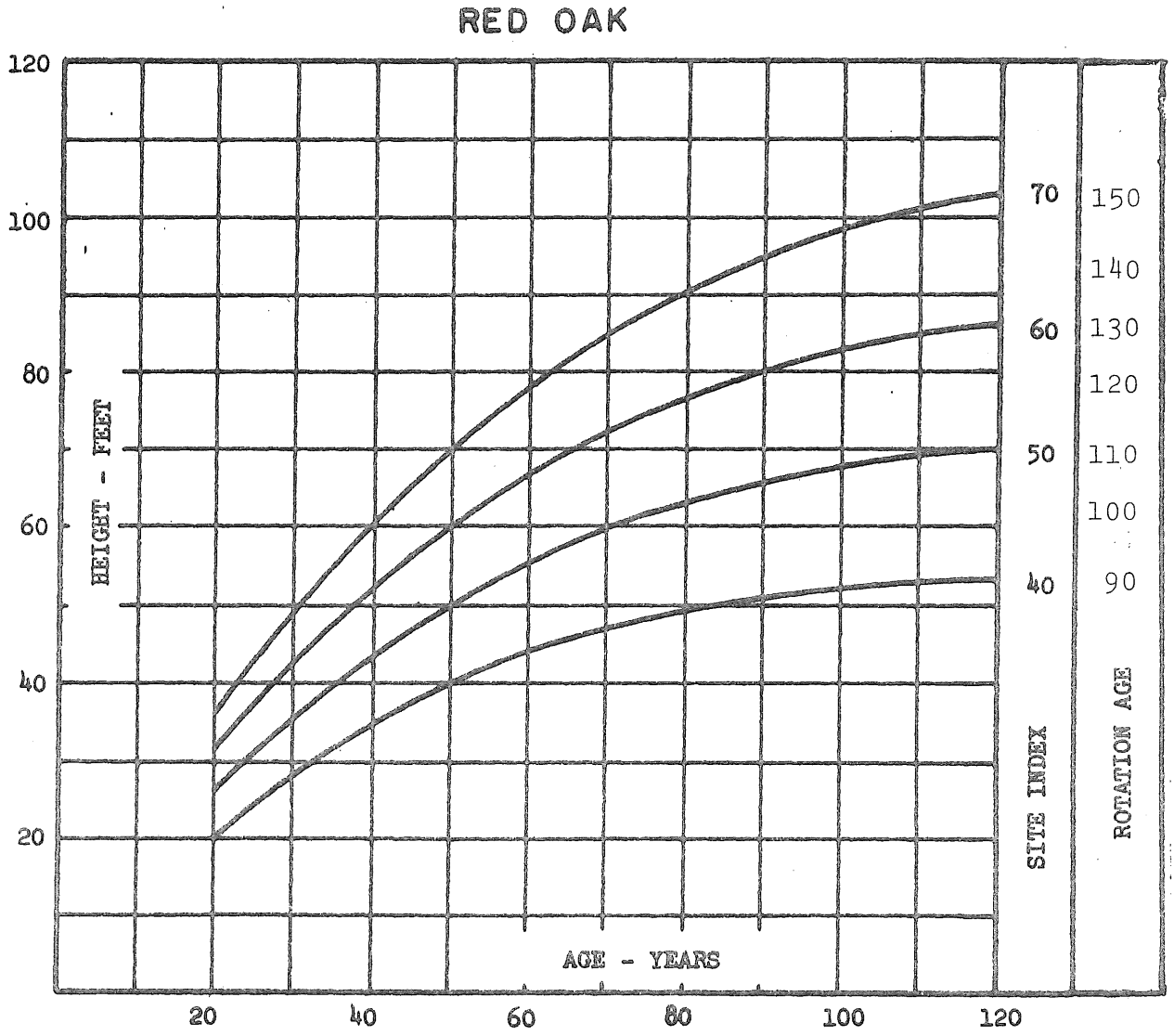

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Site Index for Paper Birch in the Lake States

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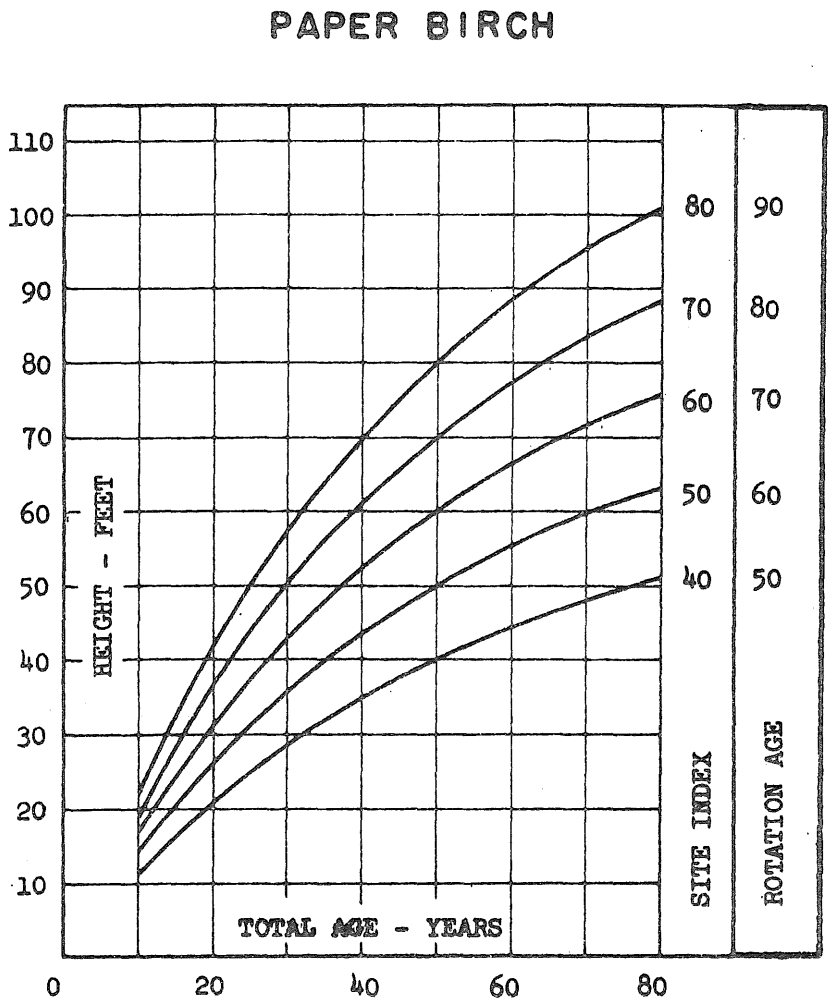

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Site Index for Aspen in the Lake States

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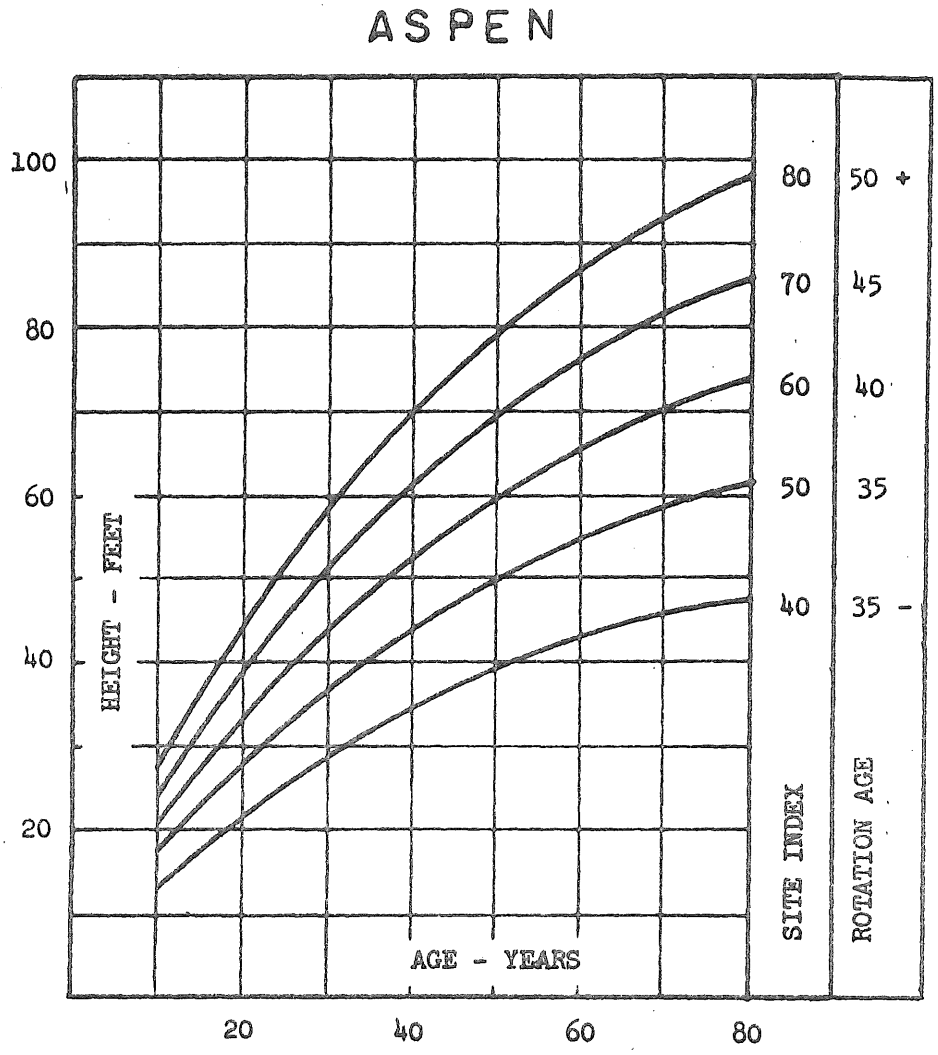

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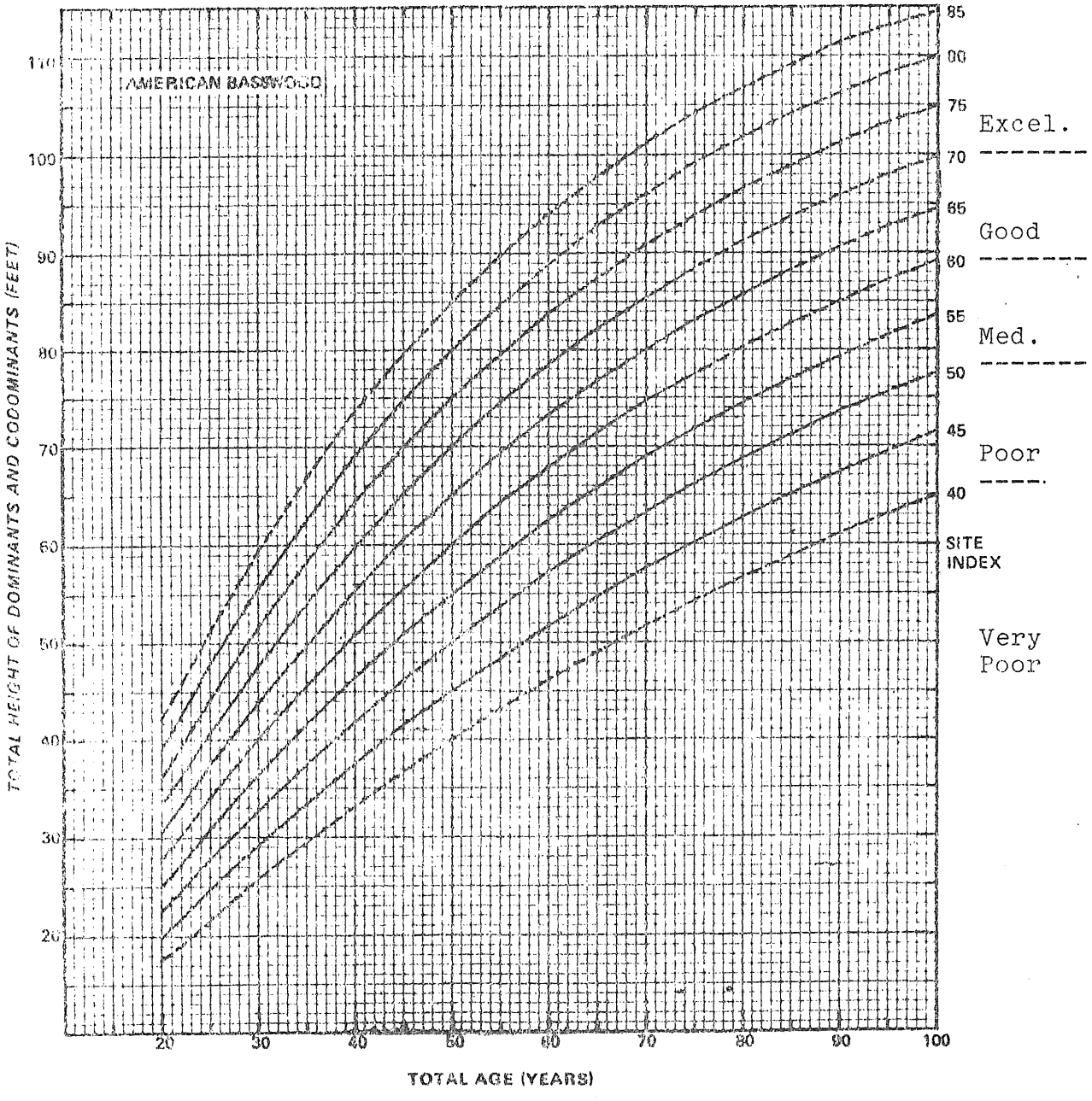


Figure 6.—*Site index curves for American basswood*

Rotation Age = 80 - 100 years
All sites

RED AND WHITE PINE[1]

Site Index - 5-year Intercept Method

Intercept (in feet)	S.I.
- 3.2	30
3.3 - 4.4	40
4.5 - 5.7	50
5.8 - 7.3	60
7.4 - 10.8	70
10.9+	80

1. Select a dominant or codominant tree.

2. Measure the distance between the first and sixth whorl of branches above 6 feet.

3. Read site index directly from chart.

4. Stand site index should be based on measurements of at least three trees.

[1]For use on pine less than 25 feet tall. For pine over 25 feet tall use standard (height over age) site index curves.

COLUMN 43: PHYSIOGRAPHIC CLASS

Record the code number for the condition that best represents the site.

Code	Condition	Description
0	Not Applicable	Permanent water, etc. Only used for cover type codes 96 and 97.
1	Xeric Site	Very dry, droughty site where excessive drainage seriously limits both growth and species occurrence such as; thin solid ridge tops and jack pine plains.
2	Xeromesic Site	Moderately dry sites, where excessive drainage limits growth and species occurrence to some extent.
3	Mesic Site	Good site, soil and water relationship favorable to tree growth with growth and species occurrence limited only by climate.
4	Hydromesic Site	Wet site, poor drainage or frequent flooding effects species occurrence. These include bottomland hardwood sites and hardpan soils of coniferous forests.
5	Hydric Site	Very wet site, growth and species occurrence seriously limited by excess water. These are the frequently flooded river bottoms and spruce bogs. (SX, TX, CX, etc.)

COLUMNS 44, 45 & 46: STAND AGE

Pertains to the main cover type and reflects the main size class of the species to be managed. Average type age is determined by boring at least two dominent or codominent trees at breast height (D.B.H.) and adding the number of years from the chart below required to reach the point of measurement. Sample tree ages are averaged to obtain type age.

AVERAGE NUMBER OF YEARS TO REACH BREAST HEIGHT

Specie	Better Site	Medium & Poor Site
Aspen	1	2
White Pine	8	12
Norway Pine	6	10
Jack Pine	5	8
Black Spruce	10	20
Tamarack	5	10
Balsam Fir	10	20
White Spruce	10	15
Cedar No. White	10	20
Maple, Sugar	8	15
Maple, Silver, Red	2	4
Ash	8	15
Elm	4	8
Basswood	2	4
Balm of Gilead	1	2
Oak	3	6
Birch, Paper	2	4
Birch, Yellow	8	15

Specie	Better Site	Medium & Poor Site
	Site Index	
Aspen	59+	58 or less
Jack Pine	46+	45 or less
Balsam Fir	42+	41 or less
Black Spruce	31+	30 or less
White Spruce	47+	46 or less
White Pine	55+	54 or less
Norway Pine	46+	45 or less
White Cedar	31+	30 or less
Tamarack	41+	40 or less
Red Oak	51+	50 or less
Paper Birch	43+	42 or less

COLUMNS 47, 48 & 49: BASAL AREA/ACRE

Record the basal area of the type utilizing the cumulative angle gauge tally portion on the back of the Stand Examination Data Sheet.

Basal area per acre is determined by:

A) Counting the number of live trees 1" D.B.H. and larger that occur within the radius of the 10 factor plot. This count is recorded on the cumulative angle gauge tally sheet. (See 16.2 for proper procedure to use).

B) Then dividing the total number of trees tallied, by the number of plots taken and multiplying the result by 10 gives you basal area per acre.

C) Measure the distance to borderline trees to determine if they are in or out of the plot. See Table Page 16.1 for distances.

Basal area per acre may have to be adjusted when there are inclusions in the type. See Appendix, Pages A-14 and A-14.1 for further explanation of the proper procedure to use.

COLUMNS 50 & 51: CORDS/ACRE

Record the actual cord volume per acre for all trees that are from 5" to 15" diameter at breast height (D.B.H.) to a 4" top diameter, as obtained from the cumulative angle gauge tally sheet, include all species. Round off to the nearest cord. Example: 6.9 = 07, 5.5 = 05, 5.6 = 06.

COLUMNS 52, 53 & 54: THOUSANDS OF BOARD FEET/ACRE

Record the actual board feet volume per acre for all trees that are 15" or larger diameter at breast height (D.B.H.) to a 6" and larger top diameter, as obtained from the cumulative angle gauge tally sheet, all species. Example: 12,000 board feet is recorded: 12.0; 200 board feet is recorded: 00.2

COLUMN 55: CONDITION CLASS:

Record the code number best representing the stand condition considering species, age, size, quality and stocking.

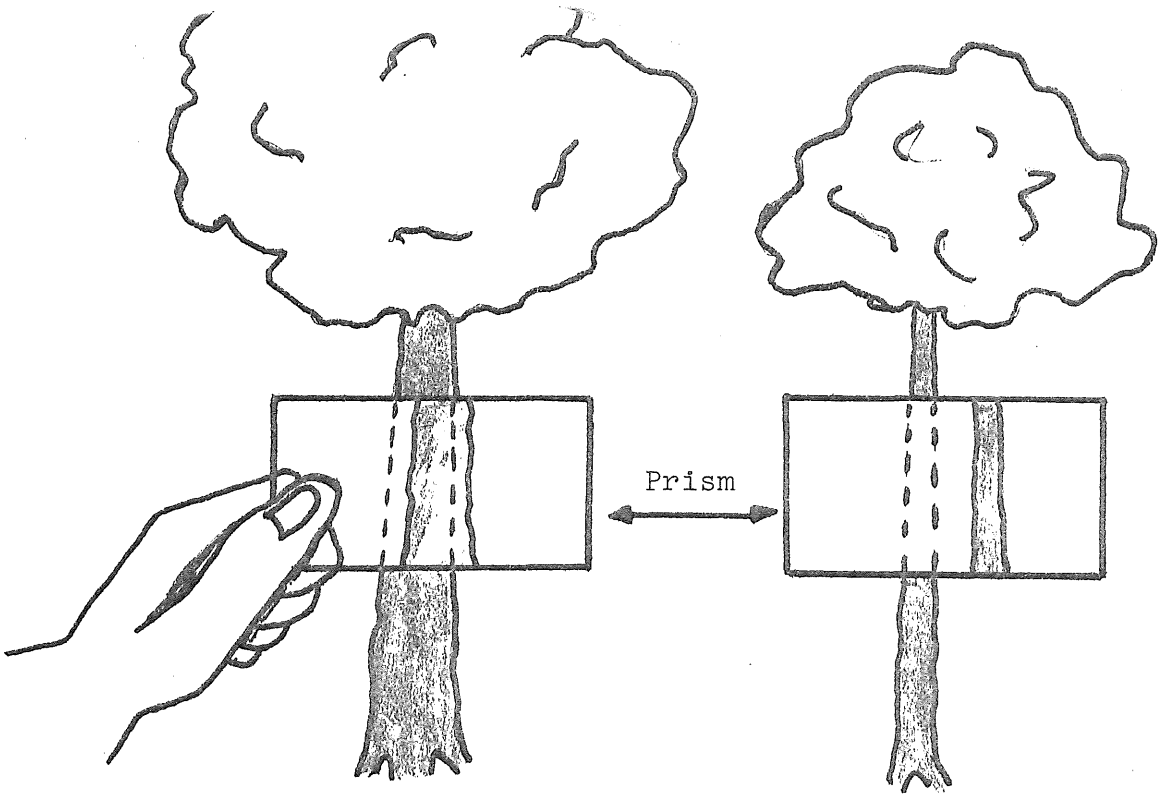
Code	Condition	Description
0	Non-stocked	(Except regeneration and cutover) includes those lands which have not supported timber in the recent past.
1	High Risk	Those stands which will not survive or will have a substantial volume loss. Includes stands which should be treated immediately (0 - 5 years).
2	Mature	A stand at or beyond rotation age and which does not fit the above catagory.
3	Immature	A stand below rotation age and which does not fit into any of the above catagories. Not below 10 years of age.
4	In the Process of Regeneration	Types below 10 years of age. Including types which have been harvested but a final stocking survey has not been made (cutover areas).

Maximum Horizontal Distance For An "In" Tree For a Prism BAF=10

DBH"	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
5	13.75	14.02	14.30	14.57	14.85	15.12	15.40	15.67	15.95	16.22
6	16.50	16.77	17.05	17.32	17.60	17.87	18.15	18.42	18.70	18.97
7	19.25	19.52	19.80	20.07	20.35	20.62	20.90	21.17	21.45	21.72
(8)	22.00	22.27	22.55	22.82	(23.10)	23.37	23.64	23.91	24.20	24.47
9	24.75	25.02	25.30	25.57	25.85	26.12	26.40	26.67	26.95	27.22
10	27.50	27.77	28.05	28.32	28.60	28.87	29.15	29.42	29.70	29.97
11	30.25	30.52	30.80	31.07	31.35	31.62	31.90	32.17	32.45	32.72
12	33.00	33.27	33.55	33.82	34.10	34.37	34.64	34.92	35.19	35.47
13	35.74	36.02	36.29	36.57	36.84	37.11	37.39	37.67	37.94	38.22
14	38.49	38.77	39.04	39.32	39.59	39.87	40.14	40.42	40.69	40.97
15	41.24	41.52	41.79	42.07	42.34	42.62	42.89	43.17	43.44	43.72
16	43.99	44.27	44.54	44.82	45.09	45.37	45.64	45.92	46.19	46.47
17	46.74	47.02	47.29	47.57	47.84	48.12	48.39	48.67	48.94	49.22
18	49.49	49.77	50.04	50.32	50.59	50.87	51.14	51.42	51.69	51.97
19	52.24	52.52	52.79	53.07	53.34	53.62	53.89	54.17	54.42	54.72
20	54.99	55.27	55.54	55.82	56.09	56.37	56.64	56.92	57.19	57.47
21	57.74	58.02	58.29	58.57	58.84	59.12	59.39	59.67	59.94	60.22
22	60.49	60.77	60.94	61.32	61.59	61.87	62.14	62.42	62.69	62.97
23	63.24	63.52	63.79	64.07	64.34	64.62	64.89	65.17	65.44	65.72
24	65.99	66.27	66.52	66.82	67.09	67.37	67.64	67.92	68.19	68.47
25	68.74	69.01	69.29	69.56	69.84	70.11	70.39	70.66	70.94	71.21
26	71.49	71.76	72.04	72.31	72.59	72.86	73.14	73.41	73.69	73.96
27	74.24	74.51	74.79	75.06	75.34	75.61	75.89	76.16	76.44	76.71
28	76.99	77.26	77.54	77.81	78.09	78.36	78.64	78.91	79.19	79.46
29	79.74	80.01	80.29	80.56	80.84	81.11	81.39	81.66	81.94	82.21
30	82.49	82.76	83.04	83.31	83.59	83.86	84.14	84.41	84.69	84.96
31	85.24	85.51	85.79	86.06	86.34	86.61	86.89	87.16	87.44	87.71
32	87.99	88.26	88.54	88.81	89.09	89.36	89.64	89.91	90.19	90.46
33	90.74	91.01	91.29	91.56	91.84	92.11	92.39	92.66	92.94	93.21
34	93.49	93.76	94.04	94.31	94.59	95.86	95.14	95.41	95.69	95.96
35	96.24	96.51	96.79	97.06	97.34	97.61	97.89	98.16	98.44	98.71
36	98.99	99.26	99.54	99.81	100.09					
37	101.74	102.01	102.29	102.56	102.84	103.11	103.38	103.66	103.93	104.21
38	104.48	104.76	105.03	105.31	105.58	105.86	106.13	106.41	106.68	106.96
39	107.23	107.51	107.78	108.06	108.33	108.61	108.88	109.16	109.43	109.71
40	109.98	110.26	110.53	110.81	111.08	111.36	111.63	111.91	112.18	112.46

$$\text{Dist.} = \text{D.B.H.} \times \left(\sqrt{\frac{43560 - \text{BAF}}{4 \times \text{BAF}}} \div 12 \right)$$

Example: D.B.H. = 8.4 inches
Distance to Tree = 23.10 feet



To determine if a tree should be tallied, view that tree through the prism at a point about breast height on the tree's main stem.

*NOTE

When using the prism:

Remember that the prism is the plot center, NOT you!

Rotate around the prism.

COLUMN 56: TIMBER STATUS

Record the code number which best represents conditions affecting the status of timber management for the type.

Before field work is started the region and area shall prepare a map that outlines the boundaries of tracts which have restrictions that will effect the management of the type, an example is: The BWCA interior, which would be coded as 3, "No Timber Harvesting Allowed".

Code	Condition	Description
0	Not applicable	Non-forest types.
1	Normal timber harvesting allowed	
2	Restricted timber harvesting allowed	Parks, etc., where esthetics or some other priority limits normal timber harvesting.
3	No timber harvesting allowed	Determined by law or policy.
4	Shoreline restriction	Determined by zoning regulations around lakes and rivers. See Appendix Page A15, A15.1 for additional explanation.

COLUMNS 57 & 58: MAIN SPECIE IN TYPE

From the specie list below, record the specie code number for the most important specie in the cover type.

For cover types that have been classified as containing trees 5" D.B.H. and larger, the main cover type specie with the highest volume of wood will be entered in Columns 57 & 58.

For cover types that have been classified as containing trees less than 5" D.B.H., the specie with the greatest number of stems will be entered in Columns 57 & 58. Example Tamarack = 7 2.

SPECIES

Code	Name	Symbol*	Code	Name	Symbol
00	None	----	34	Oak, White	WOAK
01	Ash, Black	BASH	35	Oak, Burr	OAK
02	Elm, American	AELM	36	Oak, Scarlet	SOAK
03	Maple, Silver	SMAP	38	Ash, White	WASH
04	Elm, Red	RELM	39	Ash, Green	GASH
05	Elm, Rock	ROCE	41	Hickory, Butternut	BHIC
06	Willow	WIL	42	Hickory, Shagbark	SHIC
12	Aspen, Trembling	ASP	43	Hackberry	HACK
13	Birch, Paper	PBIR	45	Box Elder	BOXE
14	Balm of Gilead	BG	51	Pine, White	WP
15	Cottonwood	COT	52	Pine, Norway	NP
16	Aspen, Largetooth	LASP	53	Pine, Jack	JP
17	Poplar, Hybred	POP	54	Pine, Scotch	SCP
21	Maple, Red	RMAP	55	Pine, Ponderosa	PONP
22	Maple, Sugar	HMAP	61	Spruce, White	WS
23	Basswood	BASS	62	Balsam Fir	BF
24	Birch, Yellow	YBIR	63	Spruce, Colorado	CSPR
25	Walnut	WAL	64	Spruce, Norway	NSPR
26	Butternut	BUTT	65	Spruce, Blk. Hills	BHSP
27	Cherry	CHER	71	Spruce, Black	BSPR
31	Oak, Red	ROAK	72	Tamarack	TAM
32	Oak, Black	BOAK	73	Cedar, White	WCED
33	Oak, English	EOAK	81	Cedar, Red	RCED
			99	Miscellaneous	MISC.

*Specie symbols given here will be used on the computer printouts to identify the specie.

COLUMNS 59 & 60: DIAMETER AT BREAST HEIGHT (D.B.H.)

Pertains to the diameter of the main specie in the type.

Enter in inches the average diameter of the tree specie being recorded as the main specie. Example: 7.0" - 7.9" = 07 (Always round down).

COLUMNS 61 & 62: HEIGHT

Pertains to the average total height of the main specie in the type.

Enter in feet the total height of the tree specie being recorded as the main specie.

COLUMNS 63, 64 & 65: VOLUME PER ACRE

Record the estimated volume per acre for the individual specie over the entire stand. Trees in the size classes 5" to 8.9" and 9" to 14.9" D.B.H. will be recorded in cords per acre. If the main specie has volume in both cords per acre and board feet per acre, the volume pertaining to the D.B.H. recorded in Columns 59 - 60 will be recorded here. The other volume will appear in Card #2, Stand Composition.

Trees with a size class of 15"+ D.B.H. will be recorded as thousand board feet per acre.

Trees with a size class less than 5" D.B.H. will be recorded in thousand stems per acre.

Example: 20 cords = 20.0
2100 board feet = 02.1
1100 stems = 01.1

Adjustments in the volume per acre will be necessary when there are inclusions within the type. See Appendix, Page A16, for an explanation of how to make the adjustments.

COLUMNS 66 & 67: INSECTS, DISEASES OR OTHER DAMAGE

Pertains to the main specie in the type. Problems on associated species or understory components shall not be considered here.

For cover types that have been classified as containing trees 5" D.B.H. and larger, the insect, disease, or damage reported here will refer to the specie with the greatest volume of wood in the type.

For cover types that have been classified as containing trees less than 5" D.B.H., the insect, disease, or damage reported here will refer to the specie with the largest number of stems in the type.

Whenever combination of pests occur on a host other than those available as an option, the most serious (or most predominant) pest should be recorded.

Refer to the Insects and Disease Data Manual in the Appendix, Page A17, for further explanation of insects and disease catagories.

Code	Damage
00	None
	INSECTS
01	Defoliators
02	Bark Beetles
03	Wood Borers
04	Spittlebug
05	White Pine Weevil
06	Spruce Budworm
07	Jack Pine Budworm
08	Shoot Insects (regen)
09	Poplar Borer
10	Root Collar Insects (regeneration)
15	Insects (other)
	DISEASES
16	White Pine Blister Rust
17	White Pine Blister Rust in comb. with White Pine Weevil
18	Sweet Fern Rust
19	Scleroderris Canker
20	Sirococcus Shoot Blight
21	Butternut Canker
22	Oak Mortality
23	Dwarf Mistletoe
24	Diplodia Tip Blight
25	Hypoxylon Canker
26	White Rot of Aspen (Phellinous)
27	Hypoxylon Canker in comb. with White Rot of Aspen
28	Heart Rot
29	Dutch Elm Disease
30	Birch Decline
31	Hardwood Cankers
32	Needle Rust
33	Shoestring Root Rot
40	Diseases (other)
	ANIMALS
41	Beaver
42	Porcupine
43	Rabbit - Mice
44	Deer (or Moose)
45	Sapsucker
50	Animal (other)
	ENVIRONMENTAL
51	Windthrow
52	Drought
53	Ice Breakage
54	Fire
55	Flooding
56	Hail
57	Frost Crack
60	Environmental (other)
	MAN CAUSED OR UNKNOWN
61	Mechanical (as a result of machinery)
62	Chemical Damage (Herbicide, etc.)
99	Unknown

COLUMN 68: PERCENT AFFECTED BY DAMAGE

Pertains to the main specie in the type.

On each plot in a type, determine the percent of stems that are affected by the insect, disease, or other damage. Average the percentage for the type by adding the result from each plot together and dividing by the number of plots.

Code	Percent of Trees Affected or Infested
0	None
1	1 - 10%
2	11 - 25%
3	26 - 50%
4	51 - 80%
5	81 - 100%

COLUMN 69: PERCENT OF MORTALITY

Pertains to the main specie in the type.

On each plot in a type, determine the percent of stems that are dead. The stem must be standing and be taller than 4½ feet in height. Count only mortality that you are reasonably sure has occurred in the past two years. Average the percentage for the type by adding the result from each plot together, and dividing by the number of plots.

Code	Percent of Mortality
0	None
1	1 - 10%
2	11 - 25%
3	26 - 50%
4	51 - 80%
5	81 - 100%

COLUMNS 70 & 71: SHRUB SPECIES COMPOSITION

Code	Description
00	No shrub species present
01	Unknown, below snow
02	Predominantly (most common) Labrador Tea, Leatherleaf
03	Predominantly lowland Alder
04	Predominantly lowland Willow
05	Predominantly Prickly Ash
06	Predominantly Raspberry or other Rubus
07	Alder/Willow with fair amount of Red Osier
08	Combination of upland Blueberry and other low shrubs
09	Predominantly Sumac
10	Predominantly Hazel
11	Hazel combined with (one or more) Honeysuckle, Mt. Maple, Dogwood, Juneberry, Upland Willow
12	Predominantly Dogwood
13	Predominantly Mt. Maple

COLUMN 72: DISTRIBUTION OF SHRUB SPECIES WITHIN STAND (this describes "coverage" not density of stems)

Code	Description
0	No shrubs present
1	Fairly uniform shrub distribution throughout stand
2	Scattered shrub clusters throughout stand
3	Shrubs located in a single concentration and as a partial coverage within the type

COLUMN 73: DENSITY OF SHRUBS WHERE THEY OCCUR WITHIN STAND

Code	Description
0	No shrub species present
1	Low density (walk quite directly through with little or no shrub contact).
2	Moderate density (almost constant contact unless walk is circuituous).
3	High density (walk through requires pushing, ducking).

COLUMN 74: AMOUNT OF SHRUB BROWSE AVAILABLE TO DEER
(Twigs - ¼ inch diameter below 7 feet)

Code	Description
0	No shrub species present
1	Nothing (all browse out of reach)
2	Small amount (some browse available)
3	Moderate amount (twigs generally available)
4	High amount (twigs are all available)

COLUMN 75: GROUND COVER

Code	Description
0	Unknown, covered with snow or water
1	Predominantly bare ground or rock or dead litter
2	Grasses and/or sedges with few or no forbs
3	Predominantly smartweed, fireweed, jewelweed, nettle or combination
4	Predominantly sphagnum mosses and/or lichens
5	Predominantly feather mosses and/or ground pine and/or lichens
6	Predominantly ferns and grasses
7	Predominantly blueberry, sweetfern, wintergreen, bearberry, and grasses or combination
8	Predominantly large leaf aster, wild sarsaparilla, Clinton's lily or combination and grasses
9	Predominantly golden rod, aster, clovers, lupine, weeds, or combination and grasses

COLUMN 76: RECONNAISSANCE LEVEL

Code	Extent of Examination
0	Other - none of those listed above
1	Aerial photo interpretation only
2	Checked from air by aircraft, helicopter, etc.
3	Field checked on the ground (not snow covered)
4	Field checked on the ground (1" - 6" snow)
5	Field checked on the ground (7" - 1' snow)
6	Field checked on the ground (1 - 2' of snow)
7	Field checked on the ground (2 - 3' of snow)
8	Field checked on the ground (3+ feet of snow)
9	Type comparison with a like type that has been ground checked

COLUMN 77: STAND ORIGIN

Record the code number for the description that best represents the origin of the stand.

For cover types that have no trees on them, Code as zero = 0. (e.g. cutover areas)

Code	Description
0	Not applicable (includes cutover areas)
1	Natural stand with no evidence of artificial regeneration
2	More than 40% of the type occupied by trees originating from artificial means
3	Less than 40% of the type is occupied by artificially regenerated trees

*"Artificial regeneration" is planting or seeding done by a person

COLUMN 78: DISTANCE TO A ROAD

Record the code number for the distance from the stand to a maintained all weather road. This is a road that is maintained all year. If the stand is across a lake or some other barrier, use the distance around the lake or barrier.

Code	Distance
0	0 - 1 mile
1	1+ - 2 miles
2	2+ - 3 miles
3	3+ - 4 miles
4	4+ - 5 miles
5	5+ - 6 miles
6	6+ - 7 miles
7	7+ - 8 miles
8	8+ - 9 miles
9	9+ miles

COLUMN 79: SIGNIFICANT CONDITIONS

Record the code number for any significant conditions that may exist in the type. Indicate only conditions that should be considered in the management of the type. Use the remarks section to specify the exact feature.

Code	Condition	Symbol
0	None	
1	Unusual botanical feature	Bota
2	Unusual geological features	Geol
3	Unusual historical features	Hist
4	Unusual scenic or recreational potential	Recr
5	Eagle or Osprey nesting site	Nest
6	Active deer yarding area	Yard
7	Other wildlife features	Wild
8	Other features	Othr

COLUMN 80: NUMBER OF CARDS USED TO RECORD DATA

Record one of the following codes to indicated where data has been entered. (This is a measure to conserve computer time by not sorting through cards that have no data recorded on them.)

Code	Number of Cards
0	Neither Card 2 or 3 used
1	Both Card 2 and 3 used
2	Only Card 2 used
3	Only Card 3 used

STAND COMPOSITION

TREES 5" D.B.H. & LARGER

CARD # 2

***

Stand composition on Card #2 is completed only for the trees classified as trees 5" diameter at breast height and larger, which are located on all forest types (including non-merchantable cover types, deforested and unproductive forest lands).

Stand composition includes information for each individual merchantable size specie within the type.

If a single species has been tallied as having both cords and board feet, separate entries will be made in Card #2 to record both volumes.

COLUMN 1: CARD NUMBER

The card number has already been entered. You do nothing in this column.

COLUMNS 2 - 30: RECORD IDENTIFICATION

You enter nothing in these columns. The computer will automatically transfer the identification data from Card #1.

COLUMNS 31 & 32, 42 & 43, 53 & 54, 64 & 65: SPECIES

Record the species code number from the list of species Page 18.0. Based on volume, list the most important specie first. In the event there are more than three species on Card #2, use Columns 64 & 65 as a place to lump all other minor species. Use specie code for Misc. = 9 9.

COLUMNS 33 & 34, 44 & 45, 55 & 56, 66 & 67: DIAMETER AT BREAST HEIGHT

Enter, in inches, the average diameter of the tree specie being recorded.

*** Do not re-enter data for a species already entered as the main species for the type in Card 1.

COLUMNS 35, 46, 57 & 68: SPECIE DISTRIBUTION

Record the code number for the description which best represents the distribution of the specie in the type.

Code	Description
0	Not applicable
1	Specie is distributed throughout the type
2	Specie is in clusters scattered throughout the type
3	Specie is in a single cluster within the type (example - 2 acre Red Pine inclusion in Aspen type)

COLUMNS 36, 37, 38 & 47, 48, 49 & 58, 59, 60 & 69, 70, 71: VOLUME OF WOOD PER ACRE

Record the estimated volume per acre for the individual specie over the entire stand area. Trees in a size class 5" to 14.9" D.B.H. will be recorded as cords per acre.

Trees 15" and greater D.B.H. will be recorded as board feet per acre.

Example: 20 cords = 20.0
2100 bd. ft. = 02.1

Volume for inclusions will be recorded in these columns. Volume adjustments are necessary for inclusions. See Appendix, Page A18, for instructions on how to make the proper adjustments.

COLUMNS 39 & 40, 50 & 51, 61 & 62, 72 & 73: INSECT, DISEASE AND OTHER DAMAGE

Record the code number which indicates the causing agent for any insect, disease or other damage that may be effecting the specie (the most serious or predominant).

Refer to the Insects and Disease Data Manual in the Appendix, Page A17, for further explanation of insects and disease categories.

Coding is only necessary where it affects more than 10% of the trees or is an important problem. (e.g. Code 23)

Code	Damage
00	None
	INSECTS
01	Defoliators
02	Bark Beetles
03	Wood Borers
04	Spittlebug
05	White Pine Weevil
06	Spruce Budworm
07	Jack Pine Budworm
08	Shoot Insects (regen)
09	Poplar Borer
10	Root Collar Insects (regeneration)
15	Insects (other
	DISEASES
16	White Pine Blister Rust
17	WP Blister Rust in comb. with WP Weevil
18	Sweet Fern Rust
19	Scleroderris Canker
20	Sirococcus Shoot Blight
21	Butternut Canker
22	Oak Mortality
23	Dwarf Mistletoe
24	Diplodia Tip Blight
25	Hypoxylon Canker
26	White Rot of Aspen (Phellinous)
27	Hypoxylon Canker in Comb. with White Rot of Aspen
28	Heart Rot
29	Dutch Elm Disease
30	Birch Decline
31	Hardwood Cankers
32	Needle Rust
33	Shoestring Root Rot
40	Diseases (other)
	ANIMALS
41	Beaver
42	Porcupine
43	Rabbit - Mice
44	Deer (or Moose)
45	Sapsucker
50	Animal (other)
	ENVIRONMENTAL
51	Windthrow
52	Drought
53	Ice Breakage
54	Fire
55	Flooding
56	Hail
57	Frost Crack
60	Environmental (other)
	MAN CAUSED OR UNKNOWN
61	Mechanical (as a result of machinery)
62	Chemical Damage (herbicide, etc.)
99	Unknown

COLUMNS 41, 52, 63, & 74: HARVEST

Record the code number which indicates if the specie should be harvested or not harvested during the ten year management plan period.

Code

0 No, the specie should be reserved for the next ten years.

1 Yes, the specie should be harvested within the ten year management plan period. This includes clear-cuts, partial cuts, etc.

STAND COMPOSITION

TREES LESS THAN 4.9" D.B.H.

CARD # 3

***

Stand composition on Card #3 is completed only for the trees classified as trees less than 4.9" diameter at breast height, which are located on all forest types.

COLUMN 1: CARD NUMBER

The card number has already been entered. You do nothing in this column.

COLUMNS 2 - 30: RECORD IDENTIFICATION

You enter nothing in these columns. The computer will automatically transfer the identification data from Card #1.

COLUMNS 31 & 32, 38 & 39, 45 & 46, 52 & 53: SPECIE

Record the specie code number from the list of species on Page 18. Based on the stems per acre, list the most important specie first. In the event there are more than 4 species use Columns 52 & 53 to lump all other minor species. Use specie Code 99 for Misc.

COLUMNS 33, 40, 47, 54: SIZE CLASS

Enter the code number that best represents the average diameter of the tree specie being recorded.

Code	D.B.H. Size
0	Not Applicable
1	0.9" or less
2	1.0" - 2.9"
3	3.0" - 4.9"

COLUMNS 34, 41, 48, 55: DENSITY

Record the density of the specie from the table for seedlings and saplings stems/acre on Page 10.

*** Do not reenter data for the species already entered as the main species for the type in Card 1. For example, in an aspen regeneration cover type, the data for aspen will appear as the main species in the type, and need not be entered again here in Card 3.

COLUMNS 35, 42, 49, & 56: SPECIE DISTRIBUTION IN TYPE

Record the code number for the description which best represents the distribution of the specie in the type.

Code	Description
0	Not applicable
1	Specie is distributed throughout the type
2	Specie is in clusters, scattered throughout the type
3	Specie is in a single cluster within the type

COLUMNS 36 & 37, 43 & 44, 50 & 51, 57 & 58: INSECT, DISEASE OR OTHER DAMAGE

Record the code number that indicates the causing agent for any insect, disease or other damage that may be effecting the specie, (the most serious or most predominant) from the list found on Page 28.

COLUMNS 59 - 80: REMARKS

Do not enter any information into the Remarks section if it has already been coded onto Card #1 "Cover Type Data", Card #2 "Merchantable Size Class Data" or Card #3 "Non-Merchantable or Understory Data"

Record up to 22 characters in print, items that pertain to conditions found in the type. Be brief - use standard abbreviations where possible.

All remarks entered will appear on the printout for the cover type.

Example: (poor remark)
"Heavy Hypox"

This is already stated under various damage columns. It is not needed here.

EXAMPLE

COMPLETED COVER TYPE EXAMINATION DATA SHEET

Type (3)

ANGLE GAUGE
IBM FOREST INVENTORY
MERCHANTABLE TYPE DATA SHEET 10 FACTOR
CUMULATIVE 104.18 MINUTE GAUGE TALLY SHEET

AVE. DBH	SPEC	CULL TREES	NON-MERT PRISM COUNT	VOL. IN CDS.-MERCHANTABLE STEMS OVER 5" D.B.H. TO 4" TOP — NO. OF 8' STICKS PER TREE: 1	2	3	4	5	6	7	8	TOTAL + NO. - DEFECT DED = NET CDS. /
14 13 14	S. M.	△	△	2 2 / 3 4 5 / 6 7 8 / 8 9 10 / 11 12 13 / 13 14 15 / 16 17 18	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21 / 23 24 25 27 28 / 29 31 32 34 35 / 37 38 40 41 42 / 44 45 46 48 49	2 4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36 / 38 40 44 46 48 50 / 52 54 56 58 60 62 / 64 66 68 70 72 74 / 76 78 80 82 86 88	7 10 12 15 / 17 20 22 25 27 30 / 32 35 37 40 42 45 / 47 50 52 55 57 60 / 62 64 67 69 72 74 / 77 79 82 84 87 89 / 92 94 97 99 103 105	9 12 15 / 18 20 23 26 29 / 32 35 38 41 44 / 47 50 53 56 58 / 61 64 67 70 73 / 76 79 82 85 88 / 91 94 96 99 102	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50 / 54 57 60 64 67 / 70 74 77 80 84 / 87 90 94 97 100 / 104 107 110 114 117	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57 / 61 65 68 72 76 / 80 84 87 91 95 / 99 103 106 110 114 / 118 122 125 129 133	4 8 12 17 / 21 25 29 33 / 37 42 46 50 / 54 58 62 67 / 71 75 79 83 / 87 92 96 100 / 104 108 113 117	19÷6= 3.2
IRON Wood			////// 100 △	1 2 2 / 3 4 5 / 6 7 8 / 8 9 10 / 11 12 13 / 13 14 15	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21 / 23 24 25 27 28 / 29 31 32 34 35 / 37 38 40 41 42	2 4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36 / 38 40 44 46 48 50 / 52 54 56 58 60 62 / 64 66 68 70 72 74	2 5 7 10 12 15 / 17 20 22 25 27 30 / 32 35 37 40 42 45 / 47 50 52 55 57 60 / 62 64 67 69 72 74 / 77 79 82 84 87 89	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44 / 47 50 53 56 58 / 61 64 67 70 73 / 76 79 82 85 88 / 87 90 94 97 100	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50 / 54 57 60 64 67 / 70 74 77 80 84 / 87 90 94 97 100	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57 / 61 65 68 72 76 / 80 84 87 91 95 / 99 103 106 110 114	4 8 12 17 / 21 25 29 33 / 37 42 46 50 / 54 58 62 67 / 71 75 79 83 / 87 92 96 100	
14 6 14	E L M	X		2 / 2 / 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21 / 23 24 25 27 28	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21 / 23 24 25 27 28	4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36 / 38 40 44 46 48 50	5 7 10 12 15 / 17 20 22 25 27 30 / 32 35 37 40 42 45 / 47 50 52 55 57 60	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44 / 47 50 53 56 58	7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50 / 54 57 60 64 67	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57 / 61 65 68 72 76	4 8 12 17 / 21 25 29 33 / 37 42 46 50 / 54 58 62 67	12÷6= 2.0
6 6 13	B. OAK		1	1 2 2 / 3 4 5 / 6 7 8 / 8 9 10 / 11 12 13 / 13 14 15	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21 / 23 24 25 27 28 / 29 31 32 34 35 / 37 38 40 41 42	4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36 / 38 40 44 46 48 50 / 52 54 56 58 60 62 / 64 66 68 70 72 74	2 5 7 10 12 15 / 17 20 22 25 27 30 / 32 35 37 40 42 45 / 47 50 52 55 57 60 / 62 64 67 69 72 74 / 77 79 82 84 87 89	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44 / 47 50 53 56 58 / 61 64 67 70 73 / 76 79 82 85 88 / 87 90 94 97 100	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50 / 54 57 60 64 67 / 70 74 77 80 84 / 87 90 94 97 100	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57 / 61 65 68 72 76 / 80 84 87 91 95 / 99 103 106 110 114	4 8 12 17 / 21 25 29 33 / 37 42 46 50 / 54 58 62 67 / 71 75 79 83 / 87 92 96 100	19÷6= 2.2
8 7 14	R. MPLE			1 2 2 / 3 4 5 / 6 7 8	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21	2 4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36	5 7 10 12 15 / 17 20 22 25 27 30 / 32 35 37 40 42 45	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57	4 8 12 17 / 21 25 29 33 / 37 42 46 50	10÷6= 1.7
8	B.		○	1 2 2 / 3 4 5 / 6 7 8	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21	2 4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36	2 5 7 10 12 15 / 17 20 22 25 27 30 / 32 35 37 40 42 45	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57	4 8 12 17 / 21 25 29 33 / 37 42 46 50	2÷6= 0.3
12	G. ASH			1 2 2 / 3 4 5 / 6 7 8	1 3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21	X 4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36	2 5 7 10 12 15 / 17 20 22 25 27 30 / 32 34 37 40 42 45	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57	4 8 12 17 / 21 25 29 33 / 37 42 46 50	5÷6= 0.8
7	BASS	△		1 2 2 / 3 4 5 / 6 7 8	3 4 6 7 / 8 10 11 13 14 / 16 17 18 20 21	2 4 6 8 10 12 / 14 16 18 20 22 24 / 26 28 30 32 34 36	2 5 7 10 12 15 / 17 20 22 25 27 30 / 32 34 37 40 42 45	3 6 9 12 15 / 18 20 23 26 29 / 32 35 38 41 44	3 7 10 13 17 / 20 24 27 30 34 / 37 40 44 47 50	4 8 11 15 19 / 23 27 30 34 38 / 42 46 49 53 57	4 8 12 17 / 21 25 29 33 / 37 42 46 50	1÷6= 0.2

				VOL. IN HUNDREDS BD. FT. SCRIBNER TO 6" TOP (CONIFERS & ASPEN) — NO. OF 16' LOGS PER TREE: 1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	TOTAL + NO. - DEFECT DED = NET BD. FT.
				3 6 / 9 12 / 14 17	5 10 16 / 21 26 31 / 36 42 47	7 14 22 29 36 43 / 50 58 65 72 79 86 / 94 101 108 115 122 129	9 18 27 36 45 54 / 63 72 81 90 99 108 / 117 121 135 144 153 162	11 22 33 44 55 66 / 77 88 99 110 121 132 / 143 154 165 176 187 197	13 26 39 52 / 65 78 91 104 / 117 130 143 156	15 30 45 / 60 75 90 / 105 120 135	16 33 50 / 66 82 99 / 116 132 149		
				3 6 / 9 12 / 14 17	5 10 16 / 21 26 31 / 36 42 47	7 14 22 29 36 43 / 50 58 65 72 79 86 / 94 101 108 115 122 129	9 18 27 36 45 54 / 63 72 81 90 99 108 / 117 121 135 144 153 162	11 22 33 44 55 66 / 77 88 99 110 121 132 / 143 154 165 176 187 197	13 26 39 52 / 65 78 91 104 / 117 130 143 156	15 30 45 / 60 75 90 / 105 120 135	16 33 50 / 66 82 99 / 116 132 149		
				3 6 / 9 12	5 10 16 / 21 26 31	7 14 22 29 36 43 / 50 58 65 72 79 86 / 94 101 108 115 122 129	9 18 27 36 45 54 / 63 72 81 90 99 108 / 117 121 135 144 153 162	11 22 33 44 55 66 / 77 88 99 110 121 132 / 143 154 165 176 187 197	13 26 39 52 / 65 78 91 104 / 117 130 143 156	15 30 45 / 60 75 90 / 105 120 135	16 33 50 / 66 82 99 / 116 132 149		

				VOL. IN HUNDREDS BD. FT. SCRIBNER TO 8" TOP (HARDWOODS)								
				3 6 / 9 12 / 15 19	6 12 18 / 24 30 36 / 42 48 54	8 17 26 34 42 / 51 60 68 76 85 / 94 102 110 118 127	11 22 33 44 55 / 66 77 88 99 110 / 121 132 143 154 165	14 27 40 54 68 81 / 94 108 122 135 148 162 / 175 189 202 215 229 242	16 32 48 64 / 80 96 112 128 / 144 160 176 192	18 37 56 74 / 92 111 130 / 148 166 185	21 42 63 / 84 105 126 / 147 159 180		
				3 6 / 9 12 / 15 19	6 12 18 / 24 30 36 / 42 48 54	8 17 26 34 42 / 51 60 68 76 85 / 94 102 110 118 127	11 22 33 44 55 / 66 77 88 99 110 / 121 132 143 154 165	14 27 40 54 68 81 / 94 108 122 135 148 162 / 175 189 202 215 229 242	16 32 48 64 / 80 96 112 128 / 144 160 176 192	18 37 56 74 / 92 111 130 / 148 166 185	21 42 63 / 84 105 126 / 147 159 180		
				3 6 / 9 12	6 12 18 / 24 30 36	8 17 26 34 42 / 51 60 68 76 85 / 94 102 110 118 127	11 22 33 44 55 / 66 77 88 99 110 / 121 132 143 154 165	14 27 40 54 68 81 / 94 108 122 135 148 162 / 175 189 202 215 229 242	16 32 48 64 / 80 96 112 128 / 144 160 176 192	18 37 56 74 / 92 111 130 / 148 166 185	21 42 63 / 84 105 126 / 147 159 180		

PLOT #	SYM	TOPO	PHYS	I & D	% AFF	% MORT	SHRUBS	DEN	HEIGHT	GROUND COVER	SPEC	FIXED RADI U.S. 1/200 AC. 0-1	11.8 RAD. 1-3	3-5
1	/	1	3	—	—	—	HAZ	M	H	GRASS	I. Wood			3
											BEECH		2	
2	\	1	3	Dis. MPLE	50	—	—	—	—	GRASS	S.M.	16		
											I. Wd		4	4
											B. OAK		4	1
3	X	1	4	DIS. ELM/ MPLE	70	—	Dogwd HAZ	M	H	GRASS	—	—	—	—
4	X	1	3	SAME	70	—	SAME	M	H	GRASS	R. OAK	1		
											G. ASH	1		
5	O	1	3	SAME	50	—	—	—	—	GRASS	B.			1
											IRON		1	2
											S.M.	10		
											BASS	2		
6	△	1	3	D.E.D.	50	20	HAZ/ DOG	L	H	GRASS	R.M.	4	1	
											BASS	3		1
											IRON			1
											S.M.	6		1
		1	3	MAPLE ELM	50 / 50	— / 5%	HAZ	M	H	GRASS	NH	4300/6 = 717	1200/6 = 200	1400/6 = 233

REMARKS

1150 st/ac
S.M. 0-1" 550 st/ac
Misc. 0-1" 600 st/ac

B.A. = 460/6 = 77

NH, 0-1"; 1150 st/ac

PLOT NO.	SPEC	AGE & SITE DATA: DBH	TOTAL HT.	AGE	S.I.
2	S. M.	14	68	53R / 63	60
6	S. M.	9	57	40R / 50	58
	S. M.	14	62	56	59

A-01956-01
F-280 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	~~Other Mngt. Unit~~	Comp. #	Acq.	Adm.	Main Cover Type	Main Cover Size	Main Cover Den.	Understory Type	Understory Size	Understory Den.	Acres	Year	Topo.
1	2–3	4–5	6–7	8–10	11–12	13	14–15	16–18	19–20	21–23	24	25	26	27–28	29	30	31–32	33	34	35–37	38–39	40
1	03	00	16	140	31	9	11	315	19		0	1	1	20	5	2	20	1	2		81	1

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	~~M.B.F. per Acre~~	Cond. Class	Thr. Status	Main Specie Spec.	DBH	HT.	V/Ac	Damg.	% Aff.	~~% Mo. Tr.~~	Shrubs Spec. Comp.	Distr.	Den.	Bro-wse	Grnd. Cover	Recon. Level	Stand Origin	~~Dist. to Road~~	~~Spec. Cond.~~	# of Cards
41–42	43	44–46	47–49	50–51	52–54	55	56	57–58	59–60	61–62	63–65	66–67	68	69	70–71	72	73	74	75	76	77	78	79	80
59	3	056	077	10		3	1	22	14	62	03.2	40	3		10	1	2	4	2	3	1			1

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D. (Same as Card # 1)	Second Specie Spec.	DBH	Dst	V/Ac	~~Damg.~~	~~%~~
1	2–30	31–32	33–34	35	36–38	39–40	41
2		35	10	1	02.2		

Third Specie Spec.	DBH	Dst	V/Ac	Damg.	~~%~~	Fourth Specie Spec.	DBH	Dst	V/Ac	Damg.	~~%~~	Fifth Specie Spec.	DBH	Dst	V/Ac	~~Damg.~~	~~%~~	
42–43	44–45	46	47–49	50–51	52	53–54	55–56	57	58–60	61–62	63	64–65	66–67	68	69–71	72–73	74	75–80
02	12	1	02.0	29		04	10	1	01.7	40		99	09	2	01.3			

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D. (Same as Card # 1)	Specie Data Spec.	Sz	Den	Dst	~~Damg.~~
1	2–30	31–32	33	34	35	36–37
3		22	1	1	1	

Specie Data Spec.	Sz	Den	Dst	~~Damg.~~	~~Specie Data Spec.~~	~~Sz~~	~~Den~~	~~Dst~~	~~Damg.~~	~~Specie Data Spec.~~	~~Sz~~	~~Den~~	~~Dst~~	Damg.	Remarks
38–39	40	41	42	43–44	45–46	47	48	49	50–51	52–53	54	55	56	57–58	59–80
19	1	1	1												

Cruiser Ch. Dickens

Tallyman E. Allman

Date 3/81

Project Leader Edit

Forester Edit

ALTERATIONS PROCEDURES

ALTERATION FLOW
GENERAL OUTLINE

(An alteration occurs; i.e., a timber sale is closed, a fire report is completed, etc...)

I. District Forester
   - A. Correct township map, showing alteration
   - B. Trace corrected cover type(s) onto matex
   - C. Correct township printout
   - D. Complete the yellow alteration sheet(s), F-280/1(s)
   - E. Attach matex to F280/1(s)
   - F. Forward to Area Office

II. Area Forester
   - A. Correct township map
   - B. Correct township printout
   - C. Forward to Grand Rapids

NOTE: Alteration sheets and matex shall be processed and submitted as soon as alteration occurs.

See page 34 of the alterations section of the manual for a detailed explanation of when to submit alterations.

A. Introduction :

The objective of the Alteration Program is basically to maintain a current data bank that accurately reflects Minnesota's forest resources. An active Alteration Program will provide the field forester with current data and accurate cover type maps of the land base.

Maintenance of this current, accurate data base in the computer system will ultimately benefit many others as well. It should prove a tremendous aid in planning, budgeting, and research to name a few.

The "Phase II" intensive forest inventory collects and records data which describes the forest land cover type "as it is" at the time it is inspected.

Any major change from this original cover type description will require a correction. Simply put, the corrected cover type description is the alteration.

Alterations of a cover type will be recorded on form F-280/1; "Cover Type Examination Data Sheet" - this is a yellow form to be used for alterations only.

The recording of alterations will, in most cases, originate with the field forester - the keystone of this program. Alterations can originate with others, such as the Game Manager, Park Superintendent, County Land Commissioner, or other land managers. These alterations should, however, be channeled through the local DNR forester.

B. When To Submit An Alteration :

So as to develop an orderly approach to alterations, especially in the case of harvesting activity, it is necessary to take each alteration as it occurs, and submit the current data. In the case of timber sales, the submission of alterations will be incorporated into the present flow procedure.

When a "Section 1" sale is finally closed, and the F-121 is sent to the Area Office, an alteration will accompany it. When these sales are closed, the field forester must evaluate the site and at that time, he will collect the necessary Phase II data to complete and submit an alteration.

When the larger "Auction Sales" continue for several years, as is often the case, an alteration will accompany the "seasonal billing" when it is sent to the Area in March. Again, the forester must visit the site to evaluate the cutover area, and at that time he will collect the Phase II data to submit the alteration.

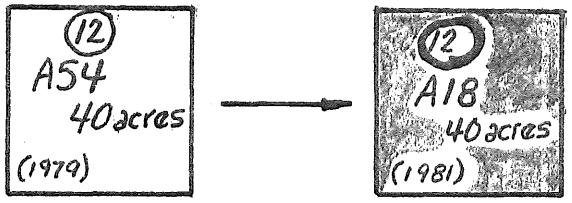
In other situations, such as plantations, an alteration will accompany the F-66, Plantation Record when it is sent to the Area. Similarly, an alteration will accompany the fire report when it is submitted, etc.

The KEY to maintaining accurate and viable resource data is the FIELD FORESTER taking that extra and very necessary step after timber sales, plantation surveys, fire reports, etc. and submitting an alteration as part of the flow procedure.

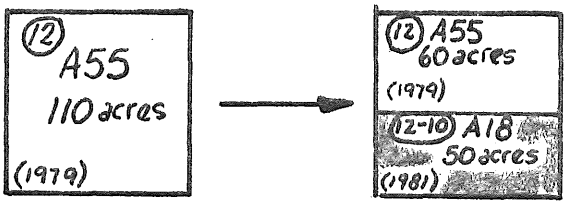
K E Y T O " C A S E S "

****

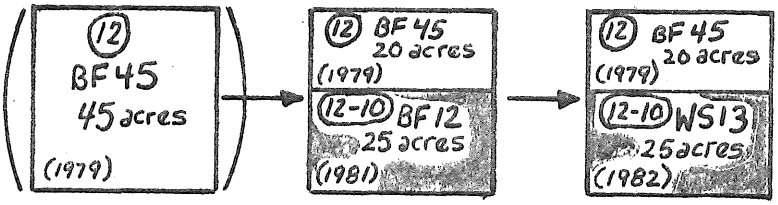
General Diagram Representing A Cover Type And The Change Occurring — Case # and Page Number



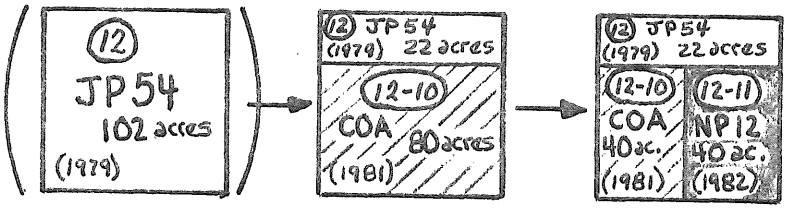
Case # 1 : Page 36



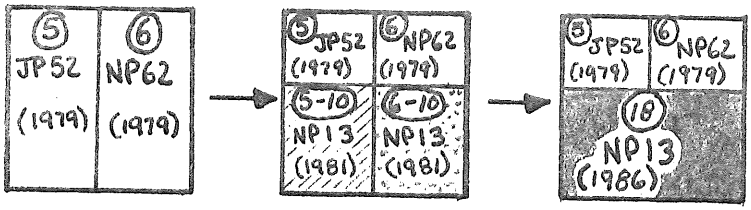
Case # 2 : Page 40



Case # 3 : Page 54



Case # 4 : Page 58



Case # 5 : Page 69

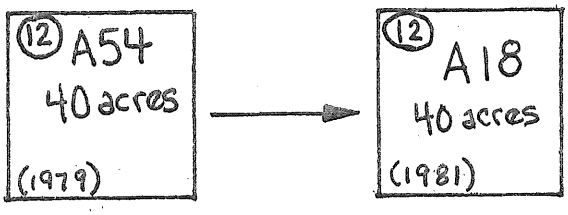
C. ALTERATIONS PROCEDURES:

****

Case # 1 : Alteration of an ENTIRE Original Cover Type

****

(e.g.: clearcuts, thinnings, selective cuts, etc. that affects the ENTIRE original cover type.)



An F-280/1, a yellow form to be used for alterations only, must be submitted to update the original cover type's data. The new data collected for the type will be recorded on this F-280/1.

i) When alterations of an entire cover type occur, the original cover type's data must first be deleted from the computer. To delete the old data, use the "Cover Type Deletions" table found in the upper right hand corner of the F-280/1.

It is very important that this table be filled out correctly. Always double check to make certain that you are deleting the right cover type.

The alteration number in this case # will always be zeroes. (As shown.)

RESOURCES

SHEET

Cover Type Deletions										
Type Seq #		Alt. #		Sec.		Twp.		Rge.		
1	2	0	0	1	1	0	6	5	2	0

The rest of this same sheet (F-280/1) will be used to record and submit the new data for the cover type.

ii) Recording Data in Card 1:

Columns 1 thru 26 will remain the same as the original cover type's data. These columns are for identification.

(Alterations of entire cover types will not receive an alteration number. Columns 4 and 5 will still be entered as ' 00 '.)

In columns 27 thru 37 enter the codes that describe the current conditions present in the cover type. ("acres" will be the same as for the original cover type since you are altering the entire type.)

In columns 38,39 enter the last two digits of the year in which the alteration is being submitted.

In columns 40 thru 80 enter the codes that describe the current conditions in the cover type.

iii) Recording Data in Cards 2 and 3:

Follow the instructions in the Phase II manual and complete these cards as you normally would, using the new data collected for the cover type.

PROCEDURES: (cont.)

In some cases these two cards may not be used. Make certain that you have entered the correct code in column 80 ('# of cards) for this F-280/1.

iv) Township Map:

The township map must also be updated. The field forester will update his copy, Area will update theirs, and the alteration specialist will correct and update the Base Map in Grand Rapids.

In the case of altering an entire type, only one change will occur on the map. A new 'cover type-sizeclass-density class' classification will be assigned the original cover type. The previous cover type number will remain the same as the original.

(In this example, the original cover type classification of 'A 5 4' would be corrected to 'A 1 8'.)

v) Matex:

Once the map is updated, place a piece of matex (frosted acetate) over the section and trace the following information onto it;

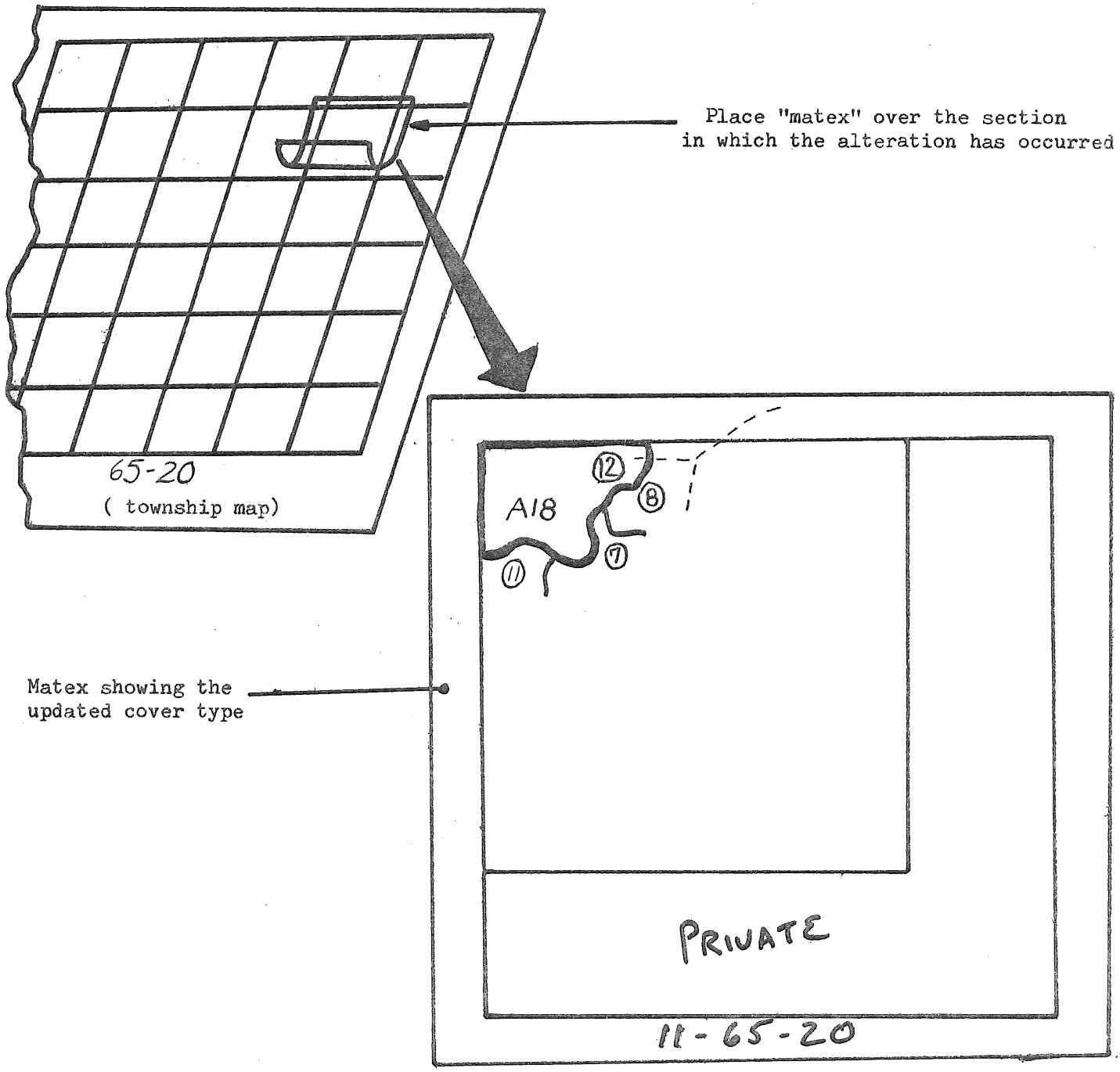
- the section lines
- ownership pattern
- updated cover type boundaries (if any)
- adjacent cover type lines
- the section-township-range (at the bottom).

PROCEDURES: Case # 1 (cont.)

ATTACH THE MATEX, by paper clip, to the alteration F-280/1, and submit together to the area office. The area can then update their township map directly from the matex. The area will then forward the F-280/1 and matex to Grand Rapids so that the base map can be updated.

Note that more than one alteration can occur within a single section - only one matex need be submitted showing all alterations that have occurred. Always make certain that all the F-280/1's are attached to the common matex.

E X A M P L E



PROCEDURES: Case # 1 (cont.)

(vi) Township Printout

The township printout must be updated. Periodically you may request an updated copy from Grand Rapids, but - as this is fairly expensive, the following method was devised to update your copy in the interim.

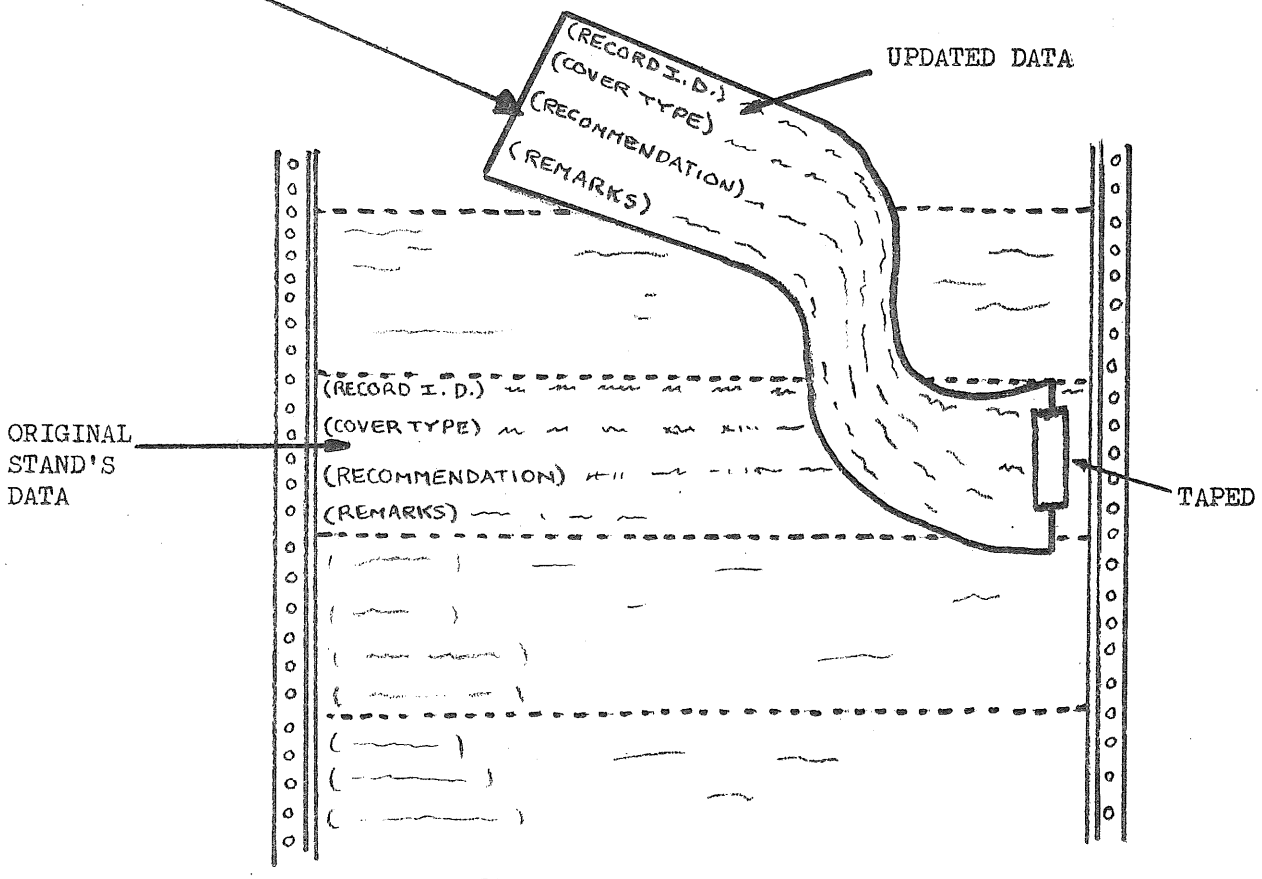
The summary entitled "Individual Cover Types , Township Printout" is the portion that will be updated. This summary is merely a reproduction of the three cards on the front of the F-280/1 rev. 2-81.

(A copy of the space occuppied by one stand's data on the printout has been made, but without any data under the headings. This "small form" is available from the Inventory Office in Grand Rapids.)

Record the current data on this small form, place it over the original stand's data in the printout, and tape it to the printout on the right hand side. (See example below.)

As alterations continue to occur to a particular cover type, several "generations" of that cover type will be taped over it with the latest alteration on top.

E X A M P L E



TOWNSHIP PRINTOUT

Example: Case 1

NA-01956-01
F-280/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions

Type Seq. #	Alt. #	Sec.	Twp.	Rge.	
1 2	0 0	1 1	0 6 5	2 0	9
					9
					9

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	~~Other Mngmt. Unit~~	~~Comp.~~	Acq.	Adm.	Main Cover Type	Main Cover Size	Main Cover Den.	~~Understory Type~~	~~Understory Size~~	~~Understory Den.~~	Acres	Year	Topo.
1	1 2	0 0	1 1	0 6 5	2 0	9	6 9	2 4 1	2 7			1	1	1 2	1	8				0 4 0	8 1	1
1	2 3	4 5	6 7	8 9 10	11 12	13	14 15	16 17 18	19 20	21 22 23	24	25	26	27 28	29	30	31 32	33	34	35 36 37	38 39	40

Site Index	Phys. Class	Stand Age	~~Basal Area~~	~~Cords per Acre~~	~~M.B.F. per Acre~~	Cond. Class	Thr. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	~~Damg.~~	~~Aff.~~	~~Mort.~~	~~Shrubs: Spec. Comp.~~	~~Distr.~~	~~Den.~~	~~Browse~~	Grnd Cover	Recon. Level	Stand Origin	~~Ins Roads~~	~~Io Roads~~	~~Cond.~~	~~# of Cards~~
7 7	3	0 0 2				4	1	1 2	0 0	0 7	0 3 8								6	3	1				
41 42	43	44 45 46	47 48 49	50 51	52 53 54	55	56	57 58	59 60	61 62	63 64 65	66 67	68	69	70 71	72	73	74	75	76	77	78	79	80	

STAND COMPOSITION - Trees 5" D.B.H. & Larger

~~Card #~~	Record I.D. Same as Card # 1	Second Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har
~~2~~							
1	2–30	31 32	33 34	35	36 37 38	39 40	41

Third Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fourth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fifth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	
42 43	44 45	46	47 48 49	50 51	52	53 54	55 56	57	58 59 60	61 62	63	64 65	66 67	68	69 70 71	72 73	74	75 76 77 78 79 80

STAND COMPOSITION - Trees less than 4.9" D.B.H.

~~Card #~~	Record I.D. Same as Card # 1	Specie Data: Spec.	Sz	Den	Dst	Damg.
~~3~~						
1	2–30	31 32	33	34	35	36 37

Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Remarks
38 39	40	41	42	43 44	45 46	47	48	49	50 51	52 53	54	55	56	57 58	59–80

Cruiser *(signature)* Date *6/81*

Tallyman ______________

Project Leader Edit ______________

Forester Edit ______________

PROCEDURES: (cont.)

****

Case # 2 : Partial Alteration of an Original Cover Type

****

(ie: only a portion of the original cover type is harvested, planted, thinned, burned, etc.)

DISCUSSION

When a partial alteration of an original cover type occurs, two situations can arise. Which situation the alteration falls under, depends on the present condition of the portion of the original cover type that was not harvested (etc.).

The first and easiest situation is when that portion of the original cover type that is not harvested (etc.) is not significantly different than what the original cover type was described as in the initial Phase II inventory.

In this first situation, the data collected for the original cover type still accurately reflects the conditions present in the uncut portion. In effect, the only change in the original data would be to reduce the 'acres'.

To reduce the 'acres' for this uncut portion is a simple matter, handled on the same F-280/1 used to update the data for the harvested portion of the original cover type. The procedures for this type of partial alteration is discussed as 'Case # 2; Situation 1'.

The second situation possible then, is obviously when the uncut portion of the original cover type has changed significantly since the initial inventory (or you would like to update or change some pertinent data).

In this situation, it will be necessary to update the data for both portions of the original cover type - the portion harvested and the portion not harvested.

To update both portions requires submitting two (2) F-280/1's. The procedures for submitting this type of alteration is presented as 'Case#2; Situation 2'.

PROCEDURES: (cont.)

***** A WORD OF CAUTION *****

Even though Situation 1 type partial alterations are easier to submit (requiring less paperwork), do not fall into the trap of assuming conditions for the portion not harvested always remain the same as the original cover type. THIS MAY NOT ALWAYS BE TRUE!!

Some cover types are a complex mix of species whose volumes have been averaged out over the whole type acreage. Other types have 'inclusions', which can really complicate the process.

However, in most cases, a new stand composition for the portion not harvested can be accurately represented using common sense. In some instances it won't be that easy, though. Complications like 'inclusions' or scattered clumps of a certain specie may require that this uncut portion be 'recruised' in order to submit accurate, reliable data.

If these complications are ignored, in favor of the easier procedure, the volumes and other data stored in the computer could become significantly different than what is actually 'out there'. In essence, just remember to use common sense and realize that you are not the only one who will be using the data. The objective is, as always, accurate, reliable resource data.

REMEMBER - the information you get out of the computer is only as good as you put into it.

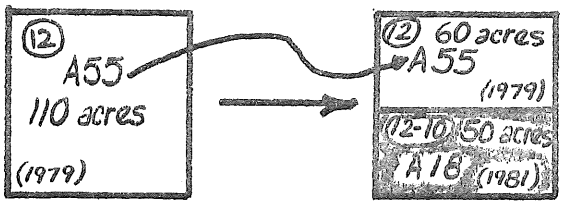
PROCEDURES: (cont.)

Case # 2 ; Situation 1 : Partial Alteration of an Original Cover Type

---

** In this situation, all data for the uncut portion, other than 'acres', remains the same as the original cover type's data.

EXAMPLE



In this example, the original cover type was 110 acres of aspen (A 5 5); in 1981 50 acres were harvested, and is now aspen regeneration (A 1 8). For simplicity, aspen was the only specie present in the original cover type, and <u>has not changed</u> significantly since the initial survey.

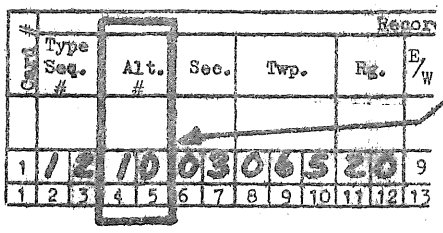
i) You will not use the 'Cover Type Deletions' table in the upper right hand corner of the F-180/1, place a large 'X' through it.

ii) Recording Data in Card 1 :

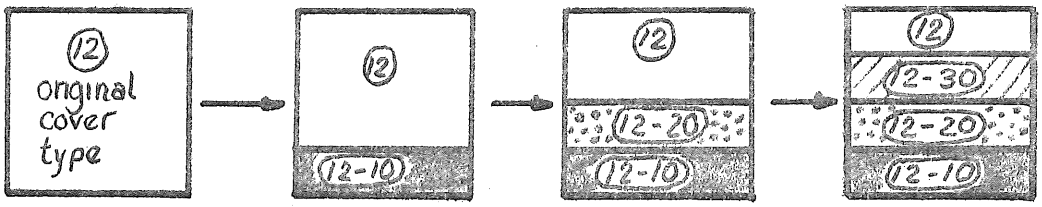
**For all but one item, the rest of this same sheet (F-280/1) will be used to update the data for the portion of the original cover type that <u>HAS</u> BEEN HARVESTED.

In <u>columns 2,3</u> enter the type sequence number. This is the same as the original cover type's type sequence number.

<u>Columns 4,5</u> are for entering the alteration number. If this is the <u>first</u> partial alteration to the original cover type, a code of " 10 " will be entered as shown at left. If this were the <u>second</u> partial alteration <u>in a different portion of the original cover type</u> than the first partial alteration, the alteration number would be " 20 ", etc.



The simplified block diagram below, shows a series of partial alterations occuring in one original cover type over a period of several years. This could often be the case when conducting large Auction Sales, or when strip cutting for natural regeneration in black spruce.

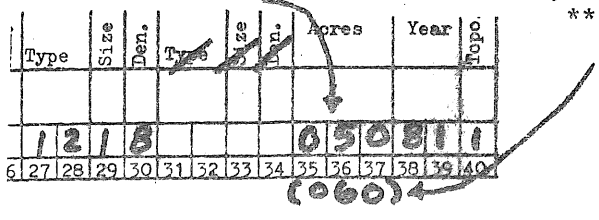


PROCEDURES: (cont.)

Columns 6 thru 26, in card 1, will be identical to the original cover type's F-280.

In columns 27 thru 34 enter the codes that describe the current condition of the main cover and understory in this portion of the original cover type that has been harvested. (In this example, the main cover type would be the aspen regeneration, and the understory would be left blank.)

In columns 35,36,37, enter the number of 'acres' that has been harvested (etc.). (In this example, 50 acres were harvested and you would enter ' 050 ', as shown below.)



***JUST BENEATH col.s 35,36,37 IN PARENTHESIS, WRITE IN THE NUMBER OF 'acres' THAT HAVE NOT BEEN HARVESTED (etc.). This is the only change in data from the original cover type, all the other data accurately reflects the conditions present in this portion that was not harvested.

***ALWAYS double check to make certain that these two acreage figures add up to exactly the original cover type's 'acres'. THIS IS VERY IMPORTANT!! (Check! 50 + 60 = 110)

In columns 38,39 enter the last two digits of the year in which the alteration is submitted.

In columns 40 thru 80 enter the codes that describe the current conditions present in this portion that has been harvested. Use the most current data you have collected and make certain that you have entered the correct code in column 80, # of cards, for this F-280/1.

iii) Cards 2 and 3 :

These cards will be completed following the instructions in the Phase II Inventory Manual. In some cases, these two cards may not be used, or only one of them used. Whatever the case, make certain that you have entered the correct code in column 80 of card 1, '# of cards', for this F-280/1.

The data in these cards, if used, will reflect the current conditions present in the portion of the original cover type that has been harvested (etc.).

iv) The Township Map

Update your township map. The portion of the original cover type that was not harvested, will retain the original cover type number (ie: the original cover type's type sequence number).

The harvested portion of the original cover type will receive a new cover type number - which is a combination of the of the original cover type's type sequence number and the alteration number. (In this example, the harvested portion would receive a cover type number of ' (12-10) ' and the portion not harvested would remain ' (12) '.)

The ' cover type, size, density classifications' will reflect the new data submitted. (In this example, the portion not harvested would remain ' A 5 5 ' since no change has occurred since the initial survey. The portion that was harvested would now become ' A 1 8 '.)

On your township map, the original cover type should now consist of two smaller types, the harvested portion and the uncut portion, separated by a cover type boundary line.

PROCEDURES: (cont.)

v) The Matex :

Once the township map is updated, place the matex over the section and transfer, ACCURATELY, the following information onto it:

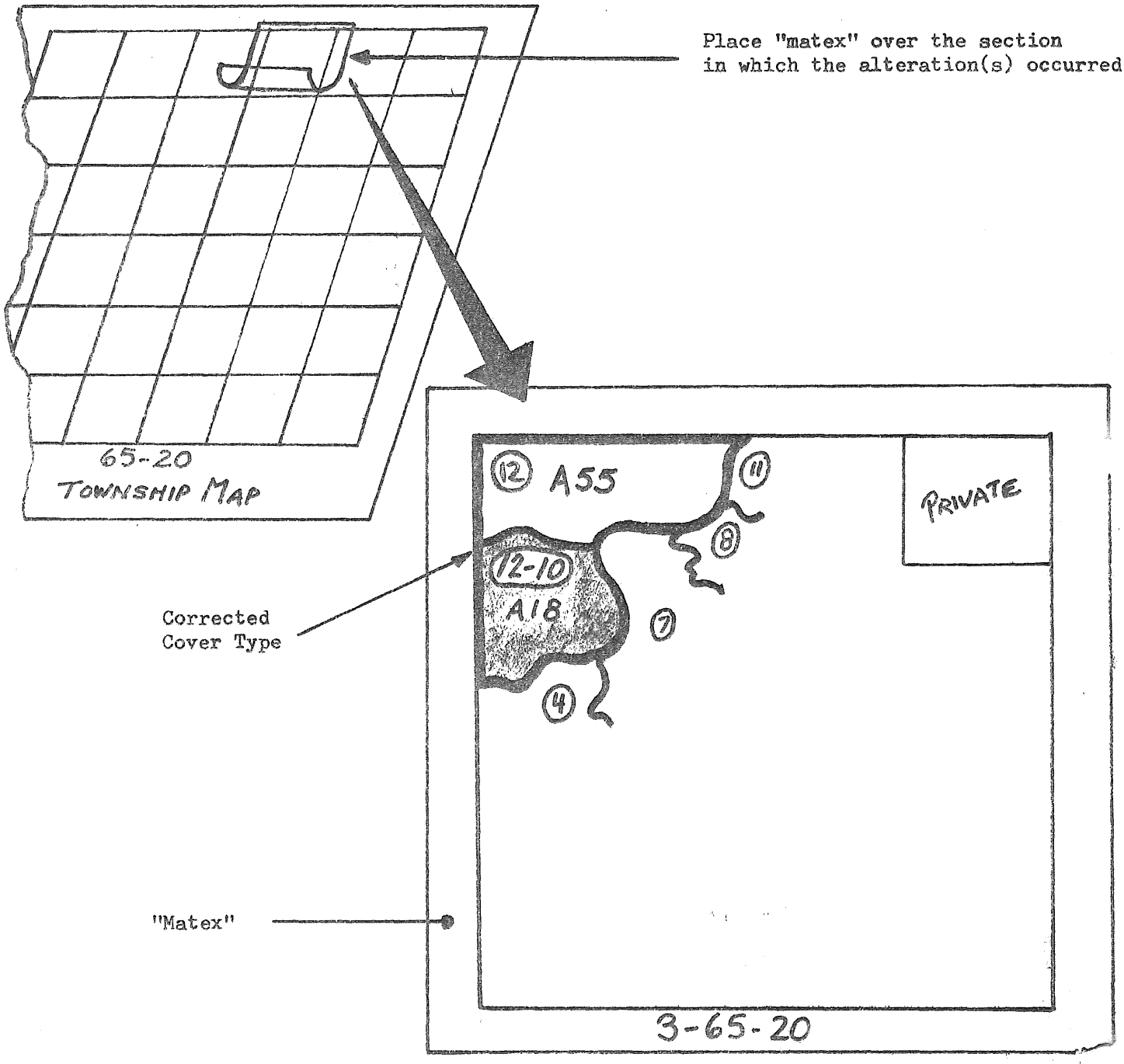
-the section lines
-ownership pattern lines
-updated cover type boundary lines
-adjacent cover type boundary lines
-current cover type numbers and type classifications
-the section-township-range (at the bottom).

ATTACH THE MATEX, by paper clip, to the alteration F-280/1, and submit together to the Area Office so they can update their records and forward the alteration to Grand Rapids.

Note that more than one alteration can occur within a section; only one matex need be submitted showing all alterations that have occurred. HOWEVER, make certain that all the alteration F-280/1's concerned are paper clipped to it and submitted together with the common matex.

An example of a matex showing a partial alteration is shown on the next page. Note that there is a cover type boundary line separating the portions of the original cover type involved, and that each have a cover type number and cover type,size,density classification.

E X A M P L E


Place "matex" over the section in which the alteration(s) occurred
65-20
TOWNSHIP MAP
12
A55
11
PRIVATE
8
12-10
A18
7
4
Corrected Cover Type
"Matex"
3-65-20

PROCEDURES: (cont.)

(vi) The Township Printout :

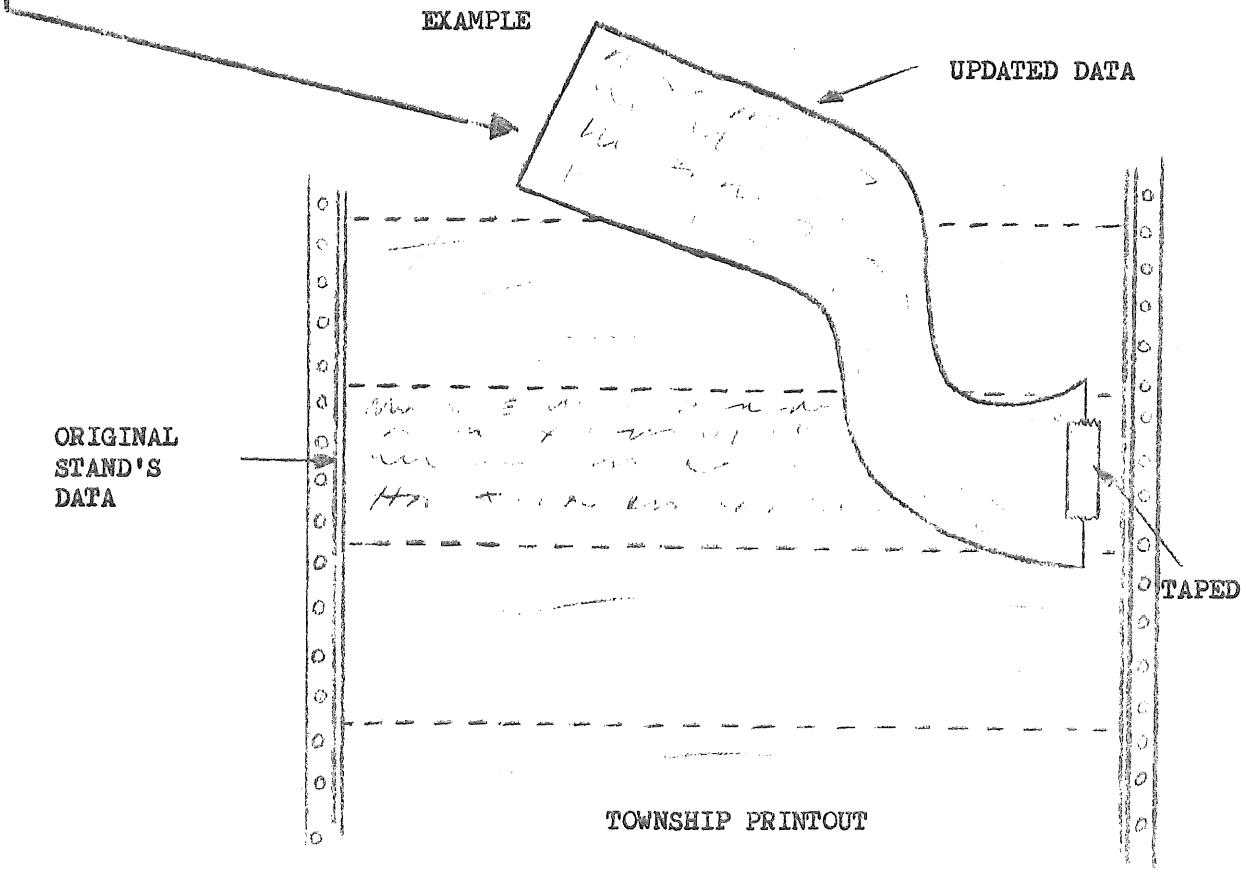
The township printout must be updated. The summary entitled "Individual Cover Types, Township Printout", is the portion that will be updated. This summary is merely a reproduction of the information contained in the three cards on the front of the F-280 Rev. 2-81.

(A copy of the space occuppied by one stand's data on the printout has been made, but without any data under the headings. This "small form" is available from the Inventory Office.)

Record the current data on this small form and place it over the original stand's data on the printout. Tape the small form to the printout on the right hand side. (See example below.)

In the case of partial alterations: If there is no change in the data for the portion not harvested, the small form will contain the current data for the portion that was harvested. The original stand's data will be the same as the portion that was not harvested, so there will be no need for an additional update form for that portion. When data does change for this portion not harvested, an additional form can be used for the new data.

When updating the printout for partial alterations, it would be wise not to obliterate the original stand's data for 'acres'. Put the new acres (for the portion not harvested) in parenthesis above the old acres. In this way you will always have the original acres to refer to in the future. It is important to always have acres balance after each alteration.



NA-01956-01
F-280/1 (exper.)
Rev. 2-81

Example: Case 2, (Sit. 1)

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions

Type Seq #	Alt. #	Sec.	Twp.	Rge.
				9
				9
				9

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mngmt. Unit	Comp. #	Acq.	Adm.	Main Cover Type	Main Cover Size	Main Cover Den.	Understory Type	Understory Size	Understory Den.	Acres	Year	Topo.
1	12	10	03	065	20	9	69	241	27			1	1	12	1	8				050 (060)	81	1
1	2-3	4-5	6-7	8-10	11-12	13	14-15	16-18	19-20	21-23	24	25	26	27-28	29	30	31-32	33	34	35-37	38-39	40

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Thr. Status	Spec.	DBH	HT.	V/Ac	Damg.	% Aff.	% Mort.	Shrubs Spec. Comp.	Distr.	Den.	Browse	Grnd Cover	Recon. Level	Stand Origin	Dist. to Road	Sp. Cond.	# of Cards
79	3	002				4	1	12	00	08	039								6	3	1	1		3
41-42	43	44-46	47-49	50-51	52-54	55	56	57-58	59-60	61-62	63-65	66	67	68	69-70	71	72	73-74	75	76	77	78	79	80

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D. (Same as Card # 1)	Second Specie Spec.	DBH	Dst	V/Ac	Damg.	Har
2							
1	2-30	31-32	33-34	35	36-38	39-40	41

Third Specie Spec.	DBH	Dst	V/Ac	Damg.	Har	Fourth Specie Spec.	DBH	Dst	V/Ac	Damg.	Har	Fifth Specie Spec.	DBH	Dst	V/Ac	Damg.	Har	
42-43	44-45	46	47-49	50-51	52	53-54	55-56	57	58-60	61-62	63	64-65	66-67	68	69-71	72-73	74	75-80

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D. (Same as Card # 1)	Specie Data Spec.	Sz	Den	Dst	Damg.
3						
1	2-30	31-32	33	34	35	36-37

Specie Data Spec.	Sz	Den	Dst	Damg.	Specie Data Spec.	Sz	Den	Dst	Damg.	Specie Data Spec.	Sz	Den	Dst	Damg.	Remarks
															2 AC. WILDLIFE OPEN.
38-39	40	41	42	43-44	45-46	47	48	49	50-51	52-53	54	55	56	57-58	59-80

Cruiser [signature] Date 6/81

Tallyman __________

Project Leader Edit __________

Forester Edit __________

PROCEDURES: (cont.)

Case # 2 ; Situation 2 : Partial Alteration of an Original Cover Type

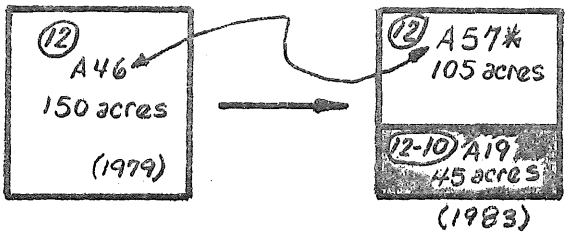
---

***In this second situation, some significant changes have occurred in the portion of the original cover type that wasn't harvested (etc.) since the initial inventory (other than 'acres').

Volumes, size class, stand composition, etc. may have changed, or in some way differs from the initial survey of the original cover type. In order to maintain accurate data, it is necessary in this case to submit two F-280/1's. One for this uncut portion and one for the portion that was harvested.

****

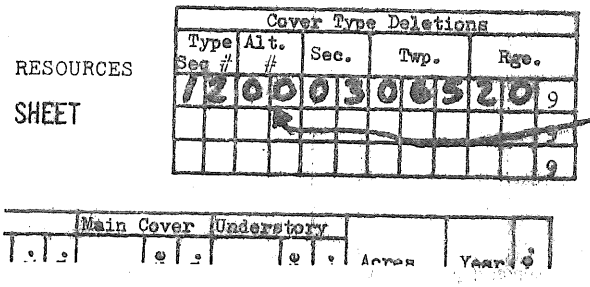
EXAMPLE:



In this example, the original cover type was 150 acres of aspen - A 4 6. In 1983, 45 acres were harvested with good aspen reproduction, A 1 9. However, in those four years since the initial inventory was completed, the aspen in the uncut portion has entered a new size class and density code due to growth - A 5 7 .

********** F-280/1 For The Portion NOT Harvested **********

i) Use this F-280/1 to delete the original cover type's data. Record the original cover type's type sequence number, section, township, and range in the 'Cover Type Deletions' table in the upper right hand corner of the alteration F-280/1. Again, make certain that the alteration number in this table is " 00 " as shown left. The cover type you are deleting should be an original cover type and as such, will not have an alteration number. (IF, the cover type you wish to delete does have an alteration number, you are altering an alteration, and the procedure for this is different. See Case 3.)



PROCEDURES: (cont.)

**** The rest of this same sheet (F-280/1) will be used to update the data for the portion of the original cover type that has not been harvested, burned, etc.

ii) Recording Data in Card 1: (portion not harvested)

Columns 1 thru 26 will remain identical to the original F-280. NO ALTERATION NUMBER for this portion. Enter ' 00 ' in columns 4 and 5.

In columns 27 thru 34 record the codes that describe the current condition of the main cover type and understory. (In this example, the main cover type would now be '12 5 7'.)

In columns 35,36,37 record the 'acres' in this portion of the original cover type that has not been harevested. (In this example, acres would be 150 - 45 = 105; enter '105'.)

In columns 38,39 enter the last two digits of the year in which the alteration is submitted.

In columns 40 thru 80 enter the codes that describe the current conditions present in this portion . Use the most current data that you have collected in order to submit this alteration. Make certain you have entered the correct code in column 80, '# of cards', for this F-280/1.

iii) Cards 2 and 3: (for the portion not harvested)

These cards will be completed following the procedures in the Phase II Manual. In some cases these two cards, or only one, may not be used - make certain you have entered the correct code in column 80 of Card 1 for the number of cards you use on this F-280/1.

****

You have now updated the computer based data for the portion of the original cover type that wasn't harvested, thinned, burned,etc. All that remains now to complete the alteration is to update the computer based data for the portion that was harvested (etc.), and to correct the map based information.

Example: Case 2 (SIT. 2)

NA-01956-01
F-280/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions				
Type Seq #	Alt. #	Sec.	Twp.	Rge.
				9
				9
				9

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mngmt. Unit	Comp. #	Acq.	Adm.	Main Cover Type	Size	Den.	Understory Type	Size	Den.	Acres	Year	Topo.
1	12	10	03	065	20	9	69	241	27			1	1	12	1	9				045	83	1
1	2–3	4–5	6–7	8–10	11–12	13	14–15	16–18	19–20	21–23	24	25	26	27–28	29	30	31–32	33	34	35–37	38–39	40

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Tbr. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	Damg.	Aff.	Mort.	Shrubs: Spec. Comp.	Distr.	Den.	Browse	Grnd. Cover	Recon. Level	Stand Origin	Dist. to Road	Site Cond.	# of Cards
81	3	001				4	1	12	00	05	060								6	3	1			
41–42	43	44–46	47–49	50–51	52–54	55	56	57–58	59–60	61–62	63–65	66–67	68	69	70–71	72	73	74	75	76	77	78	79	80

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D.	Second Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har
	Same as Card # 1						
2							
1	2–30	31–32	33–34	35	36–38	39–40	41

Third Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fourth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fifth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	
42–43	44–45	46	47–49	50–51	52	53–54	55–56	57	58–60	61–62	63	64–65	66–67	68	69–71	72–73	74	75–80

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D.	Specie Data: Spec.	Sz	Den	Dst	Damg.
	Same as Card # 1					
3						
1	2–30	31–32	33	34	35	36–37

Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Remarks
38–39	40	41	42	43–44	45–46	47	48	49	50–51	52–53	54	55	56	57–58	59–80

Cruiser G. W. Kincaid Date 3/83

Tallyman ______________________

Project Leader Edit ______________________

Forester Edit ______________________

PROCEDURES: (cont.)

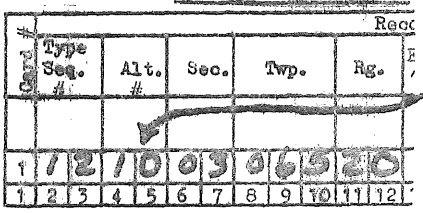
********** F-280/1 For The Portion Harvested **********

i) The cover type deletions table will not be used on this F-280/1. Place a large ' X ' through it.

ii) Recording Data in Card 1 :

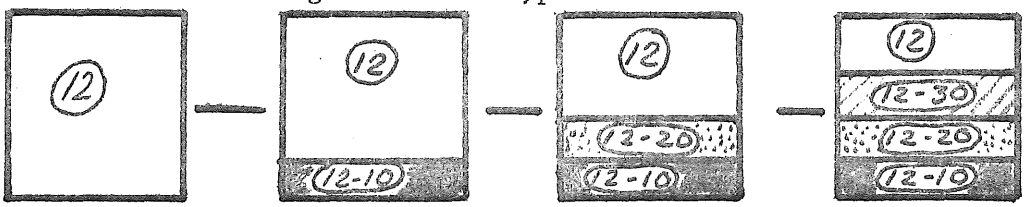
In columns 2 and 3 enter the type sequence number. This will be the same as the original stand's type sequence number.

Columns 4 and 5 are for entering the alteration number.



If this is the first partial alteration of the original cover type, a code of ' 10 ' will be entered as shown at left. If this were the second partial alteration, a code of ' 20 ' would be used, etc.

The block diagram below shows a series of several partial alterations occurring in a cover type and the correct alteration numbers.



Columns 6 thru 26 will be the same as the original cover type's F-280.

Columns 27 thru 34 will be completed using the codes that describe the current condition of the main cover type and understory in this portion of the original cover type. (In this example, the main cover type would be ' 12 1 9 ' and the understory would be left blank.)

In columns 35,36,37 enter the number of acres that has been harvested of the original cover type. Make certain that the 'acres' listed here and the 'acres' on the first F-280/1 add up to exactly the number of 'acres' in the original cover type. (In this example, 45 acres were harvested, CHECK!! 45 + 105 = 150 .)

In columns 38,39 enter the last two digits of the year in which the alteration is submitted.

In columns 40 thru 80 enter the codes that describe the current conditions present in this portion of the original cover type. Double-check that you have the correct entry for column 80, '# of cards'.

iii) Cards 2 and 3: (for the portion harvested)

These cards will be completed as you normally would, using codes that describe the current conditions in this harvested portion. In some cases, one or both of these cards may not be used - make certain that you have entered the correct code in column 80 of Card 1, '# of cards', for this sheet (F-280/1).

PROCEDURES: (cont.)

iv) The Township Map :

The portion of the original cover type that was not harvested will retain the original cover type number (ie: the original cover type's type sequence number).

The harvested portion will receive a new cover type number which is a combination of the original cover type's type sequence number and the alteration number. (In this example, the harvested portion would receive a cover type number of '12-10'. The portion not harvested would remain '12'.)

The cover type, size, density classifications will reflect the new data that has been submitted in the alteration. Each portion will receive its own classication. (In this example, the portion not harvested will have a classification of " A 5 7 ", and the harvested portion will become " A 1 9 ".)

v) The Matex :

Once the township map has been updated, place the matex over the section and ACCURATELY trace the following information onto it:

- the section lines
- the ownership pattern lines
- updated cover type boundary lines
- adjacent cover type boundary lines
- current cover type numbers/classifications
- the section-township-range (at the bottom).

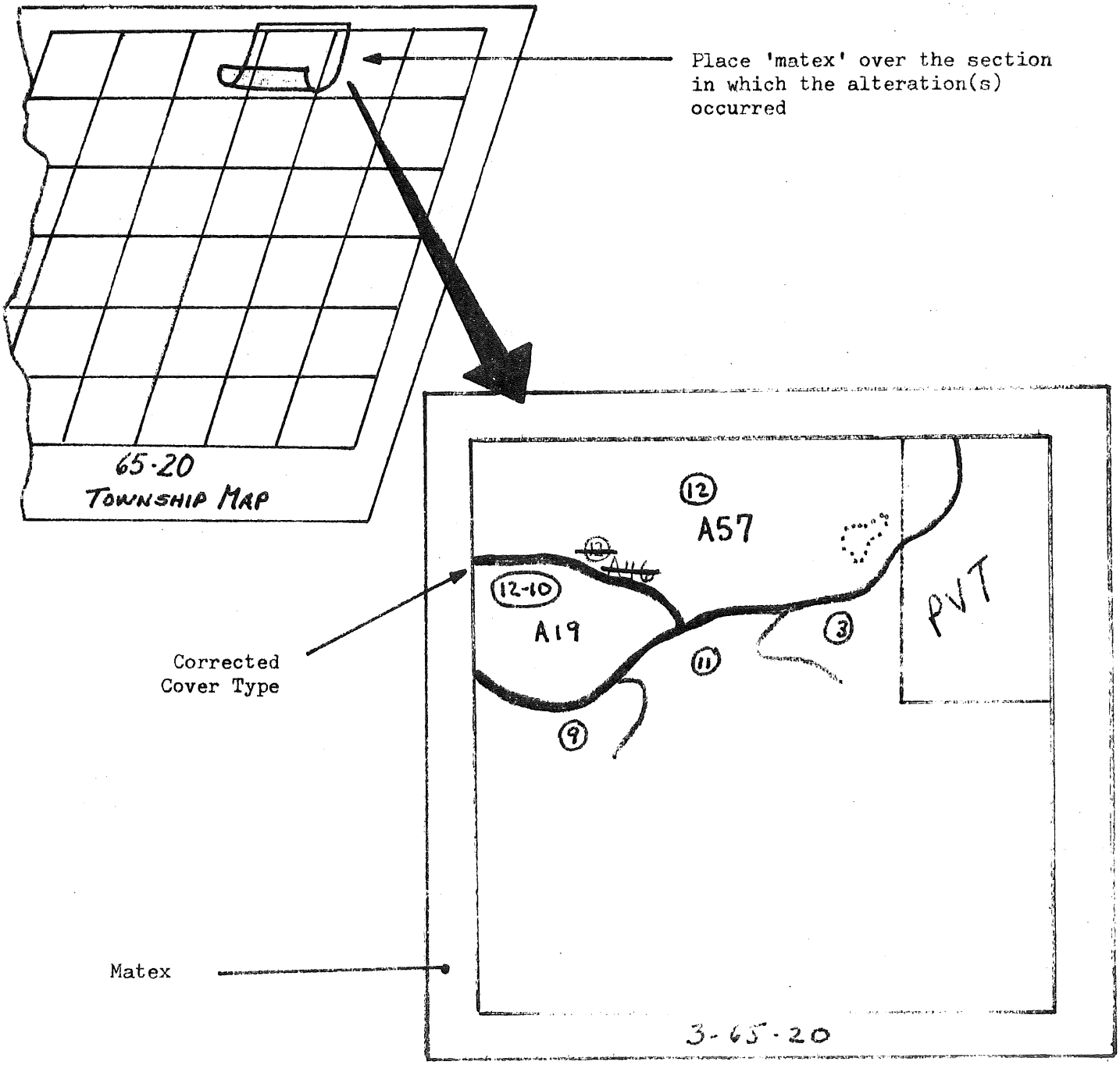
ATTACH THE MATEX, by paper clip, to the alteration F-280/1's and submit together to the Area Office. They will update their records and forward the alteration to the Inventory Office in Grand Rapids.

Note that more than one alteration may occur within a particular section - in these cases, only one matex need be submitted that shows all the alterations that have occurred. However, be sure that all the alteration F-280/1's are submitted along with,and attached to, the common matex

An example of a matex showing a partial alteration is presented on the next page. This matex would be the one that would be submitted using the example presented earlier.

Note that each portion of the original cover type has a cover type number/cover type, size, density classification and that a cover type boundary separates the two portions.

E X A M P L E


Place 'matex' over the section in which the alteration(s) occurred
65-20
TOWNSHIP MAP
12
A57
12-10
A19
11
3
PVT
9
Corrected Cover Type
Matex
3-65-20

PROCEDURES: (cont.)

(vi) The Township Printout :

The township printout must be updated. The summary entitled "Individual Cover Types, Township Printout", is the portion that will be updated. This summary is merely a reproduction of the information contained in the three cards on the front of the F-280 Rev. 2-81.

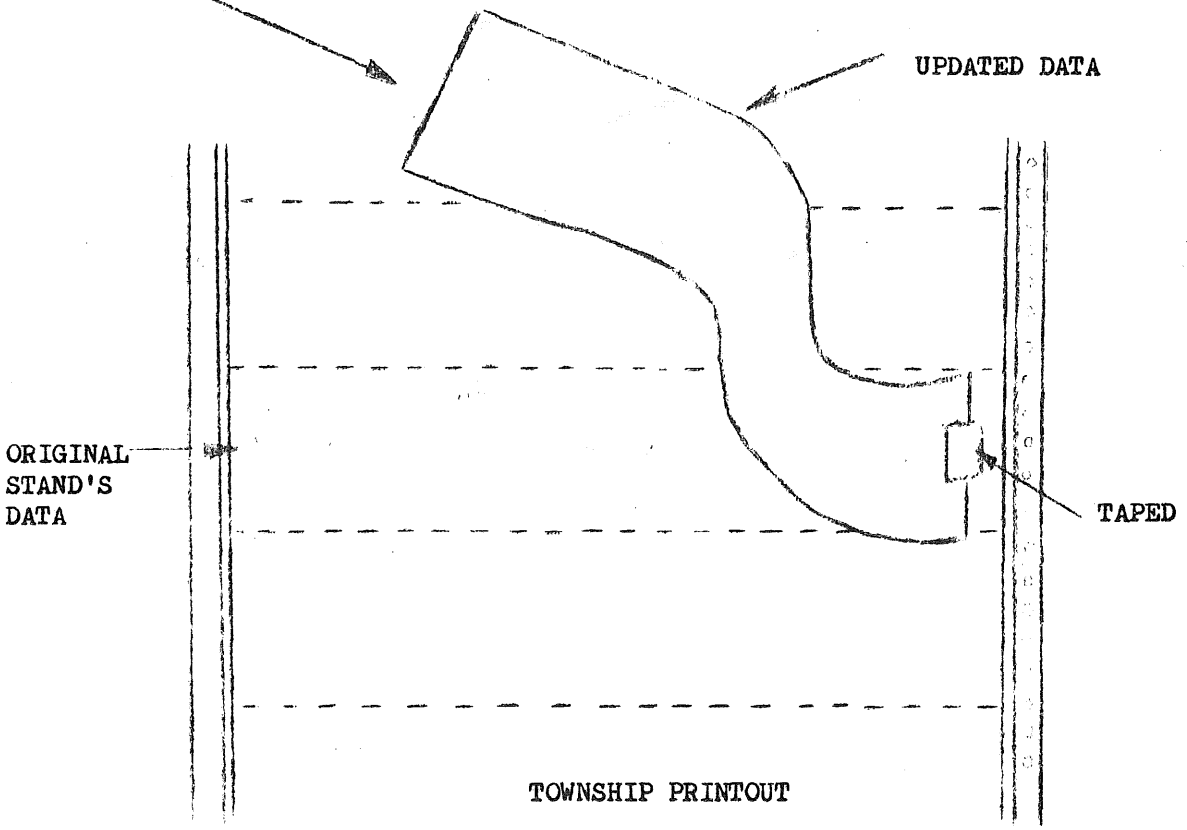
(A copy of the space occuppied by one stand's data on the printout has been made, but without any data under the headings. This "small form" is available from the Inventory Office.)

Record the current data on this small form and place it over the original stand's data on the printout. Tape the small form to the printout on the right hand side. (See example below.)

In the case of partial alterations: If there is no change in the data for the portion <u>not</u> harvested, the small form will be used to record the new data for the portion that <u>was</u> harvested. The original stand's data will be the same as the portion that was <u>not</u> harvested, so there will be no need for a small form to update that data. When the data for the portion <u>not</u> harvested <u>has changed</u>, an additional small form can be used to update that data on the printout.

When updating the printout for partial alterations, it would be wise not to obliterate the original stand's data for 'acres'. Put the new acres (for the portion not harvested) in parenthesis above the old acres. In this way you will always have the original acres to refer to in the future. It is important to always have acres balance after each alteration.

EXAMPLE



****

ALTERATIONS OF ALTERATIONS

****

(ie: updating a previous alteration cover type already submitted.)

Altering a previous alteration will not be as common as alterations to original cover types. Some examples might include; updating a 'cutover area' to a plantation or natural regeneration; correcting the data for a plantation that has failed; submitting new data for a previous alteration that was involved in a fire; etc.

Whatever the case, updating an alteration cover type is very similar to updating an original cover type. Just as in updating original cover types, alterations to alterations fall into one of two categories.

The first category is altering an entire alteration (similar to altering an entire original cover type).

The second category is altering only a portion of a previous alteration (similar to partial alterations of original cover types).

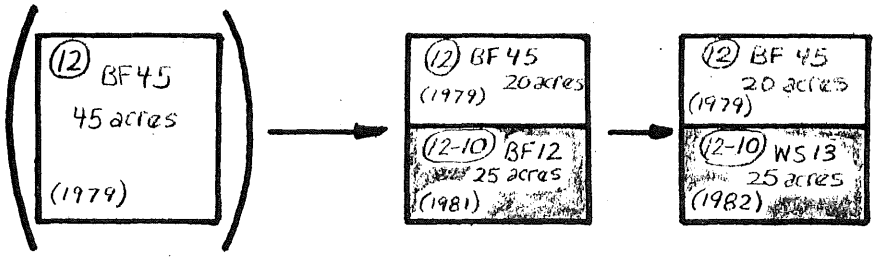
Since the procedures for these two categories are different, they will presented separately as Case # 3 and Case # 4 (Sit. 1 and 2.)

PROCEDURES: (cont.)

****

Case # 3 : Altering an Entire Alteration

****



EXAMPLE: The 'original cover type' in this example was 45 acres of 'BF 4 5'. In 1981, an alteration was submitted showing that 25 acres of this type had been harvested and was balsam fir regeneration. In 1982, the same 25 acres were planted to white spruce. It is now necessary to update the previous alteration.

i) The first step in updating an alteration cover type, in its entirety, is to delete the previous data. Use the "Cover Type Deletions" table in the upper right hand corner of the F-280/1. Enter the previous alteration's 'type sequence number', 'alteration number', section, township, and range.

In this case, we are deleting a cover type that has an alteration number - so be sure to enter that alteration number!

The correct entries for this example are shown at right.

RAL RESOURCES

ATA SHEET

Cover Type Deletions										
Type Seq #		Alt. #		Sec.		Twp.		Rge.		
1	2	1	0	0	3	0	6	5	2	0
										9
										9
										9

			Main Cover			Understory					
									Acres	Year	

The rest of this same sheet (F-280/1) will be used to record the 'new' data for the alteration cover type. This data will replace the previous alteration's data in the computer.

ii) Recording Data in Card 1 :

In columns 2 and 3 enter the type sequence number. This will be the same as the previous alteration's type sequence number (which was the same as the original cover type's type sequence number).

Columns 4 and 5: When updating an entire previous alteration, the new alteration cover type will use the same alteration number as that previous alteration. (In this example, the previous alteration number was ' 10 ', so the new alteration will also be ' 10 '.)

Columns 6 thru 26 will also be identical to the previous alteration.

In columns 27 thru 34 enter the codes that describe the current condition of the main cover type and understory.

In columns 35,36,37 enter the 'acres'. (In altering an entire previous alteration, the acres will be the same as before. Double check to make sure!)

In columns 38,39 enter the last two digits of the year in which the alteration is submitted.

In columns 40 thru 80 enter the codes that describe the current conditions present in this alteration cover type.

iii) Cards 2 and 3 :

Follow the instructions in the Phase II Manual and complete these cards as you normally would - using the current data you have collected.

In some cases, these two cards may not be used. Make certain you have entered the correct code in column 80 of card 1, "# of cards", for this F-280/1.

iv) The Township Map :

When altering an entire previous alteration, that previous alteration cover type will receive a new cover type,size,density classification. The cover type number will remain the same.(In this example, ' (12-10) '.)

The new cover type classification will reflect the new data submitted gor the alteration cover type.(In this example, ' WS 1 3 '.)

v) The Matex :

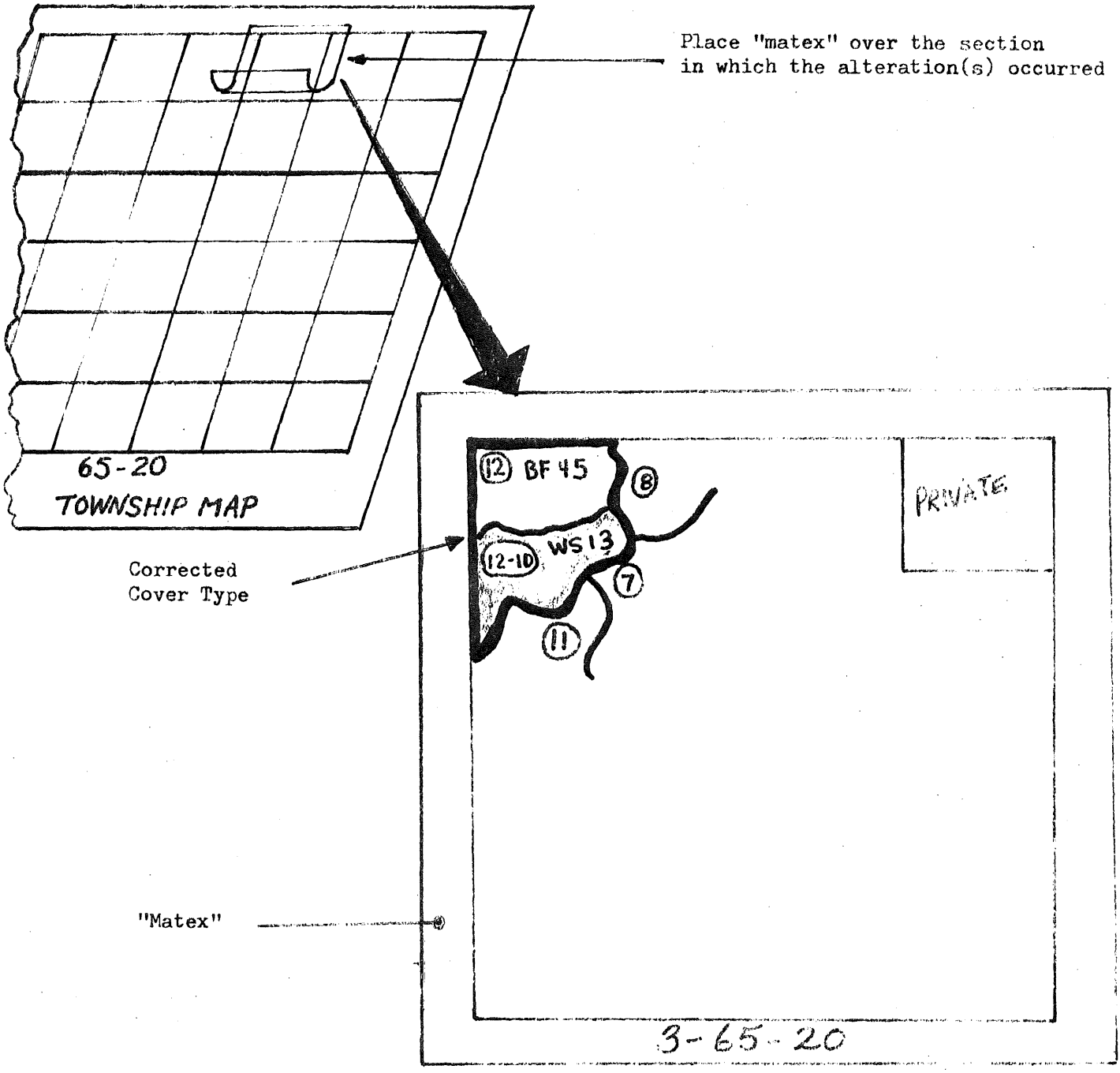
Once the township map has been corrected, place a piece of matex over the section and accurately trace the following information onto it:

- the section lines
- the ownership pattern lines
- current cover type boundary lines
- adjacent cover type boundary lines
- current cover type classifications
- section-township-range (at the bottom).

ATTACH THE MATEX by paper clip, to the alteration F-280/1 and submit together to the Area. They will update their records and forward the alteration to Grand Rapids.

Note that more than one alteration can occur in a single section. Only one matex need be submitted showing all alterations - BUT make certain that all F-280/1's concerned are attached to, and submitted with the common matex.

E X A M P L E


Place "matex" over the section in which the alteration(s) occurred
65-20
TOWNSHIP MAP
Corrected Cover Type
"Matex"
(12) BF 45
(8)
(12-10) WS 13
(7)
(11)
PRIVATE
3-65-20

(vi) The Township Printout :

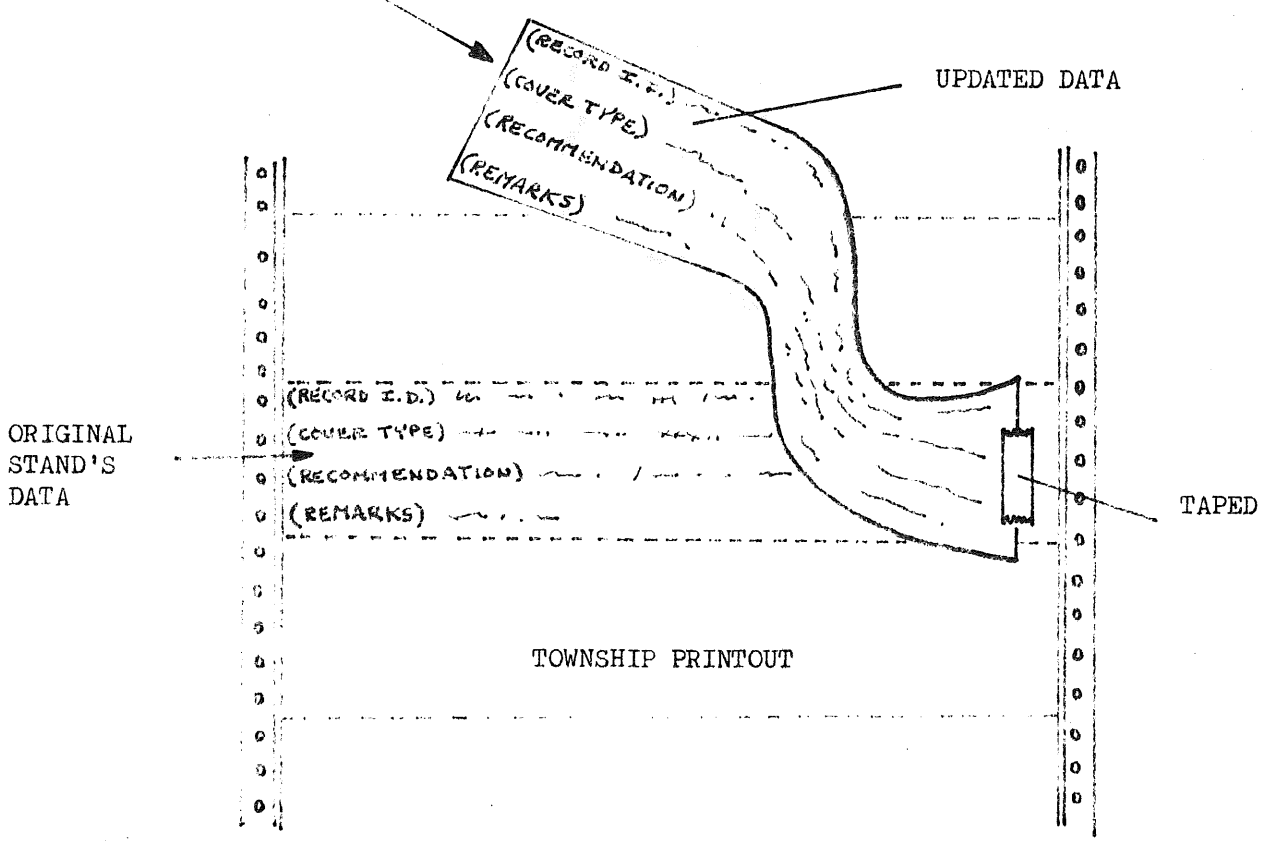
The township printout must be updated. The summary entitled "Individual Cover Types, Township Printout" is the portion that will be updated. This summary is merely a reproduction of the three cards on the front of the F-280 Rev. 2-81.

(A copy of the space occuppied by one stand's data on the printout has been made, but without any data under the headings. This "small form" is available from the Inventory Office in Grand Rapids.)

As alterations occur to a particular cover type, record the new data on the small form, place it over the original stand's data, and tape it to the printout on the right hand side.

Several "generations" of that cover type will be placed over it, with the latest alteration on top. (See the example below.)

E X A M P L E



Example: Case 3

NA-01956-01
F-280/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions										
Type Seq #	Alt. #	Sec.		Twp.		Rge.				
1 2	1 0	0 3	0 6	5 2	0	9				
						9				
						9				

Cover Type Data

Card #	Record I.D.																					Main Cover			Understory			Acres	Year	Topo.
	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mgmt. Unit	Comp. #	Acq.	Adm.	Type	Size	Den.	Type	Size	Den.											
1	1 2	1 0	0 3	0 6	5 2	0	9	6 9	2 4	1 2	7						1	1	6	1	1	3						0 2	5 8	1	1
	1 2	3 4	5 6	7 8	9 10	11	12	13 14	15 16	17 18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Tpr. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	Damg.	Aff. %	Mo-ft.	Shrubs: Spec.	Comp.	Distr.	Den.	Brow se	Grnd Cover	Recon. Level	Stand Origin	Dist. to Road	Mgm. Cond.	# of Cards
5 2	3	0 0 2				4	1	6	1	0 0	0	1	0	1	3						1	3	2			3
41 42	43	44 45 46	47 48 49	50 51	52 53	54	55	56	57	58 59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

(↑ 2-0 STOCK)

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D.	Second Specie					
	Same as Card # 1	Spec.	DBH	Dst	V/Ac	Damg.	Har
2							
1	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32 33 34	35 36 37 38	39 40	41		

Third Specie					Fourth Specie					Fifth Specie				
Spec.	DBH	Dst	V/Ac	Damg. Har	Spec.	DBH	Dst	V/Ac	Damg. Har	Spec.	DBH	Dst	V/Ac	Damg. Har
42 43	44 45	46	47 48 49	50 51 52	53 54	55 56	57	58 59 60	61 62 63	64 65	66 67	68	69 70 71	72 73 74 75 76 77 78 79 80

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D.	Specie Data				
	Same as Card # 1	Spec.	Sz	Den	Dst	Damg.
3						
1	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32 33	34	35	36	37

Specie Data					Specie Data					Specie Data					Remarks
Spec.	Sz	Den	Dst	Damg.	Spec.	Sz	Den	Dst	Damg.	Spec.	Sz	Den	Dst	Damg.	
															PLANT NO. 11039A
38 39	40	41	42	43 44	45 46	47	48	49	50 51	52 53	54	55	56	57 58	59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Cruiser GW Kincaid Date 5/81

Tallyman _____

Project Leader Edit _____

Forester Edit _____

PROCEDURES: (cont.)

****

Case # 4 : Altering only a Portion of the Previous Alteration

****

This second category of alterations of alterations can have two situations, just as partial alterations of original cover types could have two situations. Refer to the 'Discussion' on page 8 . The same logic applies in this case. As a matter of fact, the procedures for these two cases (#2 and #4) are the same except for assigning 'alteration numbers'.

As in case 2, which situation procedures to use depends on the conditions present in the portion of the previous alteration cover type that has not been affected by the recent activity.

Situation 1 presents the procedures for when the portion not altered has not significantly changed since that alteration was submitted previously. This requires only a change in acres for that portion and can all be handled on one F-280/1.

Situation 2 procedures are for when the unaffected portion has changed since the previous alteration was submitted. This will require two F-280/1's because both portions will receive new data.

Please reread " A Word of Caution " on page 9 .

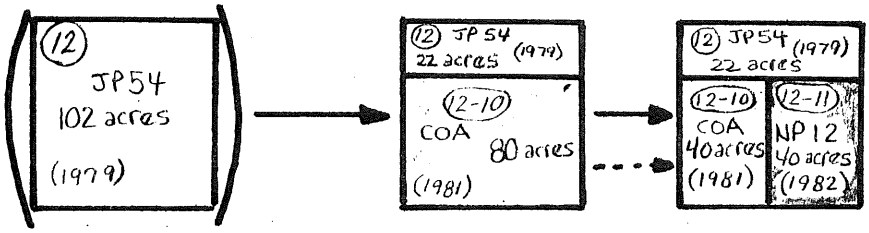
PROCEDURES: (cont.)

****

Case # 4; Situation 1 :

****

EXAMPLE :



In this example, the original cover type was 102 acres of 'JP 5 4'. In 1981, an alteration was submitted showing that 80 acres of the original cover type had been harvested and classified as a 'cutover area'. In 1982, 40 acres of the cutover area was planted to norway pine. The remaining 40 acres of the previous alteration was still classified as 'cutover area'.

i) The "Cover Type Deletions" table will not be used in this situation. Place a large ' X ' through it.

ii) Recording Data in Card 1 :

In columns 2 and 3 record the type sequence number. This will be the same as the previous alteration's type sequence number.

Columns 4 and 5 will be the 'new' alteration number. The first digit of this new alteration number will be the same as the previous alteration number. The second digit will reflect whether this is the first, second, third, etc. alteration to that previous alteration.

For instance, the first partial alteration to a previous alteration whose alt.# was '20', would receive an alt.# of '21'. If this were the second partial alteration to that same previous alteration, it would receive an alt.# of '22', etc.

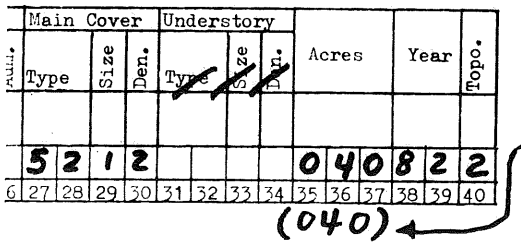
(In this example, the alteration is the first partial alteration to a previous alteration whose alt.# was '10', so the alteration number for this portion of the previous alteration would be '11'.)

Card #	Record						
	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	
1	12	11	03	065	20		9
1	2 3	4 5	6 7	8 9	10 11	12	13 1

Columns 6 thru 26 will remain identical to the previous alteration. These columns are for identification.

PROCEDURES: (cont.)

In columns 27 thru 34 enter the codes that describe the current condition of the main cover type and understory in this portion of the previous alteration. (In this example, the main cover type would be " NP 1 2 ", and the understory would be left blank.)



Columns 35,36,37 will show the 'acres' in this portion of the previous alteration cover type. (In this example, 40 acres, entered as '040' as shown.)

*****Just beneath columns 35,36,37, enter, in parenthesis, the number of 'acres' that HAS NOT been planted (etc.). This takes care of the only change in data for that portion of the previous alteration. (In this example, it would be 40 acres also, entered as (040) as shown.)

ALWAYS CHECK to make certain that these two acreage figures add up to EXACTLY the number of acres present in the previous alteration cover type!!!!!

In columns 38,39 enter the last two digits of the year in which this alteration is submitted.

In columns 40 thru 80 enter the codes that describe the current conditions present in this portion of the previous alteration that HAS BEEN planted, burned, etc.

iii) Recording Data in Cards 2 and 3 :

These two cards will reflect the new data that has been collected for the portion of the previous alteration that HAS BEEN planted, etc. Follow the instructions in the Phase II Manual.

In some cases, one or both of these cards may not be used, make certain that you have entered the correct code in column 80 of card 1, " # of cards " to reflect the number of cards you have used on this F-280/1.

iv) The Township Map :

Correct the township map to show the current cover types and classifications. In this example, the original cover type now looks like three smaller types.

1) That portion of the original cover type that wasn't harvested in 1981 and remains '12', JP 5 4 .

2) That portion of the previous alteration that wasn't planted, and remains '12-10', "cutover area".

3) That portion of the previous alteration that was planted and receives a new cover type number of '12-11', and classified as NP 1 2.

(See the example following item v).)

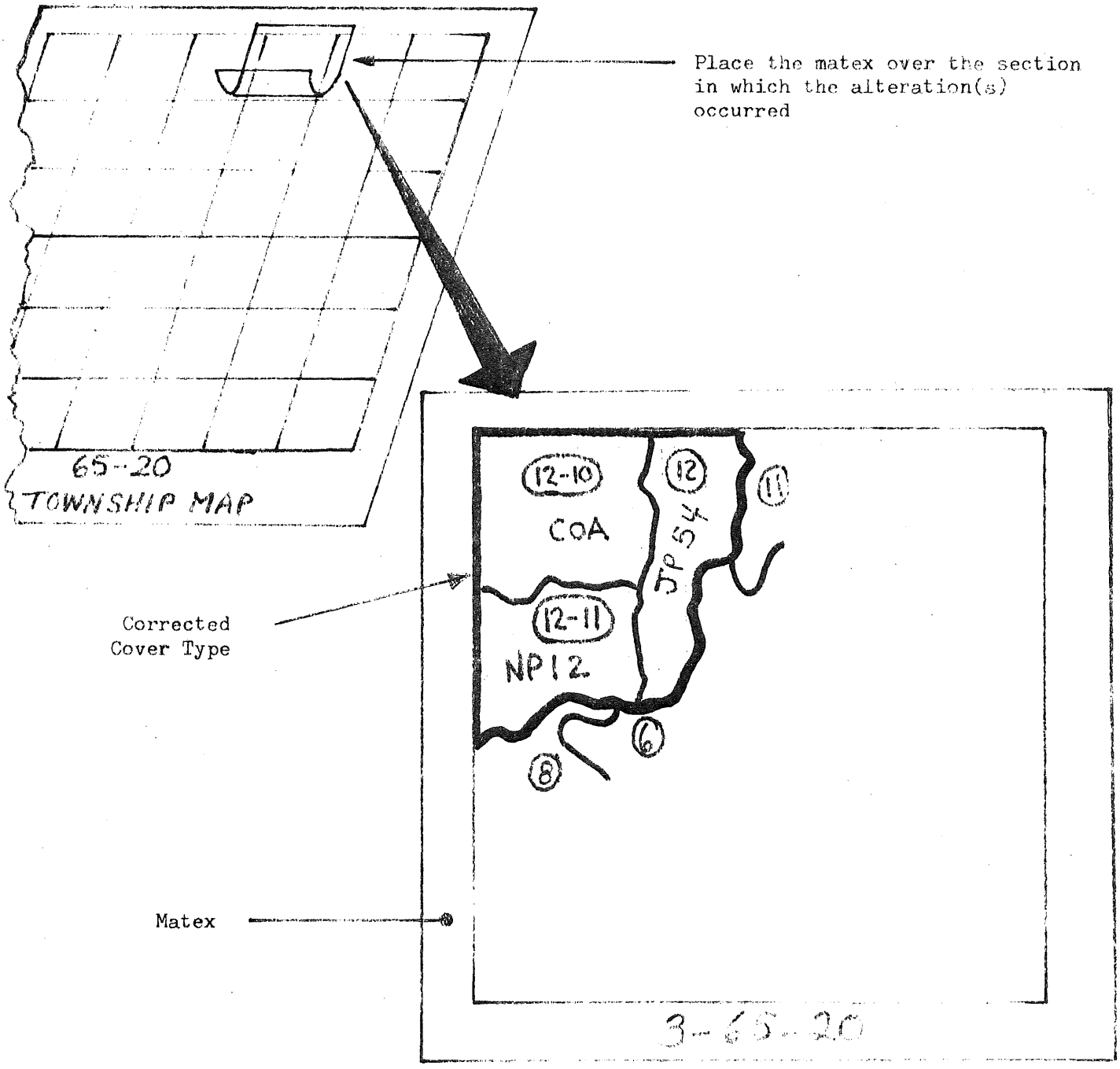
v) Once the township map has been updated, place a piece of matex over the section and accurately trace the following information onto it: the section lines; ownership pattern lines; current cover type boundary lines; adjacent cover type lines; current cover type classifications; and the section-township-range at the bottom.

Note that each of the alteration cover types are separated from each other by a cover type line.

PROCEDURES: (cont.)

ATTACH THE MATEX, by paper clip, to the alteration F-280/1's, and submit together to the Area Office. Again, if more than one alteration occurs within a section, only one matex need be submitted showing all alterations. Make certain that all the alteration F-280/1's for that section are attached and submitted together with the common matex. (See the example below for a typical matex showing a partial alteration of a previous alteration.)

E X A M P L E



PROCEDURES: (cont.)

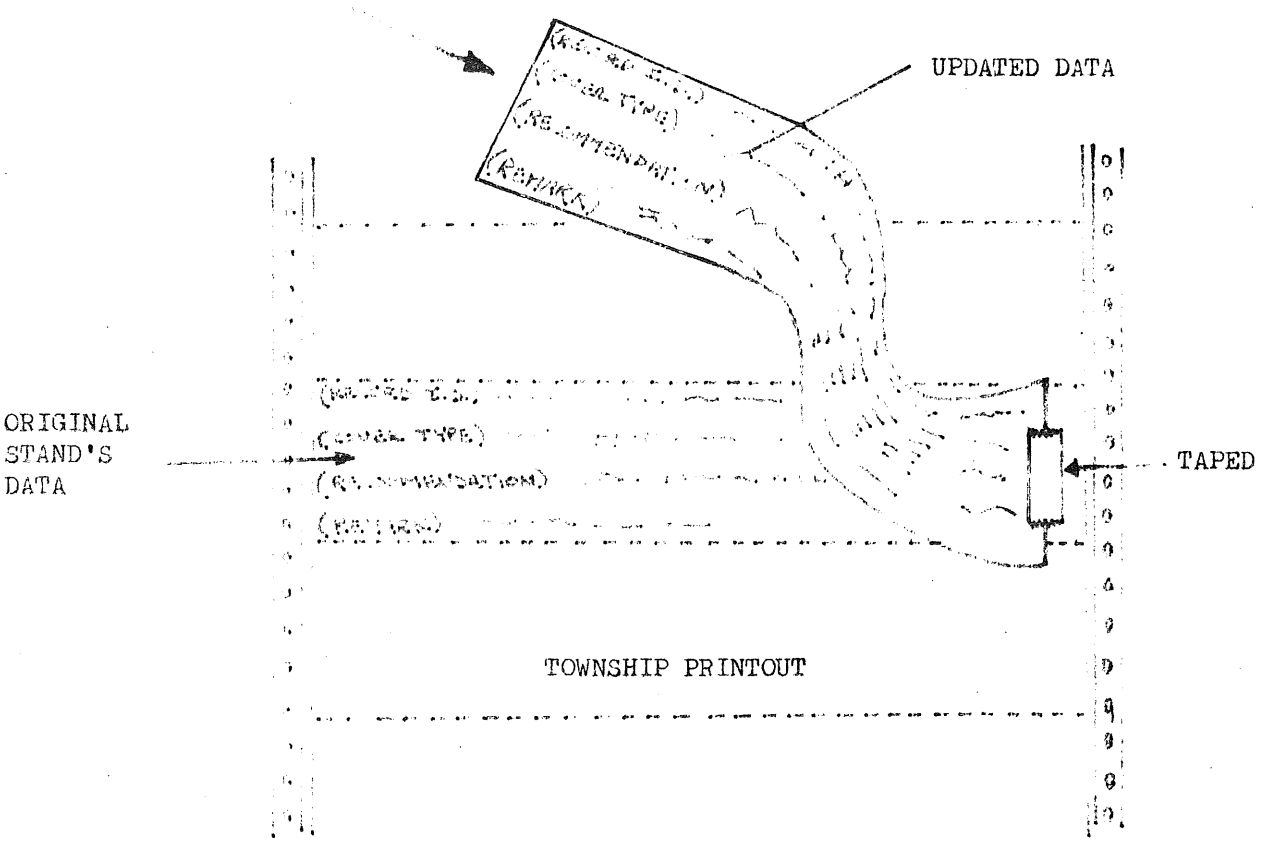
(vi) The Township Printout :

The portion of the township printout that will be updated is the summary entitled "Individual Cover Types, Township Printout". This summary is reproduction of the three cards on the front of th F-280 Rev. 2-81.

A "small form" on which the new data can be entered is available from the Inventory Office in Grand Rapids. Place this small form with the current data inserted beneath the headings, over the previous stand's data and tape it to the printout on the right hand side.

Whenever dealing with partial alterations it is always wise not to obliterate the original stand's data on "acres". Place the new acres beside the old acres, so that you will be able to refer to the original acres when needed. It is important to make certain that the acres always balance when making alterations.

E X A M P L E



Example: Case 4 (SIT. 1)

NA-01956-01
F-230/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions				
Type Seq #	Alt. #	Sec.	Twp.	Rge.
				9
				9
				9

Cover Type Data

Card #	Record I.D.																						Main Cover			Understory			Acres		Year	Topo.
	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mngmt. Unit	Comp. #	Acq.	Adm.	Type	Size	Den.	Type	Size	Den.													
1	1 2	1 1	0 3	0 6	5 2	0	9	6 9	2 4	1 2 7				1	5 2	1 2							0 4	0 8	2	2						
1	2 3	4 5	6 7	8 9	10 11	12	13	14 15	16 17	18 19 20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40		

(040)

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cord. Class	Tor. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	Damg.	Aff. to Ht.	Shrubs: Spec. Comp.	Distr.	Den.	Brow wse	Grnd Cover	Recon. Level	Stand Origin	Dist. to Road	Soil Cond.	# of Cards
5	0	2 0 0 3				4	1	5	2	0 0	0 1	0	0 8					1	3	2			3
41	42	43 44 45	46 47 48	49 50 51	52 53 54	55	56	57	58	59 60	61 62	63	64 65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

(↑ mostly 3-0 stock)

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D.	Second Specie					
	Same as Card # 1	Spec.	DBH	Dst	V/Ac	Damg.	Har
2							
1	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32 33 34	35 36 37	38	39 40		41

Third Specie					Fourth Specie					Fifth Specie					
Spec.	DBH	Dst	V/Ac	Damg.	Har	Spec.	DBH	Dst	V/Ac	Damg.	Har	Spec.	DBH	Dst	V/Ac	Damg.	Har
42 43	44 45	46	47 48 49	50 51	52	53 54	55 56	57	58 59 60	61 62	63	64 65	66 67	68	69 70	71 72	73 74

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D.	Specie Data				
	Same as Card # 1	Spec.	Sz	Den	Dst	Damg.
3						
1	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32	33 34	35	36	37

Specie Data					Specie Data					Specie Data					Remarks
Spec.	Sz	Den	Dst	Damg.	Spec.	Sz	Den	Dst	Damg.	Spec.	Sz	Den	Dst	Damg.	
															PLANT NO. 116518
38 39 40	41	42	43	44	45 46 47	48	49	50	51	52 53 54	55	56	57	58	59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Cruiser [signature] Date 4/82

Tallyman _____

Project Leader Edit _____

Forester Edit _____

PROCEDURES: (cont.)

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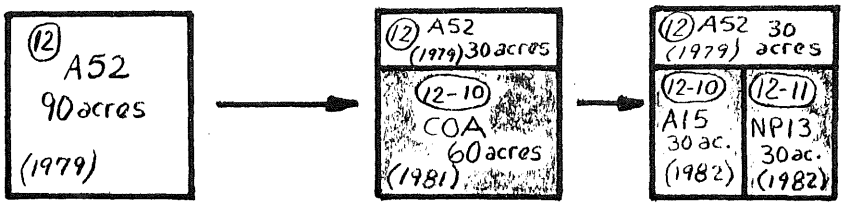
Case # 4 ; Situation 2 :

****

EXAMPLE :



In this example, the original cover type was 90 acres of aspen, 'A 5 2'. In 1981, 60 acres were harvested and an alteration was submitted showing this portion as a 'cutover area'. In 1982, 30 acres of this previous alteration was planted to norway pine. The remaining 30 acres of the previous alteration is no longer classified as 'cutover area', it is now aspen regeneration. This means that both portions of the previous alteration needs updating.

i) The first F-280/1 will be used to update the data for the portion that was not planted, etc.

The first step will be to delete the previous alteration's data. Use the 'Cover Type Deletions' table in the upper right hand corner of the F-280/1.

Enter the previous alteration's type sequence number, alteration number, section, township, and range in the table.

Since the cover type we are deleting in this case, does already have an alteration number, make certain that it is entered in this table. The correct entries for this example are shown above right.

OURCES

ET

Cover Type Deletions										
Type Seq #	Alt. #		Sec.		Twp.		Rge.			
1	2	1	0	0	3	0	6	5	2	0	9
											9
											9

Main Cover	Understory									

ii) Recording Data in Card 1 : (for the portion not planted)

* A second F-280/1 will be completed for the plantation.

Columns 2 thru 26 will be the same as the previous alteration's data. This portion of the previous alteration will use the same alteration number as the previous alteration.

In columns 27 thru 34 enter the codes that describe the current condition of the main cover type and understory. (In this example, the main cover type would be aspen regeneration, the understory will be left blank.)

In columns 35,36,37 enter the 'acres' in this portion of the previous alteration. (The aspen regen. in this example, covers 30 acres, and would be entered as ' 030 '.)

In columns 38,39 enter the last two digits of the year in which the alteration is submitted.

Card #	Record										
	Type Seq. #	Alt. #	Sec.		Twp.		Rg.		E/W	
1	1	2	1	0	0	3	0	6	5	2	0	9
	1	2	3	4	5	6	7	8	9	10	11	12	1

Main Cover			Understory							
Type	Size	Den.	Type	Size	Den.	Acres		Year	Topo.
1	2	1	5				0	3	0	8	2	2
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

PROCEDURES: (cont.)

In columns 40 thru 80 enter the codes that describe the current conditions in this portion of the previous alteration.

iii) Cards 2 and 3 :

These cards will be completed as you normally would. Follow the instructions in the Phase II Manual using the current data collected for this portion of the previous alteration.

In many cases, one or both of these cards may not be used. Always double check to make certain that you have entered the correct code in column 80 of card 1, ' # of cards ', for this alteration F-280/1.

****

This completes the first F-280/1 that must be submitted. A second F-280/1 will be completed and submitted for the other portion of the previous alteration.

Example: Case 4 (SIT. 2)

NA-01956-01
F-280/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions				
Type Seq #	Alt. #	Sec.	Twp.	Rge.
1 2	1 0	0 3	0 6 5	2 0 9
				9
				9

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mngmt. Unit	Comp.	Acq.	Adm.	Main Cover Type	Main Cover Size	Main Cover Den.	Understory Type	Understory Size	Understory Den.	Acres	Year	Topo.
1	1 2	1 0	0 3	0 6 5	2 0	9	6 9	2 4 1	2 7			1	1	1 2	1	5				0 3 0	8 2	1
1	2 3	4 5	6 7	8 9 10	11 12	13	14 15	16 17 18	19 20	21 22 23	24	25	26	27 28	29	30	31 32	33	34	35 36 37	38 39	40

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Tbr. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	Damg.	Aff.	Mort.	Shrubs: Spec. Comp.	Distr.	Den.	Browse	Grnd Cover	Recon. Level	Stand Origin	Dist. to Road	Sgn. Cond.	# of Cards
6 2	2	0 0 2				4	1	1 2	0 0	0 5	0 2 3								6	3	1			
41 42	43	44 45 46	47 48 49	50 51	52 53 54	55	56	57 58	59 60	61 62	63 64 65	66 67	68	69	70 71	72	73	74	75	76	77	78	79	80

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D. Same as Card # 1	Second Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har
2							
1	2–30	31 32	33 34	35	36 37 38	39 40	41

Third Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fourth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fifth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	
42 43	44 45	46	47 48 49	50 51	52	53 54	55 56	57	58 59 60	61 62	63	64 65	66 67	68	69 70 71	72 73	74	75 76 77 78 79 80

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D. Same as Card # 1	Specie Data: Spec.	Sz	Den	Dst	Damg.
3						
1	2–30	31 32	33	34	35	36 37

Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Remarks
38 39	40	41	42	43 44	45 46	47	48	49	50 51	52 53	54	55	56	57 58	59–80

Cruiser GWKincaid   Date 8/82

Tallyman ____________________

Project Leader Edit ____________________

Forester Edit ____________________

Example: Case 4 (SIT. 2)

NA-01956-01
F-230/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions

Type Seq #	Alt. #	Sec.	Twp.	Rge.
				9
				9
				9

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mngmt. Unit	Comp. #	Acq.	Adm.	Main Cover Type	Main Cover Size	Main Cover Den.	Understory Type	Understory Size	Understory Dev.	Acres	Year	Topo.
1	1 2	1 1	0 3	0 6	5 2	0 9	6 9	2 4	1 2	7			1 1	5 2	1 3					6 3	0 8	2 1
	1 2	3 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 30	31 32	33 34	35 36	37 38	39 40		

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Tmr. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	Damg.	Aff.	Mo-At.	Shrubs: Spec. Comp.	Distr.	Den.	Bro-wse	Grnd Cover	Recon. Level	Stand Origin	Dist. to Road	Sgn. Cond.	# of Cards
5 5	2	0 0 2				4	1	5 2	0 0	0 1	0 1 3				1 0	1	2	4	1	3	2			3
41 42	43	44 45 46	47 48 49	50 51	52 53 54	55	56	57 58	59 60	61 62	63 64 65	66	67	68	69 70	71	72	73	74	75	76	77	78	79	80

(2-0 STOCK)

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D.	Second Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har
2	Same as Card # 1						
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32 33 34	35 36	37	38	39 40	41

Third Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fourth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har	Fifth Specie: Spec.	DBH	Dst	V/Ac	Damg.	Har
42 43	44 45	46	47 48 49	50 51	52	53 54	55 56	57	58 59 60	61 62	63	64 65	66 67	68	69 70 71	72 73	74

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D.	Specie Data: Spec.	Sz	Den	Dst	Damg.
3	Same as Card # 1					
	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32	33 34	35 36	37	

Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Specie Data: Spec.	Sz	Den	Dst	Damg.	Remarks
															PLANT NO. 10014
38 39 40	41	42	43 44		45 46 47	48	49	50 51		52 53 54	55	56	57 58		59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Cruiser E.W. Kinicard Date 8/82

Tallyman _____

Project Leader Edit _____

Forester Edit _____

PROCEDURES: (cont.)

********** Second F-280/1 for Situation 2 **********

i) The "Cover Type Deletions" table will not be used on this F-280/1, place a large ' X ' through it. The deletion of the previous alteration's data was handled on the first F-280/1.

ii) Recording Data in Card 1 :

In columns 2 and 3 enter the type sequence number. This will be the same as for the previous alteration.

Columns 4 and 5 will be the new alteration number. The first digit of this alteration number will be the same as the previous alteration. The second digit will indicate whether this is the first, second, third, etc. alteration to the previous alteration.

For instance, the first partial alteration to a previous alteration with an alt. # of '20', would receive a new alt. # of '21'. If this were the second partial alteration to the same previous alteration, the new alt. # would be '22', etc.

(In this example, this is first partial alteration to the previous alteration whose alt.# was '10', so the new alt.# for this portion will be ' 11 ' as shown.)

Card #	Record							
	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W		
1	12	11	03	065	20	9		
	1 2 3	4 5	6 7	8 9	10	11	12	13

Columns 6 thru 26 will be the same as for the previous alteration. These columns are identification.

In columns 27 thru 34 enter the codes that describe the current cover type and understory in this portion of the previous alteration. (In this example, the main cover type would be 'NP 1 3', and the understory would be left blank.)

In columns 35,36,37 enter the number of 'acres' in this portion of the previous alteration. (In this example, the plantation is 30 acres, entered as '030'.)

** It is very important to double check and make sure this acreage figure, and the one on the first F-280/1 add up to EXACTLY the 'acres' shown for the previous alteration. Check! 30+30=60 .)

In columns 38,39 enter the last two digits of the year in which this alteration is submitted.

In columns 40 thru 80 enter the codes that describe the current conditions in this portion of the previous alteration.

iii) Cards 2 and 3 :

These cards will be completed following the instructions in the Phase II Manual. Use the current data collected for this portion of the previous alteration.

In some cases, one or both of these cards may not be used. Make certain that you have entered the correct code in column 80 of card 1, '# of cards', used in this alteration F-280/1.

iv) The Township Map :

Correct your township map to show the current cover type lines, cover type numbers, and classifications.

In this example, the original cover type would now consist of three smaller types; two alteration cover types and that portion of the original cover type that wasn't harvested in 1981.

The portion of the previous alteration that is now aspen regeneration would receive a cover type number of '12-10' and a cover type classification of 'A 1 5'.

The portion of the previous alteration that was planted to norway pine will have a cover type number of '12-11' and a cover type classification of 'NP 1 3'.

The portion of the original cover type that was never altered will retain the same cover type number and classification as before. (By the way, if it had changed significantly since the initial survey, another F-280/1 could have been submitted for it's new data. In this example, it was unchanged.)

v) The Matex :

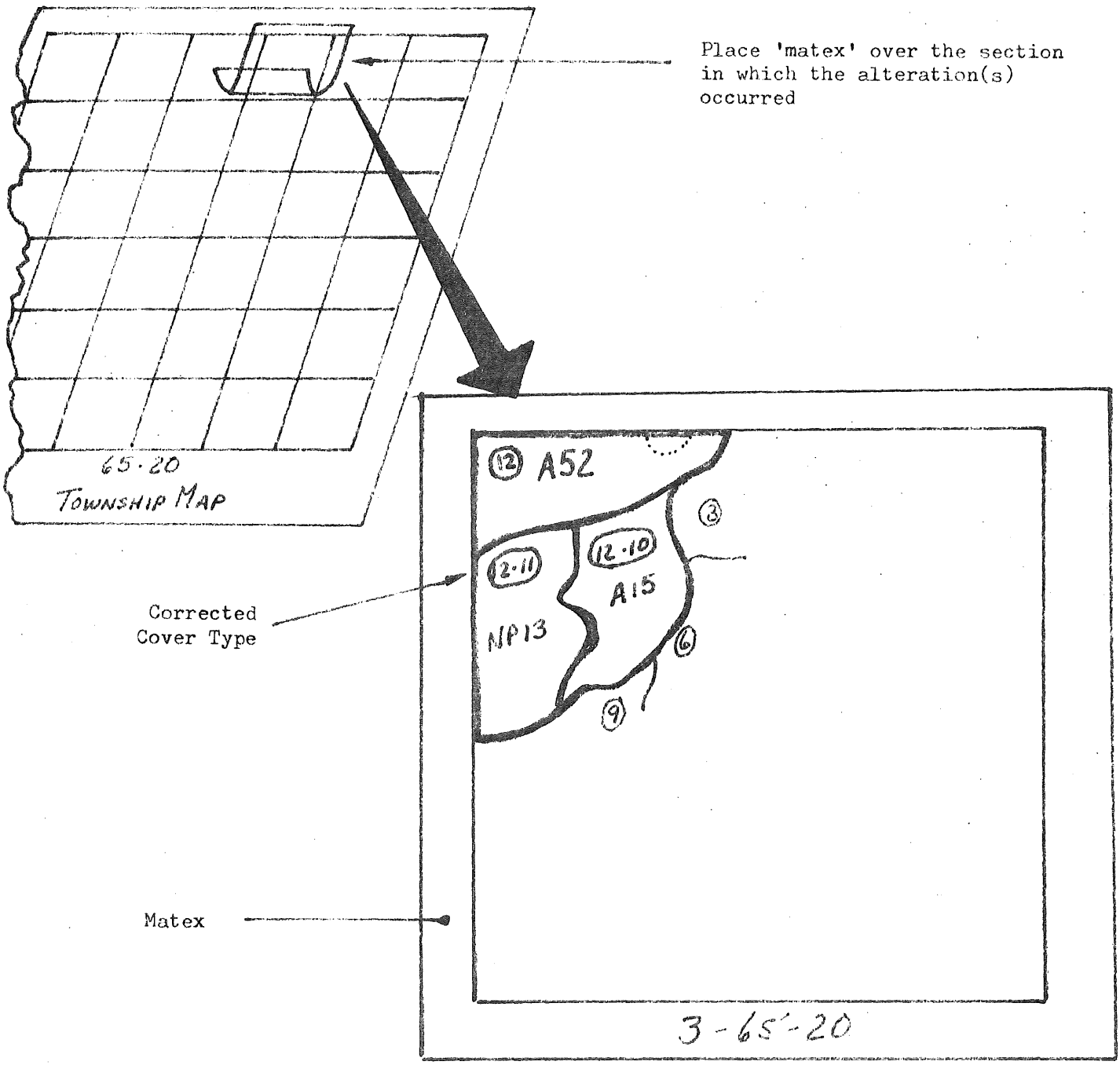
Once the township map is current, place a piece of matex over the section in which the alteration has occurred. On this matex, ACCURATELY, trace the following information:

- the section lines
- the ownership pattern lines
- current cover type boundery lines
- adjacent cover type lines
- current cover type classifications
- current cover type numbers
- the section-township-range (at the bottom).

On the next page is what this example's matex would have looked like. Note that the two alteration cover types are separated by a type line, and each have cover type numbers and classifications reflecting the data submitted.

Always double check to make sure that this is the case in your alterations that are submitted. The matex reflects the new data submitted and is transfered accurately from the township map.

E X A M P L E


Place 'matex' over the section in which the alteration(s) occurred
65-20
TOWNSHIP MAP
12 A52
3
12-11
12-10
A15
NP13
6
9
Corrected Cover Type
Matex
3-65-20

PROCEDURES: (cont.)

(vi) The Township Printout :

The township printout must be updated. The summary entitled " Individual Cover Types, Township Printout " is the portion that will be updated. This summary is merely a reproduction of the three cards on the front of the F-280 Rev. 2-81.

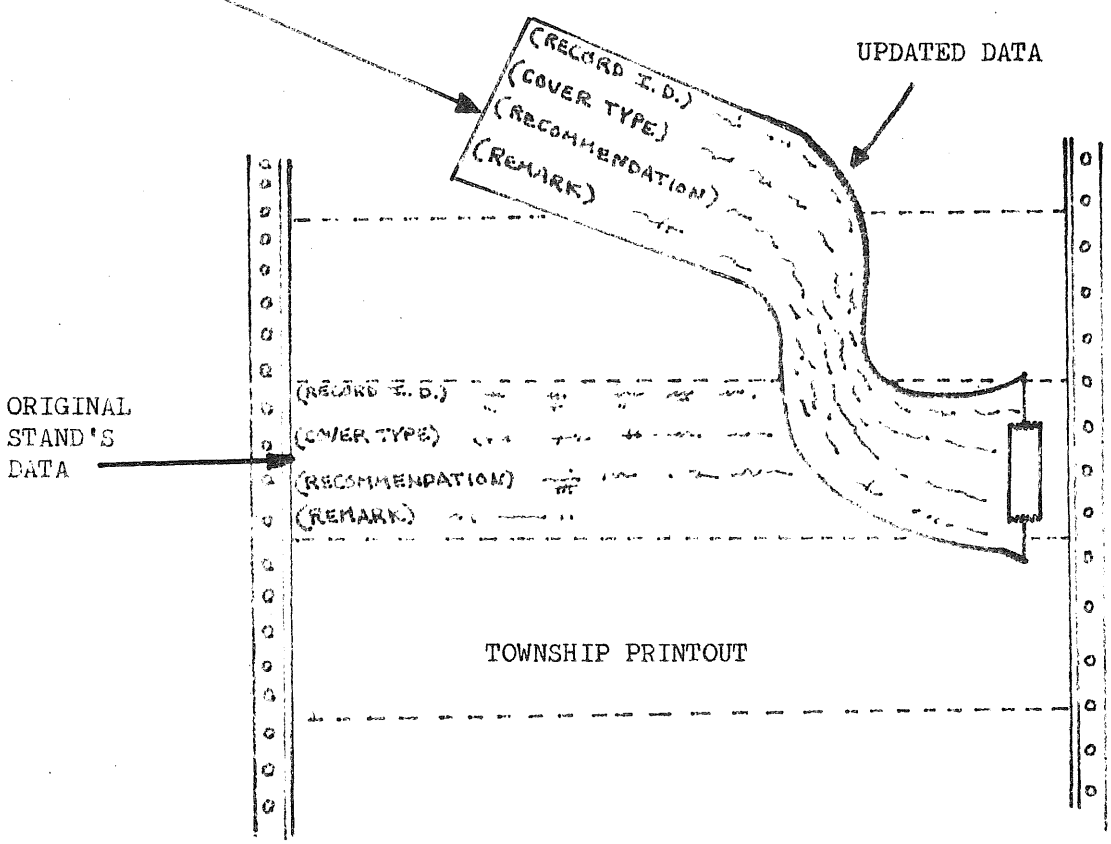
(A copy of the space occuppied by one stand's data on the printout has been made, but without any data under the headings. This "small form" is available from the Inventory Office in Grand Rapids.)

Record the current data on this small form and place it over the original stand's data on the printout. Tape the small form to the printout on the right hand side. (See example below.)

In the case of partial alterations: If there was no change in the data for the portion not harvested (as there wasn't in our example), the small form will contain the new data for the portion that was harvested. The original stand's data on the printout will be the same as for the portion that was not harvested, so there will be no need for an additional update form in this case. When stand composition for the portion not harvested does change from the original stand's data, then an additional update form will be used.

When updating the printout for partial alterations, it would be wise not to obliterate the original stand's data for "acres". Put the new "acres" (for the portion not harvested) in parentheses above the original data. In this way, you will always have the correct number of acres to refer to in future alterations of that cover type. It is important to always have acres balance after performing alterations.

E X A M P L E

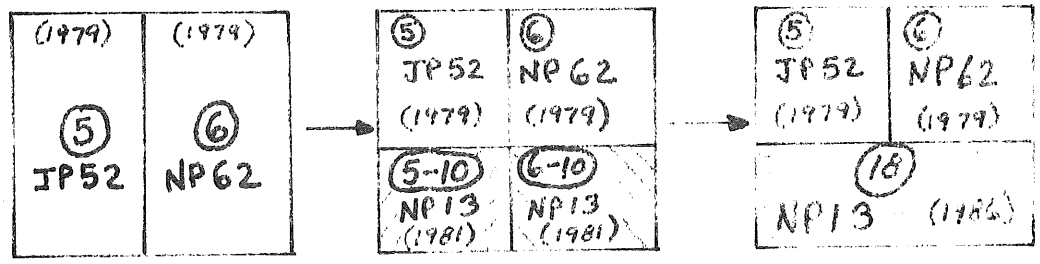


PROCEDURES: (cont.)

****
Case # 5 : Combining Cover Types
****

This category of alterations should prove to be the least used. When similar cover types are adjacent and managed the same, it could prove expedient to combine the types. This category of alterations should be used cautiously though, as all previous data will eventually be lost from the computer. A sufficient time should be allowed to pass after management practices are administered in order to ensure that the types involved will indeed best be represented as one larger type.

An example :



The block diagram above depicts a 40 acre clearcut that resulted in two 20 acre partial alterations of the respective original cover types. These two partial alterations were both planted to norway pine as one plantation.

After five years of careful survival and stocking checks, the entire plantation is determined to be a complete success. At that point, the field forester decides to combine the two partial alterations into one larger cover type. (A wise move, if he is certain that the plantation is indeed successfully established.)

Combining the two alteration cover types is a simple process requiring one F-280/1.

The previous two partial alterations of the original cover types has already reduced those original cover type's acres and submitted the current data for them. So, unless some significant changes have occurred in those types, they will not be involved in the alteration.

All that remains then to combine the two partial alteration cover types, is to delete their respective data, and submit the current data for one new cover type.

(i) Use the "Cover Type Deletions" table to delete the two alteration cover type's data from the computer. Since these two cover types do have an alteration number, make certain that their respective alteration numbers are entered in the table. (The correct entries for this example are shown at right.)

COVER TYPE DELETIONS

SOURCE?	Type Code	ALT. #	Sec.	TWP	RGE
ET	05	10	03	065	20
	06	10	03	065	20

(ii) The rest of this same sheet (F-280/1) will be used to enter the current data available for the one type that has resulted from the combination of the partial

	Main Cover			Understory			Acres	Year	

PROCEDURES: (cont.)

alteration cover types. Follow the instructions in the Phase II Inventory Manual and complete the three cards of this F-280/1 using the current data.

Note: The new "type sequence number" will be the next number available in the original numbering sequence in the section. (In this example, the last type sequence number used in that section was " 17 ", therefore this new cover type will be asigned the next number available - " 18 ".)

Note: This new cover type resulting from a combination of previous cover types, will not receive an "alteration number". Enter "zeroes" in columns 4 and 5.

Note: The "acres" of the new cover type will be the sum of the previous cover types' "acres" which have been combined. Make certain that this is the case, it is important that "acres" always balance after alterations. (In this example, 20 + 20 = 40, enter "040".)

Note: In some cases cards 2 and 3 may not be used, always double check to make certain you have entered the correct code in column 80 of card 1 ("# of cards") for this sheet (F-280/1).

(iii) Follow the normal alteration procedures for updating the township map, submitting the matex and F-280/1, and updating the township printout.

****

Example: Case 5

NA-01956-01
F-280/1 (exper.)
Rev. 2-81

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

COVER TYPE EXAMINATION DATA SHEET

Cover Type Deletions

Type Seq #	Alt. #	Sec.	Twp.	Rge.
05	10	03	065	20 9
06	10	03	065	20 9
				9

Cover Type Data

Card #	Type Seq. #	Alt. #	Sec.	Twp.	Rg.	E/W	Co. #	R.A.D. #	S.F.	Other Mngmt. Unit	Comp. %	Acq.	Adm.	Main Cover Type	Main Cover Size	Main Cover Den.	Understory Type	Understory Size	Understory Den.	Acres	Year	Topo.
1	18	60	03	065	20	9	69	241	27			11		52	1	3				(ETC.)		

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Thr. Status	Main Specie in Type: Spec.	DBH	HT.	V/Ac	Damg.	Aff.	Mort.	Shrubs: Spec. Comp.	Distr.	Den.	Browse	Grnd. Cover	Recon. Level	Stand Origin	Dist. to Road	Sgn. Cond.	# of Cards

STAND COMPOSITION - Trees 5" D.B.H. & Larger

Card #	Record I.D.	Second Specie: Spec.	DBH	Dst.	V/Ac	Damg.	Har
2	Same as Card # 1						

Third Specie: Spec.	DBH	Dst.	V/Ac	Damg.	Har	Fourth Specie: Spec.	DBH	Dst.	V/Ac	Damg.	Har	Fifth Specie: Spec.	DBH	Dst.	V/Ac	Damg.	Har

STAND COMPOSITION - Trees less than 4.9" D.B.H.

Card #	Record I.D.	Specie Data: Spec.	Sz	Den	Dst.	Damg.
3	Same as Card # 1					

Specie Data: Spec.	Sz	Den	Dst.	Damg.	Specie Data: Spec.	Sz	Den	Dst.	Damg.	Specie Data: Spec.	Sz	Den	Dst.	Damg.	Remarks

Cruiser _____ Date _____ Project Leader Edit _____

Tallyman _____ Forester Edit _____

D. "CORRECTING" INITIAL PHASE II INVENTORY

The "Alterations" discussed thus far in the procedures, become necessary because of some management practice (harvesting, etc.) or some natural occurrence (fire).

"Corrections" become necessary due to some human error in the initial Phase II Inventory. The vast majority of these errors are taken care of through the editing process - by inventory project leaders, coordinated editing by the field forester, and check cruising by the project leader to ensure quality control. These measures are taken before the data is introduced into the computer system via Grand Rapids. Inevitably though, it seems, some errors do manage to enter the system.

As time passes, the field forester discovers these discrepancies between what the inventory says is out there and what he actually finds. Correcting these computer based errors and map based problems is handled through the Alterations Program and is a very important aspect of the program.

Typical corrections might include:
- volume data
- cover type classification
- cover type boundaries
- site productivity data
- stand composition
- insect/disease information
- administrative data (ownership, timber status, etc.).

The most common error encountered thus far has been cover type boundaries. If this is the only error, corrections are fairly simple.

After correcting <u>your</u> township map, submit a matex showing the new boundaries (through the normal chain of submission).

Boundary lines are important as they affect the "acres" in that cover type, and thus, allowable cut calculations.

The "new" acres will be calculated in Grand Rapids and the computer and map based information updated. The matex will be returned to you noting the current acres so you can correct your records. Any subsequent maps or printouts will reflect the current acres and boundary lines.

To correct certain other errors will require somewhat more work by the field forester.

When a forester discovers errors in cover type classification; significant errors in volume figures; basal area/acre; site productivity; etc.; <u>new data must be collected</u> and submitted by the <u>field forester</u>.

Phase II procedures must be followed if this new data is to be meaningful within the system.

For instance: a field forester discovers, through inspection, that the initial Phase II inventory calls a cover type a "white spruce" type, when it is actually a "balsam fir" type. All data must now be corrected.

On the front of the F-280/1 that is submitted, delete the original type's data using the Cover Type Deletions table. The updated cover type will use the same type sequence number and other identification codes. Corrections will not receive an alteration number. All other data will reflect the new information collected and recorded on the back of this same F-280/1.

Some errors are simple to handle and would only require a letter to the forest inventory alterations specialist explaining the problem.

Some examples might include: a section or township that all cover types received the wrong codes for admin., acq. sta., timber status, etc. The correction could be handled in Grand Rapids and subsequent printouts would show the correct codes.

Another situation that arises is land ownership changes due to land sales, land exchange, etc. Again a letter explaining the change will suffice, and these acres will be corrected on any subsequent maps and printouts.

In all cases, the field forester will be kept informed of what and when corrections are processed and into the system. After notification, all future maps and printouts will be current as of that date.

APPENDIX

PHASE II INVENTORY COUNTDOWN PLANNING GUIDE

Countdown Week	Action Taken
12	1. Notify the Inventory Unit of the intent to conduct an inventory project after Region approval.
	2. Begin solving the following problems: a. funding b. project location by township c. operations schedule (priority listing by township) d. housing (tremendous impact on crew moral which affects quantity and quality) e. equipment - hand tools, vehicles, off road units f. compartment needs (place on A-22 maps) g. timber mngt. considerations h. wildlife mngt. considerations i. special interest data needs k. crew assignments
	3. Prepare A-22, Land Ownership/Acquisition Status Maps (inventory will provide "how to" instructions) (special compartments should be designated)
	4. Locate available photos (Area copies are preferrable)
11	Continue with 1 through 4 above
10	Continue with 1 through 4 above
9	Continue with 1 through 4 above
8	Conduct an organizational meeting with inventory personnel to discuss items 1 through 4.
	Submit the following to inventory
	a. A-22 maps (entire projects)
	b. Aerial photos (top 5 priority townships)
	c. Training plans if needed (time and place)
7	Inventory will:
	a. Begin checking A-22, Land Ownership/ Acquisition Status Maps
6	Inventory will:
	a. Begin corner placement on aerial photos

b. Select project leader

5 Inventory will:

a. Continue photo corner placement

b. Begin project leader training

4 Inventory will:

a. Continue photo corner placement

b. Project leader training

3 Inventory will:

a. Project leader training

b. Review project plans and organization

2 Inventory will:

a. Project leader training

1 Inventory will:

a. Conduct necessary field crew training

0 Begin field work

A-22
Rev. 11/73

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

TOWNSHIP PLAT

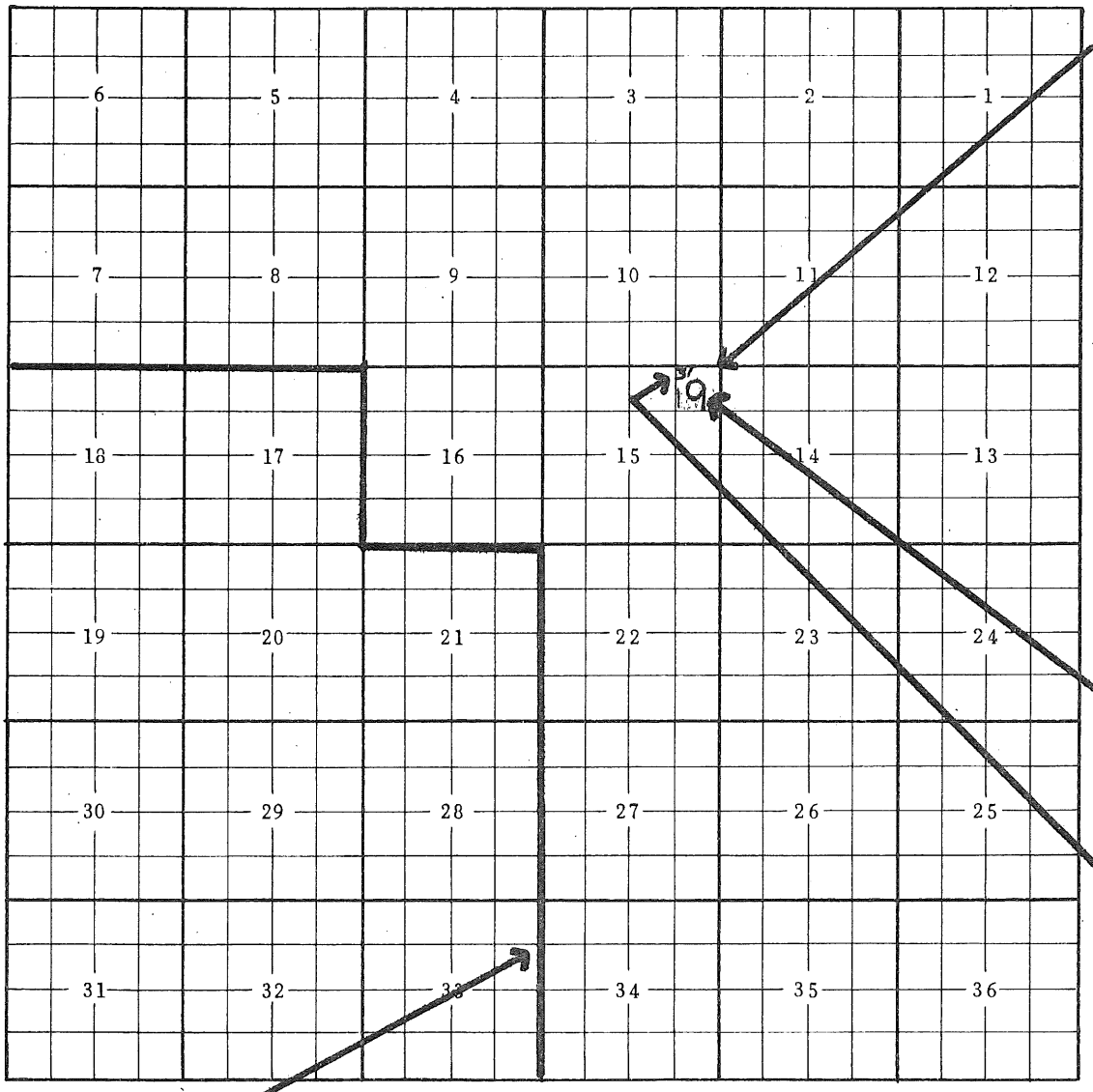
TOWN 184

RANGE 42

COUNTY Brokl

State Lot # 314

WI # _____



Use colored pencils to distinguish land ownerships:

Red is State land,
Green is County land,
Brown is Parks and Rec. land,
Blue is Fish and Wildlife land,
Yellow is Law Enforcement, Water, or Minerals land.

Large numbers indicate Acquisition Status See Page 7.3 of Inv. Manual

Small numbers indicate lots and represents the # of acres, rounded off.

Remarks: (Use colored markers to identify which border corresponds to which forest):

Border Johnson State Forest

TYPE MAPPING SYMBOLS

Improved Road: (gravel, asphalt, etc.) ————————

Unimproved Road: (dirt, cart, snowmobile trail, etc.) — — — — —

Railroad: ++++++++

Drainage Ditch: ——— ——— ———

Utility Line: (other than within road R/W) ——— • ——— • ———

Pipeline: ——— o ——— o ———

River or Stream: • • • ——— • • • ——— • • ——— (intermittent flow)
(not ditch) → → → → → → → (year round flow with direction of flow indicated by arrows)

-water boundaries of a river should also be delineated if of significant width:

AERIAL PHOTO CORNER RECORD SYMBOLS

To be recorded on the reverse side of aerial photography

Land corner, recovered: (over pin-prick on back side of photo)

BT: Bearing tree

IP: Iron pipe

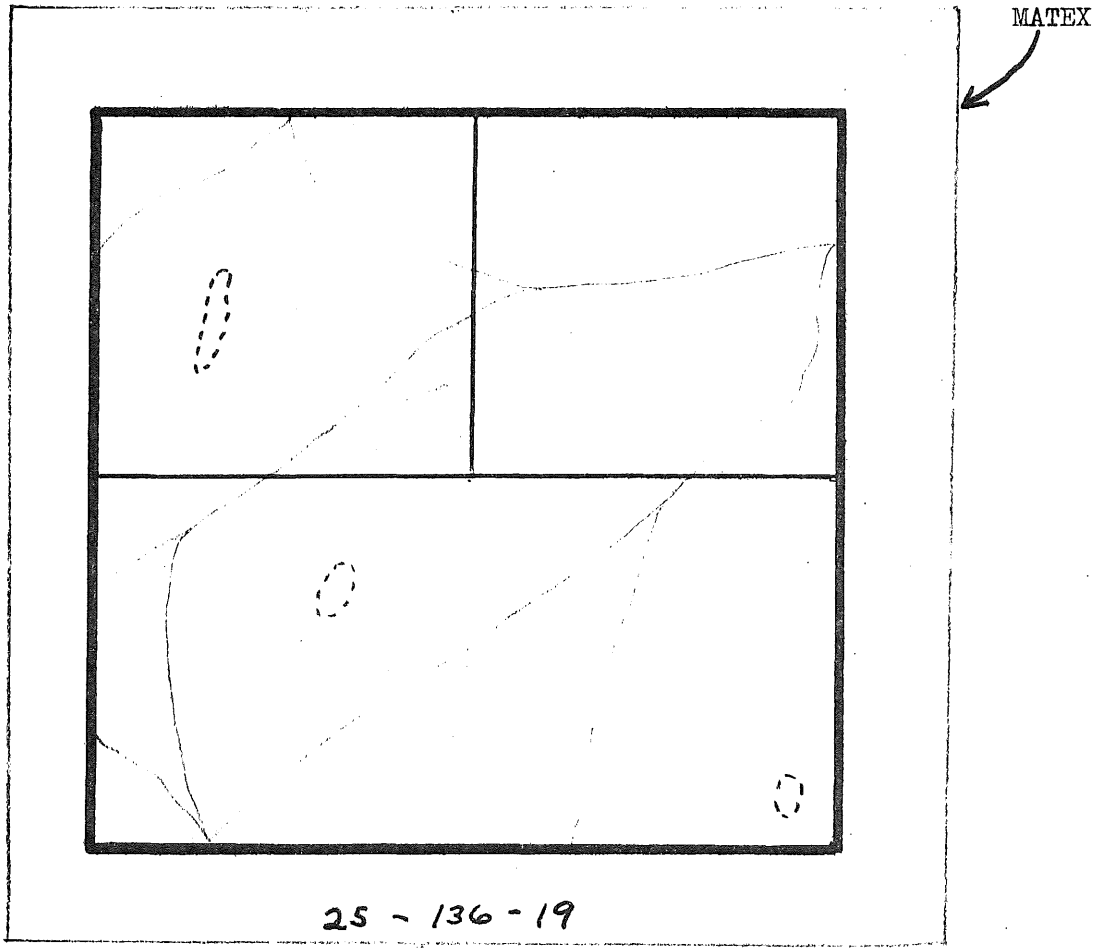
MON: Permanent monument, stone or concrete

WM: Witness mark, capped pipe, stake or other marker indicating direction (azimuth) and distance to corner

SP: Scribed post

YT: Yellow tag marker

FIGURE 1: Initial type map as delivered to the field inventory forester.



SCALE: 4 inches = 1 mile

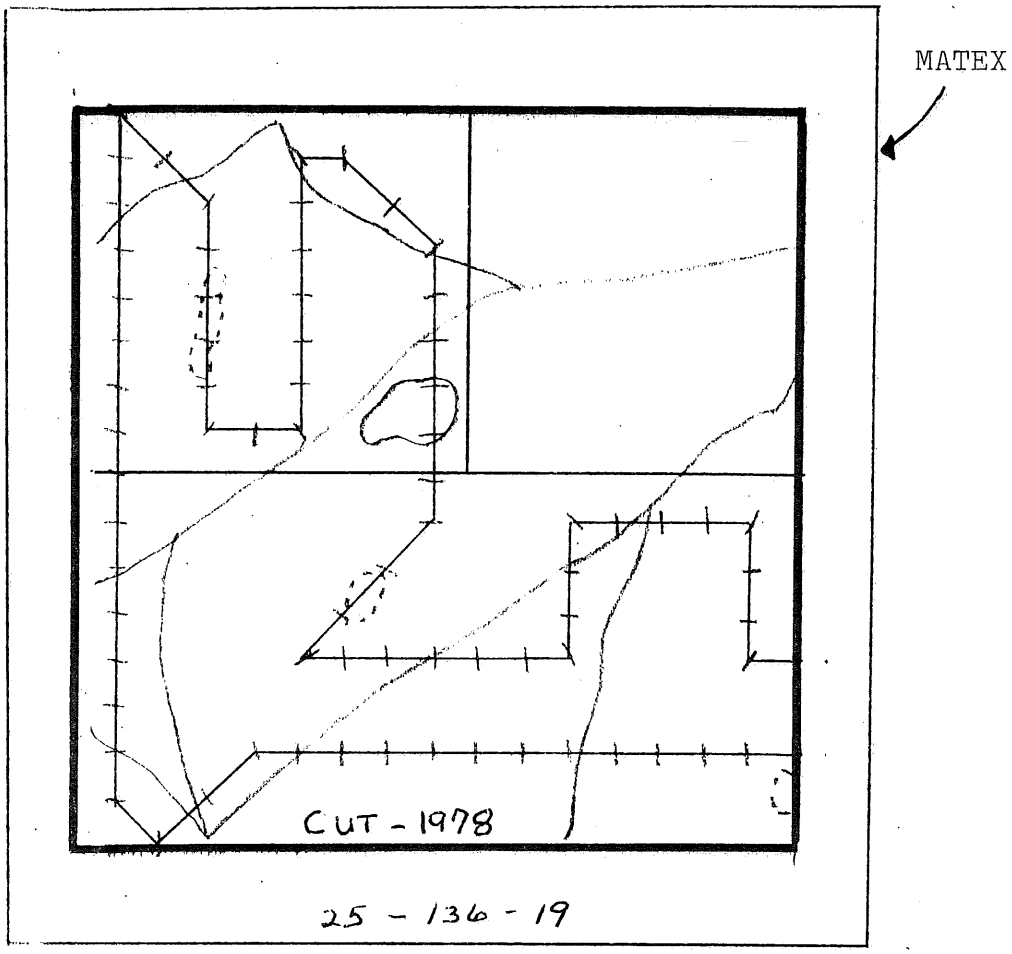
NE Quarter - Private **NW Quarter - County** **S Half - State**

A. Forest types delineated

B. Inclusions delineated using dotted lines

C. Recent type changes noted: example - cut area shown

FIGURE 2 Same map before field work begins



SCALE: 4 inches = 1 mile

NE Quarter - Private NW Quarter - County S Half - State

A. Course lines drawn in with tallies marked.

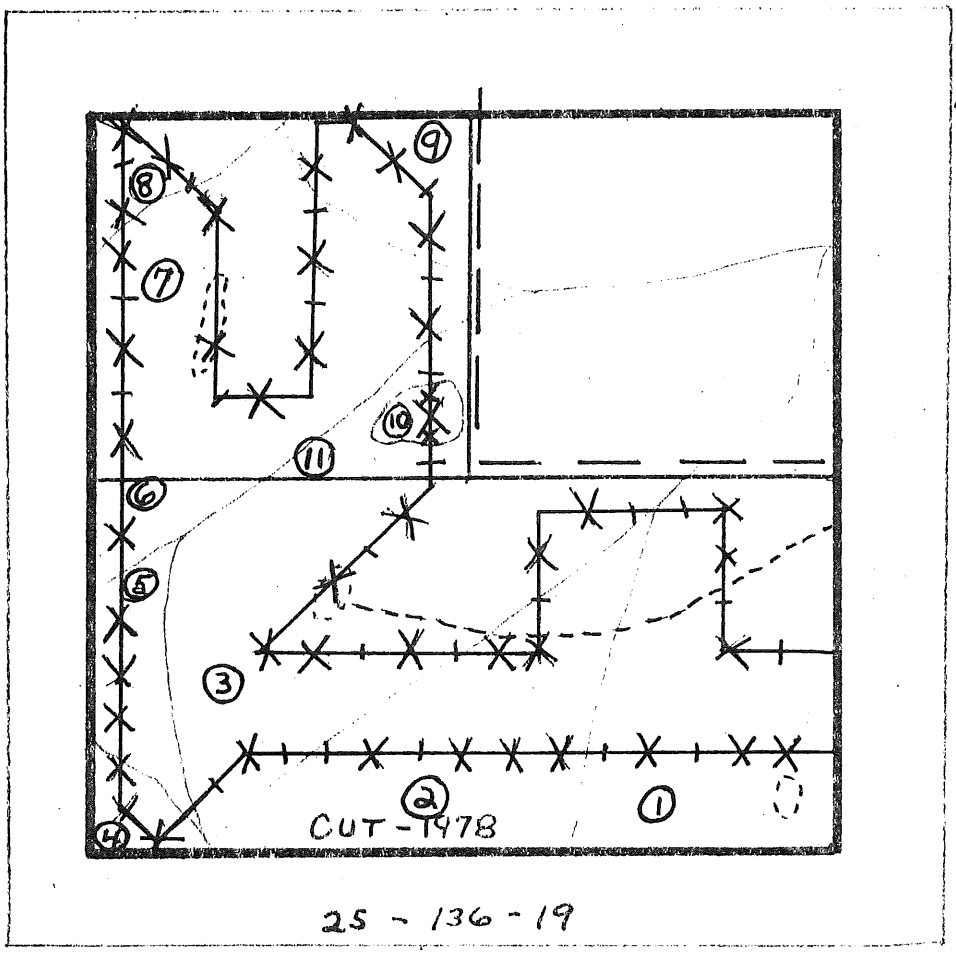
B. All types to be adequately surveyed.

C. Use cardinal directions - N, NE, E, SE, S, SW, W, NW.

D. Survey state and county ownership pnly - Do Not field survey private land.

E. A photo grid will be placed under the matex to assist with course determination.

FIGURE 3 Same map following completion of field inventory work.



SCALE: 4 inches = 1 mile

NE Quarter - Private NW Quarter - County S Half - State

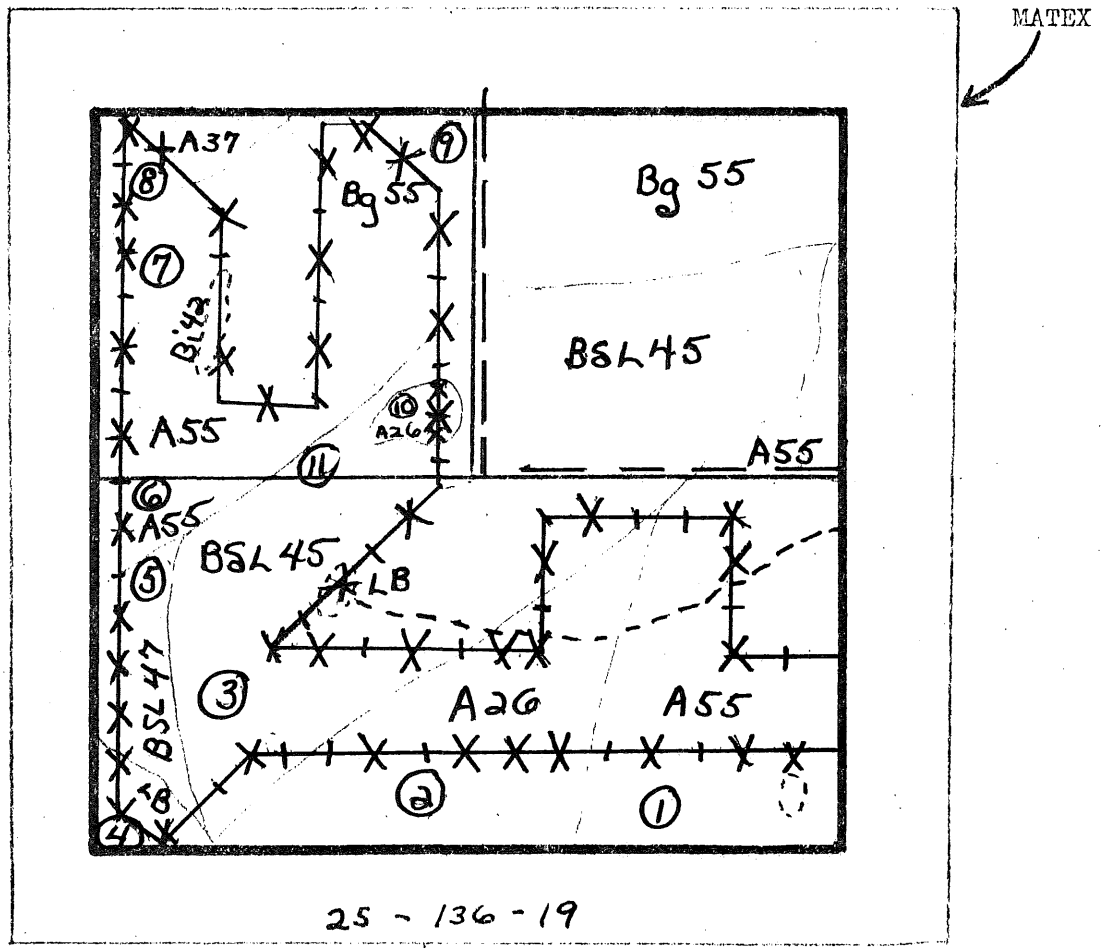
A. Plots marked with yellow "X"'s on the matex.

B. Type sequence numbers assigned in the field.

C. Add roads, trails, ditches, etc. while in the field.

D. Be sure to meet minimum plot number requirements.

FIGURE 4 Same map following completion of field forester office work (completed field matex)



SCALE: 4 inches = 1 mile

NE Quarter - Private NW Quarter - County S Half - State

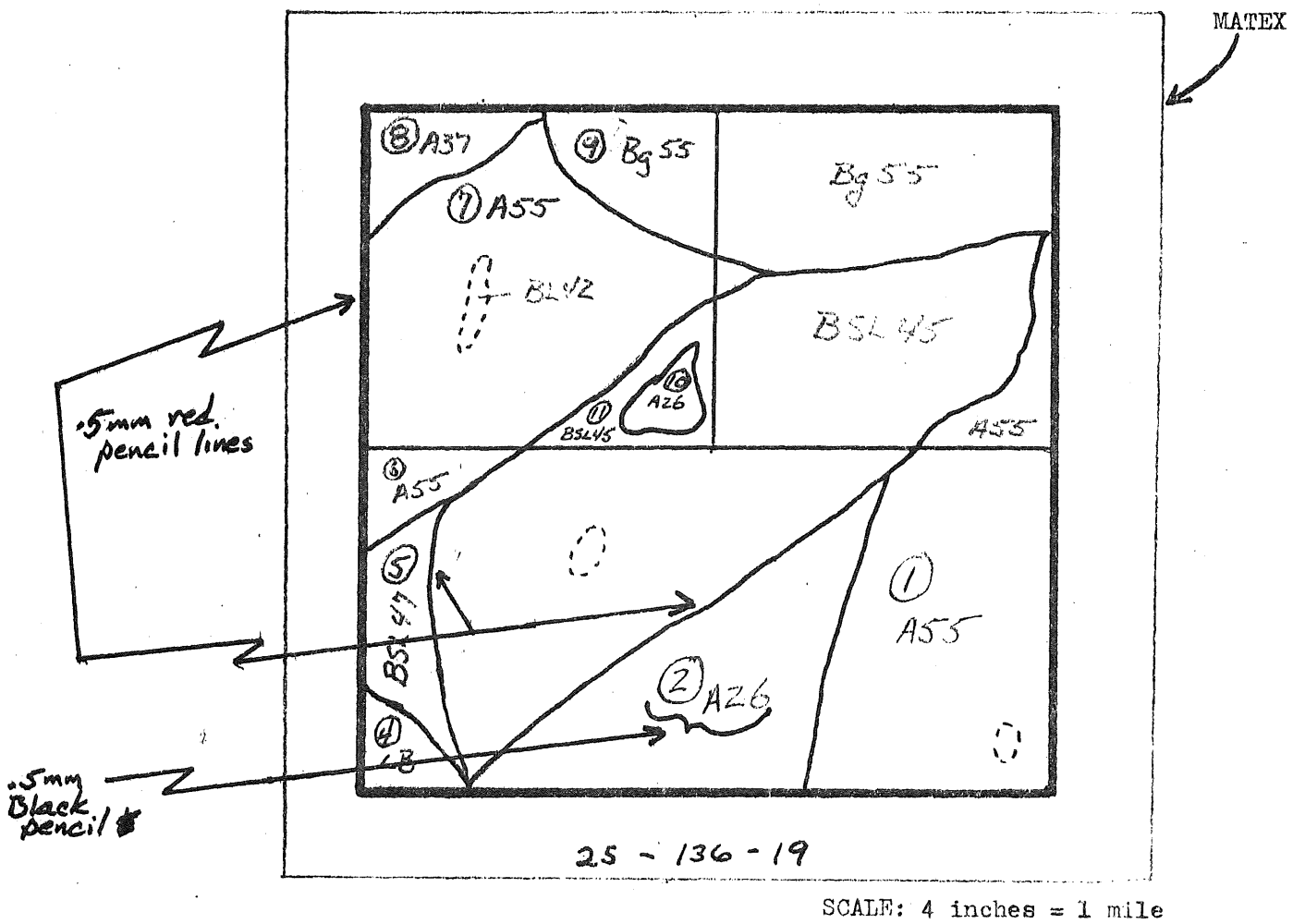
A. Hand in the completed matex with the completed field data sheets.

A. Species, size, and density codes added to matex following office computations.

B. Private land is coded using type comparisons or photo interpretation.

C. Hand in the completed matex with the completed field data sheets following crew edits.

FIGURE 5 Final matex as submitted to Grand Rapids - compatable with computer graphics system.



SCALE: 4 inches = 1 mile

NE Quarter - Private NW Quarter - County S Half - State

Note: In types 10 and 11, if a type(s) is completely surrounded by another type, the "island(s)" must have sequence number 1 less than the type surrounding it.

Grand Rapids Mapping - Copy of Type Map

Due to the use of an automatic digitizer for encodement of type maps into a form which a computer can understand and manipulate, the section maps must be subject to some rather strict control.

General

In order to keep the amount of area error due to line width to a minimum, the pencil used to record type and section boundaries shall be a 0.5 mm red lead automatic drafting pencil. Linear symbol such as trails, streams, pipelines, sequence numbers, type designations, etc., shall use the same type pencil as above but with regular black 0.5mm lead. For lead, use only that which you receive from the Inventory Unit. Use no other, as some bleed and/or rub off.

Particulars

When a linear feature (utility line, pipeline, ditch, etc.) crosses a type, make sure that the features of the symbol does not bisect type boundaries; e.g:

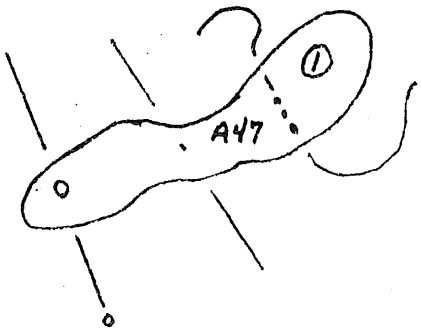


Fig. 1

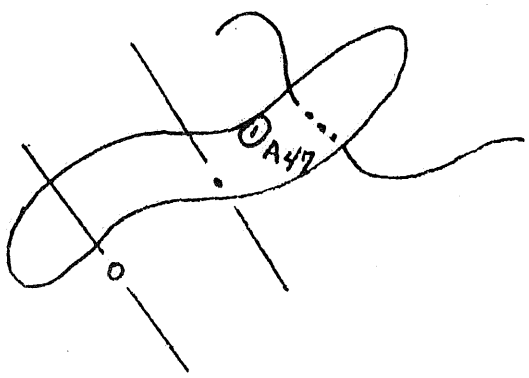


Fig. 2

In the case of Figure 1, the type boundaries are not bisected by linear map features. In Figure 2 they are. Figure 2 would cause the need for redraft of map in order for the automatic digitizer (AD) to read it.

When labeling a type, keep alpha-numeric characters (type identifiers) at least two line widths from type boundary (see Figures 1 and 2). This too is for the sake of the AD.

Note: if type is too small for above, do this:

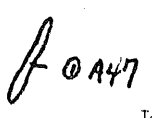


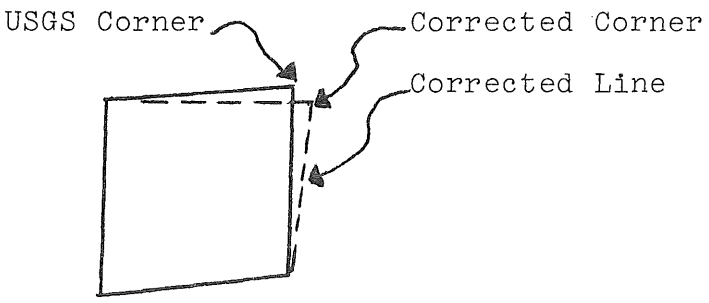
Fig. 1a

PROCEDURE FOR CHANGING CORNER LOCATION ON MAPPING

The corners that were located on the photography by the Forest Inventory Field Office in Grand Rapids are consistent with the U.S. Geological Survey Quadrangle Series mapping. Often these corners are approximations were corner evidence and/or monuments have since been obliterated, re-established by survey, common agreement or settled by court action.

For the purpose of Forest Inventory Program mapping, corner location should be from the best, most responsible information available to best estimate public forest resource volumes and avoid conflicts with adjacent land-owners. Therefore to plot the new (corrected) location when different from that established from USGS mapping, it is necessary to follow the following procedure:

1. All corner relocations are to be on the authority of the District and/or Area Forester.
2. All new (corrected) corner locations will be visited with the district forester, if possible, and corner evidence recorded on the reverse side of the aerial photo including distance and azimuth <u>from</u> any bearing trees, yellow tags or any other witness marks. (See Aerial Photo Corner Record Symbols).
3. <u>Using a stereoscope</u>, pin-prick the location of the corrected corner on the aerial photo, in the field.
4. Indicate the corrected section lines on the matex-acetate by dashed lines and type the section to the new dashed line. <u>Do not remove</u> the solid line as established using USGS quadrangle mapping. It is needed to accurately plot the corrected corner location on the base map for the township. (See example below).
5. <u>Using a stereoscope</u>, stereo-transfer the corrected corner location to adjacent photos. Usually four photos are affected.
6. Insure that other inventory crews working in adjacent sections are notified of the corner locations change and record by circling the affected corner in red on the township ownership plat map returned to the Grand Rapids Office.



EDIT PROCEDURE

1. Check if there are matex's for all ownership shown on the A-22.

2. Check matex for uniform type lines and for a separate type sequence number for each type.

3. Check for a field sheet corresponding to each type number on the matex.

4. Check legal description to make sure they are compatable with A-22 and matex.

5. Check remaining codes on Card I for contradicting codes.

6. Check Card II for consistancy with Card I. Make sure volume and size codes agree.

7. Check Card III for consistancy with Card I.

It is frequently necessary to use the back of the field sheet in order to resolve contradicting codes on the front. After you are satisfied with all the coding sign off on the space provided you at the bottom of the sheet.

Check Cruise Procedure

In order to assure that the highest standards are maintained throughout the inventory it will be necessary to conduct a certain number of check cruises.

These check cruises will be done on a crew basis. Each crew will be check cruised once per month.

The check cruiser will randomly select types to be checked. A minimum of the same number of plots as the orginal crew will be taken. Where more than one answer is acceptable no points will be deducted. When completed, the check cruise will be reviewed with the crew.

The results of this check cruise will be delivered to the Field Operations Specialist in Grand Rapids monthly.

DNR FOREST INVENTORY CHECK CRUISE
FOR MERCHANTABLE COVER TYPES

County_____ Range_____ Type Number_____ Crew C _____ Chck. Cr._____
Township_____ Section_____ Type Acres_____ T _____ Date_____

Table A[1]: Main Cover Classification

	Wt	Orig	C/C	Loss
Main Cover Type[5]				
Main Cover Size	5			
Main Cover Density[3]	1			
Understory Type	2			
Understory Size	2			
Understory Density	2			
Topography	1			
Physiographic Class	3			
Condition Class	5			
Stand Origin	2			
Significant Cond.	1			
Point Loss				

Table B[1]: Main Cover Measurements

	Wt	Orig	C/C	Loss	Acceptable Accuracy
Site Index	10				±5 or 10%
Stand Age	5				±5 yr or 10%
Basal Area	5				±5 or 15%
Cords Per Acre	10[4]				±2 cds or 15%
Stems Per Acre					±200 or 15%
MBF per Acre					±1 MBF or 15%
Point Loss					

Table C[1]: Main Species Data

	Wt	Orig	C/C	Loss	Acceptable Accuracy
Specie	2				N/A
DBH	2				±1 or 15%
Height	2				±5 or 10%
Volume/Acre	3				±2cds or 20%
Damage	5				N/A
% Affected	1				N/A
% Mortality	1				N/A
Point Loss					

Table D[1]: Shrubs

	Wt	Orig	C/C	Loss
Specie Composition	2			
Distribution	1			
Density	1			
Browse	1			
Ground Cover	2			
Point Loss				

Table E[1]: Stand Composition
Card 2[2]

Specie 1

	Orig	C/C	Loss	Acceptable Accuracy
Diameter				±1" or 15%
Distribution				N/A
Volume/Acre				±2 cds or 20%
Damage				N/A
Harvest				N/A
Point Loss				

Specie 2

	Orig	C/C	Loss	Acceptable Accuracy
Diameter				
Distribution				SAME
Volume/Acre				
Damage				
Harvest				
Point Loss				

Specie 3

	Orig	C/C	Loss	Acceptable Accuracy
Diameter				
Distribution				SAME
Volume/Acre				
Damage				
Harvest				
Point Loss				

Specie 4

	Orig	C/C	Loss	Acceptable Accuracy
Diameter				
Distribution				SAME
Volume/Acre				
Damage				
Harvest				
Point Loss				

Specie 5

	Orig	C/C	Loss	Acceptable Accuracy
Diameter				
Distribution				SAME
Volume/Acre				
Damage				
Harvest				
Point Loss				

Specie 6

	Orig	C/C	Loss	Acceptable Accuracy
Diameter				
Distribution				SAME
Volume/Acre				
Damage				
Harvest				
Point Loss				

Card 3[6]

Specie 1

	Orig	C/C	Loss
Size			
Density			
Distribution			
Damage			
Point Loss			

Specie 2

	Orig	C/C	Loss
Size			
Density			
Distribution			
Damage			
Point Loss			

Specie 3

	Orig	C/C	Loss
Size			
Density			
Distribution			
Damage			
Point Loss			

Specie 4

	Orig	C/C	Loss
Size			
Density			
Distribution			
Damage			
Point Loss			

Table F: Type Execution

	Wt	Loss
Type Lines	.5	
Legal Description	.5	
Remarks	.5	
Editing	.5	
Sheet Neatness	.5	
Matex Neatness	.5	
Point Loss		

		Point Loss
Table A:	Main Cover Classification	
Table B:	Main Cover Measurements	
Table C:	Main Species Data	
Table D:	Shrubs	
Table E:	Stand Composition	
Table F:	Type Execution	
	Total	

Score _____
100 - point loss (70 passing)

[1]Check Cruiser should give benefit of the doubt to the crew when more than one answer is acceptable.

[2]Computation of point loss in Table E for Card 2 should be distributed amongst the number of species recorded. Weight is 2 pts for diameter, 2 pts for distrib., 4 pts for volume, 2 pts for damage, 2 pts for harvest.

[3]Main cover density code is to be checked against the crews volume.

[4]Points will be divided according to percentage of check cruisers volume in each catagory, i.e., if check cruiser has 10% of total volume in MBF, one point will be assigned to MBF volumes. A merchantable cover type varying in combined merchantable volume of 10 cords or 20% from check cruise data results in automatic failure.

[5]An inaccurate Main Cover type constitutes automatic failure.

[6]Computation of point loss in Table E for Card 3 should be distributed amongst the number of species recorded. Weight is 2 pts for size, 2 pts for density, 2 pts for distribution, 2 pts for damage.

Comments:

SAFETY

Personnel working on the field phases of the forest survey are subject to many hazards. Each person should always be conscious of these hazards and do their best to avoid accidents.

DON'T TAKE CHANCES! Eliminate horseplay and carelessness.

THINK SAFETY!

1. SAFETY IN THE WOODS:

   a. Walk, don't run in the woods. Check the terrain ahead for hazards at all times.

   b. Wear proper clothing. Remove cuffs from trousers, wear long sleeve shirts. Wear proper foot gear for the conditions being worked in. Hard hats should be worn. During hunting season wear blaze orange vests or jackets.

   c. Keep a sufficient distance behind the person ahead of you to avoid being slapped by branches.

   d. Be watchful of twigs and branches which may cause eye injuries. A forest type such as white cedar which retains the dead twigs and branches for many years is especially dangerous. Safety glasses should be worn.

   e. Keep someone posted as to where you plan to work each day, so that if you haven't returned in a reasonable length of time someone can find you. (Important if you are injured)

   f. Do not travel at night. If you have not made it out of the woods before total darkness or if you become lost, settle down some place and wait for daylight. Stumbling around in the dark is dangerous.

   g. Be wary of animals that behave in an unusual manner. It is not normal for a skunk or fox to attack a person unless the animal has rabies or some other ailment. Watch for bee nests or hives as they are often located near the ground or in the moss and duff.

   h. Keep a small individual first aid kit on your person, know how to use it and treat all wounds promptly.

   i. See that a completely supplied large first aid kit is in each vehicle you use.

   j. For the sake of safety, field crews will consist of two people.

REMEMBER! DO NOT TAKE CHANCES! And you may live to be a healthy, old Forester.

Key for Main Cover Type Determination

Does a cover type (pg. 8) have at least 40% or more of the volume (use stems per acre if less than 5")?

YES
That will be the cover type (If two types have 40% or more, choose the one with the greatest volume).

NO
Which group has more volume Conifers or Hardwoods?

CONIFERS

Which group has the greatest volume

Upland Conifers
Choose the following type with the greatest volume.

White Spruce	61
Balsam Fir	62
Black Spruce (upland)	74
Red Cedar	81

Pines
Choose the following type with the greatest volume.

White Pine	51
Norway Pine	52
Jack Pine	53
Scotch Pine	54

Lowland Conifers
Choose the following type with the greatest volume.

Black Spruce (lowland)	71
Tamarack	72
White Cedar	73

HARDWOODS

Which group has the greatest volume

Upland Hardwoods
Choose the following type with the greatest volume.

Northern Hdwd	20
Walnut	25
Oak	30
Central Hdwd	40

Aspen/Birch
Choose the following type with the greatest volume.

Aspen	12
Birch	13
Balm	14
Cottonwood	15

Bottomland Hdwd
Choose the following type with the greatest volume.

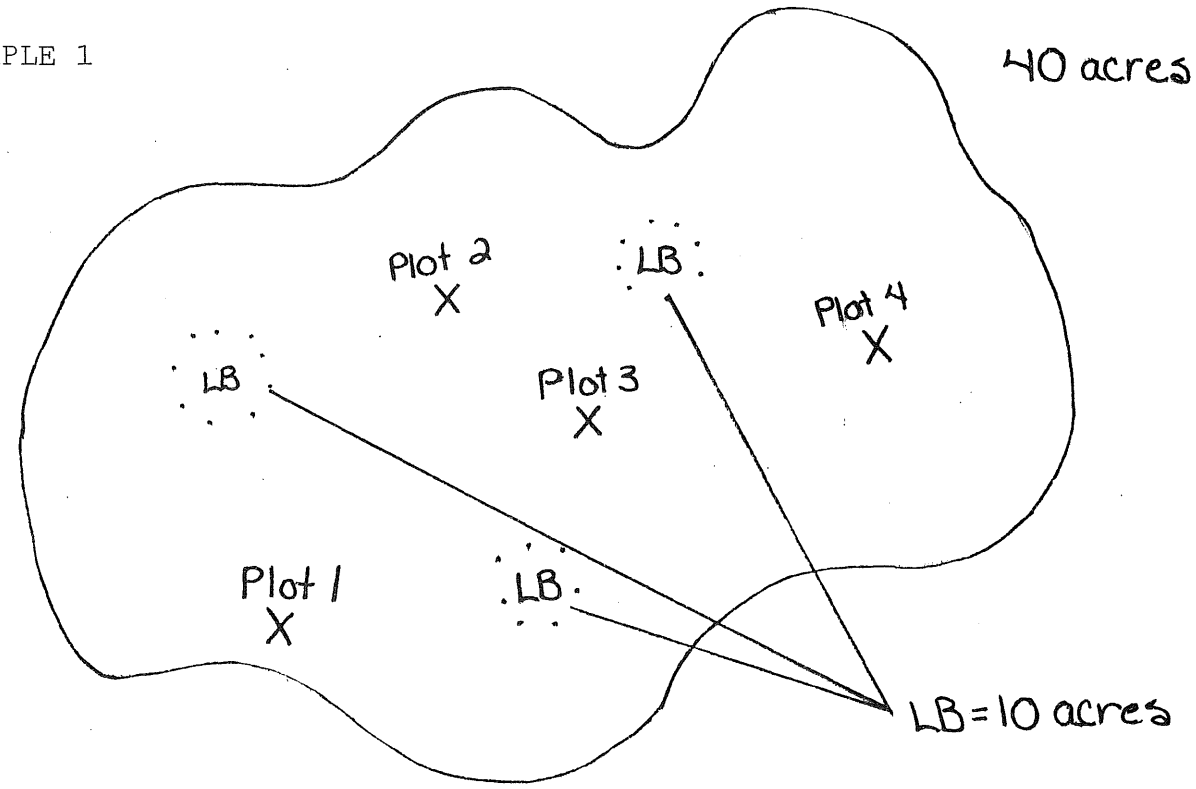
Ash	01
Willow	06
Lowland Hdwd	09

Some of the types may switch between groups depending on the Physiographic Class.

Adjustments for Inclusions

1. B.A./Acre. Basal Area is not to be reduced in the same manner as we do volume, but should be representative of the forested areas.

EXAMPLE 1

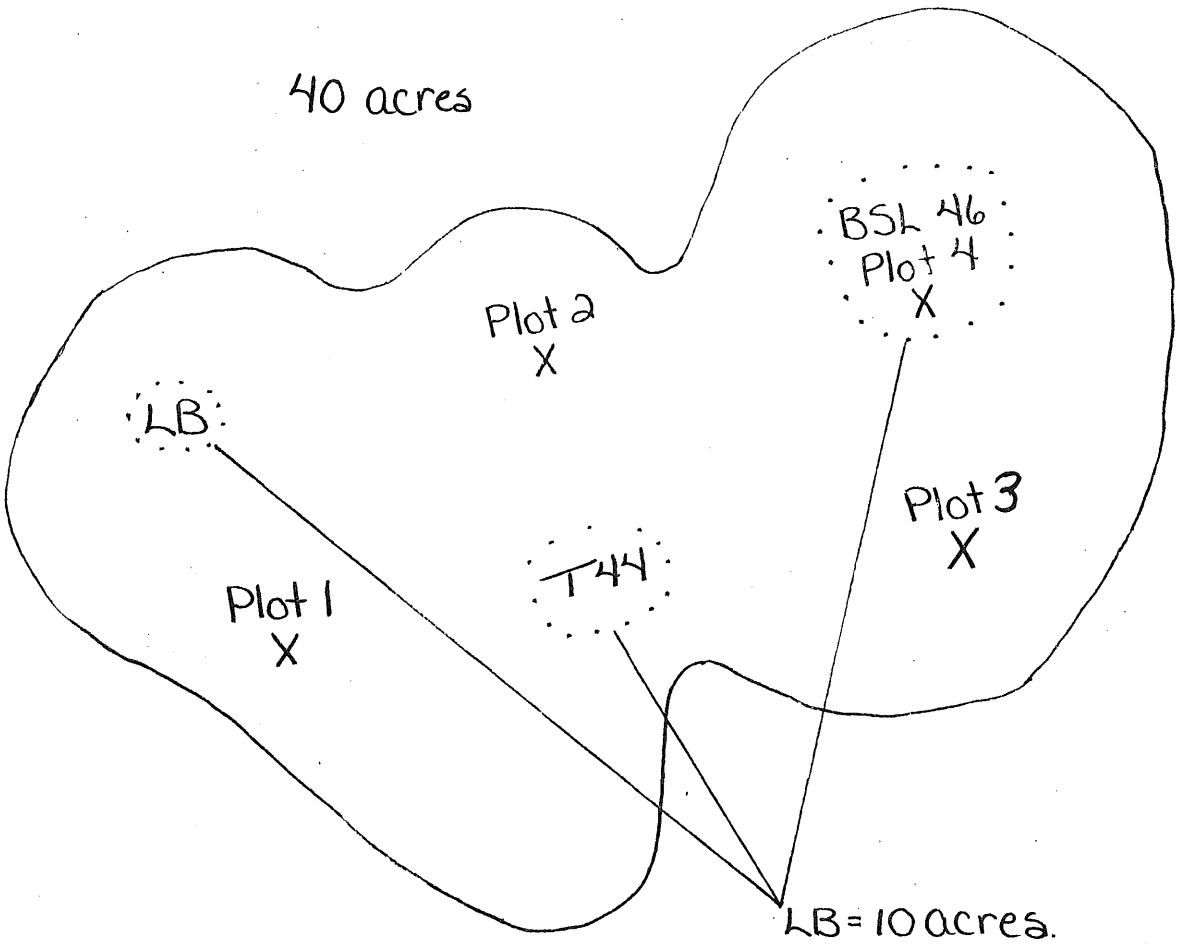


Volume shows 80 cords divided by 4 plots = 20 cords/acre. This should be reduced to 15 cords/arce in order to obtain an average cords/acre for the type.

B.A. shows 40 trees divided by 4 plots = 10 x 10 = 100 B.A./acre. This should not be reduced to give an average B.A./acre for the type.

Adjustments for Inclusions

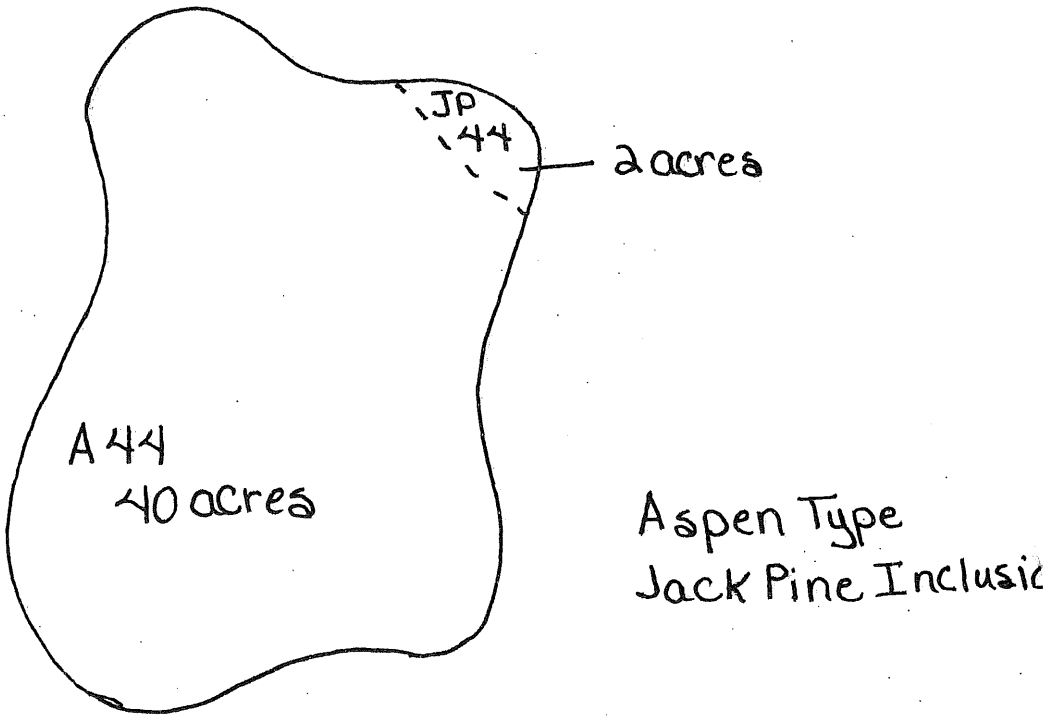
EXAMPLE 2



Volume shows 60 cords divided by 4 plots = 15 cords/acre. This volume should not be reduced because our plots gave a representative sample.

B.A. shows 30 trees divided by 3 plots = 100 B.A./acre. Use just the plots in the main cover type so as to give a true indication of B.A./acre in the forested areas.

Volume Adjustments for Inclusions



v/ac = Total volume divided by total acres

40 cords JP/2 plots = 20 cds/acre of JP for Inclusion

20 cords/acres X 2 acres = 40 cords JP Total

40 cords/ 40 acres = 1 cord JP/acre for type located in a single cluster

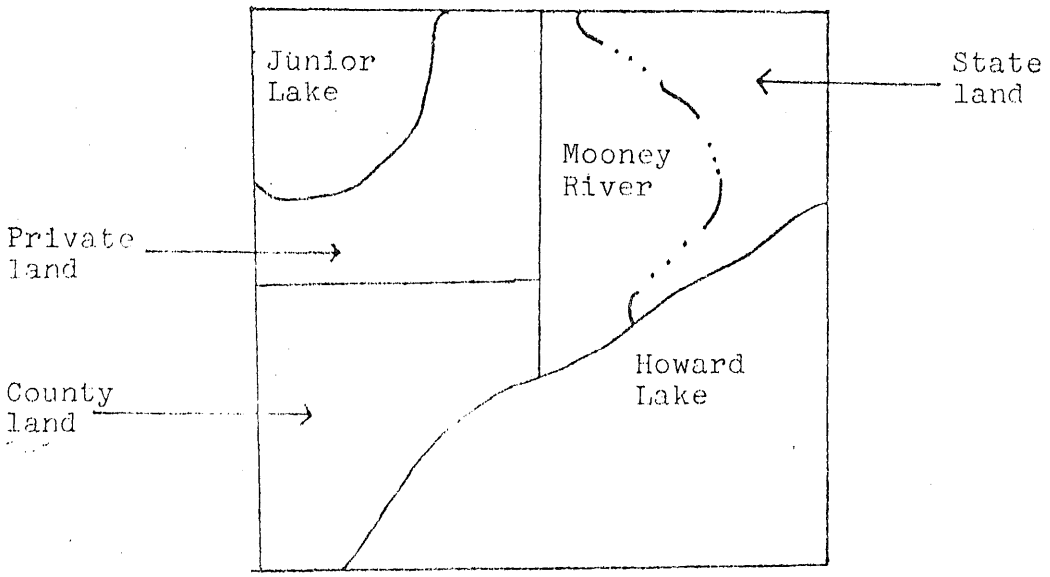
1. Fill out columns 1 thru 26 using type sequence #99, (columns 2,3) use recreation code #93 in column 27 and 28.

2. Fill in column #56 using timber status 4.

3. Use card 3 to indicate the names of rivers and/or lakes with the restriction that applies to each.

4. Put a 3 in column 80.

EXAMPLE



13-148-22

Since Howard Lake is a recreational classified body of water we will use 50 feet. Mooney River is a natural river so we will use 100 feet. Check with the project leader or county office for the specific water classifications within the county your working. General 35 feet, recreational 50 feet, and natural 100 feet are the three classifications being used.

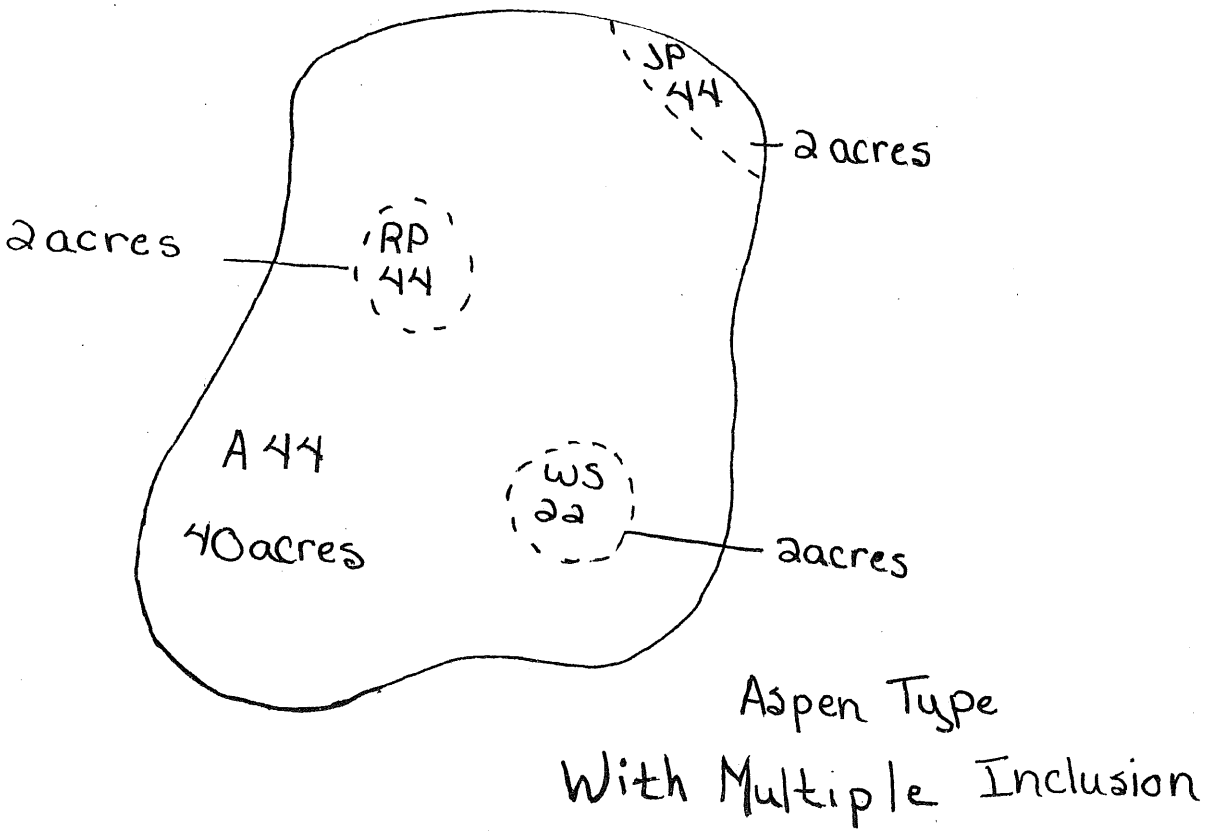
Fill out one type sheet #99 for all state land using timber status 4 and in remarks HOWARD LAKE 50, MOONEY RIVER 100.

Fill out one type sheet #99 for all county land using timber status 4 and in remarks HOWARD LAKE 50.

Using this system it will no longer be necessary to put separate type lines along lakes and rivers. No type sheet will be filled out for section containing unrestricted bodies of water.

Volume Reduction for Main Cover Type

Reduce volume on main cover type when it will be affected 10% or more.



6 acres of inclusion divided by 40 acres of type = 15%.

Reduce volumes of main cover type by 15%.

100 - 15 = 85%
Multiply main type volume by .85.

FOREST INSECT AND DISEASE SUPPLEMENT

FOREST INSECT AND DISEASE DATA

The following pages describe gross symptoms of the more important forest insects and diseases which you might encounter. In some cases only one symptom on a given host is necessary to identify a particular pest, when at other times a number of symptoms and/or a process of elimination will be needed. It may be necessary to contact a specialist in some cases. Page numbers refer to the reference booklet, "A Guide to Common Insects and Diseases of Forest Trees in the Northeastern United States". This booklet is now available at all crew stations and the Forestry library in Grand Rapids.

There are several general publications which will serve as a good general key to the more common insects and disease problems. Most of these have been sent out to Areas and Districts as they have become available and should be accessible to all personnel who will take the time to look them up.

1. "Eastern Forest Insects" or "Insect Enemies of Eastern Forests",

2. "A Guide to Common Insects and Diseases of Forest Trees in Northeastern United States",

3. "Diseases of Forest and Shade Trees of the United States",

4. "A Guide to Insect Injury at Conifers in the Lake States",

5. There are also a series of publications called "How To" identify a number of the more commonly found insects and diseases.

1. DEFOLIATORS

Almost all trees are hosts of one defoliator or another. Examples (other than those to be covered later) are the forest tent caterpillar, large aspen tortrix, aspen leaf tier, various hardwood leaf feeders, larch sawfly, introduced pine sawfly, pine tussock moth, and yellow-headed spruce sawfly. All are self evident during growing season. Defoliators are most important in conifers, especially due to rapid spread throughout the type resulting in loss of growth and mortality. Lesser defoliation reduces vigor in all species, making the trees more susceptible to attack by other secondary pests.

Identifiers: Self explanatory. Primary defoliators not covered elsewhere: forest tent caterpillar, page 4, large aspen tortrix, page 7, birch leafminer, page 22, pine tussock moth, page 62, pine sawflies, page 63, yellowheaded spruce sawfly, page 68, larch sawfly, page 68.

2. BARK BEETLES (Otherwise known as pine engraver beetle) Page 73.

Bark beetles become a problem only when their hosts are under some type of stress or where they are allowed to build up on slash left over from a thinning operation.

Identifiers:

1. Host trees (pines usually) yellowing.
2. Many small, (1 -. 2 millimeter) round beetle exit holes in bark. (These may be confined to upper portions of tree only, therefore not being immediately evident). Bark may slough off during later stages or after attack.
3. Fine wood powder in bark crevices, and on ground, coming out of beetle exit holes.

3. WOOD BORERS Pages 32-33 and Page 73)

Wood borers usually attack only trees which have declined in vigor for some other reason, or trees which are already dead. They are important because boring reduces the grade of lumber produced from infested logs, may lead to breakage of standing trees, and may allow introduction of rot and canker fungi. Many hosts: both conifer and hardwood. Symptoms include: borer holes, relatively large, (greater than 3 millimeters) either round or oval, large quantities of coarse wood fibers. Not to be confused with bark beetle emergence holes which are smaller, more numerous, (like shotgun discharge) with finer wood powder. Bark beetle galleries are only in bark or surface of wood. Wood borer galleries begin under the bark as wide paths, but then enter the actual heartwood.

Identifiers: All species.

1. Large holes in bole (at least ¼") that actually enter the heartwood. May be either oval or round.
2. May be large quantities of coarse fiberous frass.
3. Wood borer galleries not to be confused with those of bark beetles which leave smaller, more numerous holes with fine wood powder. Bark beetle galleries are in surface of wood only.

4. SPITTLEBUGS Pages 81 and 82

Spittlebugs, especially the saratoga spittlebug, are occasionally very damaging pests of red pine, and at times jack pine plantations. They can cause very severe growth loss as well as deformation and mortality. Symptoms include: bright reddish "flags", puncture marks, pitching, and flecking on wood and inner bark at feeding sites.

Identifiers: Red pine, jack pine.

1. Flagging-needle reddening and twig dieback.
2. Flecking and brown puncture marks in the outer wood of the two year old branch internodes under the thin branch bark.
3. Found in your (up to 15') plantations, especially where alternate hosts, primarily when sweet fern but including many other low growing plants (except for grasses, lichens, and sedges) are present.

May be confused with shoot blight, wilting from drought or shoot borer damage. If flecking is not found, check for black fruiting bodies on needle bases and split branch to check for larval borings in center of stem.

5. WHITE PINE WEEVIL · Page 79

A serious pest of white pine and other hosts, such as jack pine, scotch, and red pine. Other conifers are attacked rarely. Damage is due to larvae boring in terminal shoots, killing them, and causing growth of multiple leaders degrading products. Identify by presence of crooks and/or multiple leaders. Severity of problem is reduced where hosts are in the understory.

Identifiers: White pine, jack pine, scotch and red pine.

1. Multiple leaders or crooks in main stem.
2. Found mainly in more open grown plantations up to 20 feet in height.
3. Terminal of young pines (less than 20 feet) red, shriveled and characteristically crooked. Larval chambers under the bark of last year's new growth.

6. SPRUCE BUDWORM Page 61

A typical defoliator which is the most important pest of various species of fir in the United States and Canada. Has been responsible for the loss of billions of cords over very large acreages. Identified by extensive defoliation of fir, and white spruce in mixture with fir.

Identifiers:

1. Defoliated trees, thin crown foliage topkill, and/or dead trees.
2. Needles in top of crown or exposed areas are red and webbed together, often with cast larval and pupal skins.
3. Stunted growth of dominant and co-dominant trees as indicated by small or tightly packed growth rings.

7. JACK PINE BUDWORM Page 62

Similar to spruce budworm except for host difference. Important in stands on droughtly soils over 45 years of age.

Identifiers: Jack pine

1. Defoliated trees, thin crown foliage topkill and or dead trees.
2. Needles in top of crown or exposed areas are red and webbed together, often with cast larval and pupal skins.
3. Stunted growth of dominant and co-dominant trees as indicated by small or tightly packed growth rings.

8. SHOOT INSECTS (Regeneration) Page 77

Shoot insects attack the surface or internal portions of shoots and stems of conifers, causing malformation and/or breakage. Examples include: the eastern pineshoot borer, phyacionia tip moths, the white pine weevil (discussed elsewhere), the pine gall weevil, and others.

Identifiers: Red pine, jack and white pines.

1. Lateral and terminal shoot breakage.
2. Larval galleries with frass in shoot and emergence holes may be present.
3. Old injury occurs as deformed or crooked stems.

9. POPLAR BORER

This is the most serious wood borer of aspen, boring in and causing weakening of the stem, wind and ice breakage, and quality loss in bolts. According to Graham (1963), as much as 64% of all mature aspen may suffer some attack. These very large tunnels, if not causing direct breakage, serve as infection courts for wood rotting fungi and may be associated with hypoxylon cancer. Attack is identified by the presence of large oval holes, sapstreaking, possible breakage and accumulations of large fibrous frass and wood fibers. Attacks usually more severe in more open aspen stands.

Identifiers: Poplar species

1. Large oval shaped borer holes in stem, sapstreaking.
2. Possible stem breakage.

10. ROOT COLLAR INSECTS (regeneration) Page 83

Primarily the pine root collar weevil. Other root insects include: White grubs, pales weevil, and the root tip weevil. Host species include all pines. These insects may be very damaging when appropriate conditions are met: White grubs-plantation in heavy sod, pales weevil-plantation among fresh pine stumps, and root collar weevil-plantation in light sandy soil.

Identifiers: Pines

1. Black pitch, frass and larval borings in root collar area of tree often covered by duff layer.
2. Fading of foliage throughout entire tree, usually in a plantation.
3. Tree may tip over if injury is severe enough.

Not to be confused with mouse damage, indicated by presence of feeding scars (small teeth marks) at ground level, heavy saratoga spittlebug damage, as evidenced by a great deal of flagging and pitching under the bark of branches, or shoestring root rot. Drought may cause wilting of entire crown but no borings will be present in root collar area.

15. INSECTS OTHER THAN PREVIOUSLY MENTIONED

This category should be marked when none of the above insect infestation damage is diagnosed. In the case where serious or widespread damage is noticed, the Regional Insect and Disease Specialist should be consulted.

16. WHITE PINE BLISTER RUST Page 97

Blister rust is the most serious disease of white pine. Its occurrence has caused a great reduction in the numbers of white pine planted over the years.

Identifiers: White Pine

1. Flagging or dead branches.
2. Deformation of tissue at point of sunken, discolored cankers during most of year, or yellowish blisters in June.
3. Pitch exudation from canker on main stem. (May be confused with porcupine damage).
4. Dead tops (with associated streaking).

17. WHITE PINE BLISTER RUST in combination with WHITE PINE WEEVIL

In this case, both blister rust and white pine weevil symptoms are both present.

18. SWEET FERN BLISTER RUST

Sweet fern rust affects jack and scots pine, and causes reduced height and diameter growth. Older trees may die from suppression or be killed by girdling. Nursery stock may also suffer mortality losses when the alternate host is closeby. The basal canker provides an entry point for wood-rotting organisms and is attractive to wood boring insects. Often the wood behind the canker cannot be used for pulp because of discoloration. This disease is caused by a fungus which utilizes alternate hosts to complete its life cycle. Both sweet fern (Comptonia sp.) and sweetgale (Myrica sp.) serve as the alternate host.

Identifiers:

1. Canker presence within 5 feet of the ground line. The canker may appear only as an elongated swelling. Older cankers will cause malformation of the lower stem and produce typical "catfaces".

2. In the spring (May), orange-yellow blisters or pustules may be present on the edges of the canker.

19. SCLERODERRIS CANKER Page 98

Scleroderris canker (lake states strain) has caused extensive mortality in young pine plantations and nurseries in northeastern United States and eastern Canada. A relatively new strain (european strain) has caused major mortality in poletimber, red and scots pine plantations in New York and Vermont. Although the lake states strain has been found in Minnesota, it has not caused any important damage, most incidence being found in off-site situations. However, both strains have the potential to become very serious problems.

Identifiers: All pines, especially red.

1. In spring, dieback of last year's foliage and buds and/or browning of bases of needles.
2. Total dieback by July.
3. Needles loose and dropping off.
4. Fungus grows down branch, enters stem and kills young tree (6 ft), or forms canker on older tree (lake states strain).
5. Fungus may go into stem and kill larger trees (european strain).

20. SIROCOCCUS SHOOT BLIGHT OF RED PINE Page 93

This fungus disease of red pine needles can be a very serious problem in young stands. It is generally only a problem when red pines are being regenerated and grown under overstory red pine. The entire regenerating stand can be killed under the proper weather conditions. Sirococcus has only been a problem on red pine.

Identifiers:

1. Overstory red pine are present. The most serious damage will be beneath or right next to the overstory trees.
2. Only the current seasons growth is killed. However, damage is cumulative and may kill the tree.
3. Current year needles die, turn brown and droop. The needle bends near the base as it wilts or droops. Dead needles do not fall off for two or more years.
4. The bud is killed.
5. Dead trees may be found.
6. There is little or no resin soaking or discoloration of the wood under the bark on dead shoots.

This disease may be confused with spittlebug, diplodia, or scleroderris. However, since only current year growth is killed and needles droop by bending near the base and there is little or no resin soaking or discoloration or pitch pockets formed under the bark, it should not be confused.

21. BUTTERNUT DIEBACK Page 40

Butternut is found on a variety of sites extending from southeast to north central Minnesota. Reported in 1967 was a canker disease caused by the fungus (Sirococcus clavigignenti) which is now known to be eliminating butternut from its natural range. Trees of all ages and sizes, and on all sites, are affected. Cankers spread on branches and trunks, eventually girdling the trees and, after several years, killing them.

Identifiers:

1. Dying branches or dead tops; epicormic shoots below killed portions.
2. In spring, inky-black, thin fluid exuding from cracks in cankers.
3. Older stem and branch cankers, covered by shredded bark and/or bordered by successive callus layers.

22. OAK MORTALITY

The crown deterioration and subsequent death of oaks is caused by four major agents in Minnesota forests: the vascular fungus disease, oak wilt (Ceratocystis fagacearum); a fungal root and butt rot (Armillariella mellea); a beetle, two lined chestnut borer (Agrilus bilineatus) and drought. The occurrence of oak wilt in Minnesota counties has eliminated the European oak export market and made the interstate transport of actively infested material illegal. Trees weakened by drought and defoliation are then susceptible to chestnut borer and armillaria build up. When these areas are clearcut and converted, the young pines may die when armillaria growing out from the old oak stumps contacts their roots.

Identifiers:

1. Discoloration and dropping of leaves from top down. Red oaks will die first year, white and burr oaks more slowly.
2. Twigs of infected branches will have discolored bark.
3. Mortality occurs in pockets because of spread through root grafts.
4. A sweet fermenting odor (rotten apples) may be emitted from bark.

OAK WILT Page 53

ARMILLARIA ROOT ROT - CONIFERS Page 58

1. Rhizomorphs (dark colored shoestrings) under bark of affected trees at, and below root collar area.
2. Browning of foliage and dying of individual or groups of trees. May be confused with or compounded by affects of drought and/or bark beetles.
3. May be honey colored mushrooms present in fall.

TWO-LINES CHESTNUT BORER-OAKS Page 30

A secondary insect which attacks and kills (by girdling under bark) oaks which have been stressed by other factors.

1. Flat headed larva present under bark.
2. Attack usually begins at top of tree and extends downward.
3. Adult emerge through characteristic D-shaped holes (2 millimeters) in bark.

23. DWARF MISTLETOE OF BLACK SPRUCE Page 94

Dwarf mistletoe is the most damaging pest on black spruce. Black spruce is attacked and killed in all stages of its development by dwarf mistletoe. Dwarf mistletoe can be found in most parts of Minnesota where black spruce occurs. The major host is black spruce. It occasionally infects white spruce and tamarack but is not an economic problem on these hosts. It has been found in one location on jack pine.

Identifiers: 1. Witches brooms - a prolific production of branches.

2. In combination with pockets of dead and dying trees as the disease advances.

Witches brooms are often seen on balsam fir and other tree species. These witches brooms are caused by other problems - not dwarf mistletoe.

24. DIPLODIA TIP BLIGHT Page 92

Diplodia is generally considered a weak pathogen, but it may successfully attack and kill pines. It is most serious on trees growing under stress such as during a drought.

Hosts : All pines.

Identifiers: 1. Stunting and browning of current years' shoots and needles in May and June.

2. Branch flagging where the fungus is working its way down a branch towards the stem.

3. The wood of infected branches becomes resin soaked.

4. Pitchy cankers may form under the bark, killing the tree top or the entire tree.

25. HYPOXYLON CANKER Page 42

Hypoxylon canker is the most serious mortality-causing disease of quaking aspen in Minnesota. Yearly losses from this disease approach the net annual growth of aspen. Approximately 12% of all quaking aspen in Minnesota is infected. Hypoxylon canker infects both quaking and bigtooth aspen, although bigtooth aspen is 5 to 10 times more resistant to the disease. Balsam poplar is rarely infected.

Identifiers:

1. Yellow-orange areas on the bark of any age of tree, particularly quaking aspen.

2. In trees with cankers two years or more of age, look for loose bark with a blister appearance. Under the bark will be gray pillars formed by the fungus.

3. In trees infected for at least three years, these gray pillars change to hard, gray, raised structures. Both pillars and hard, gray structures can be found on the same canker.

4. Often trees broken off part way up the stem indicate a stand infected with hypoxylon since the cankered area becomes a weaker area on the stem.

26. WHITE TRUNK ROT OF ASPEN - Phellinus (Fomes) igniarius Page 50

White trunk rot is the major cause of volume loss in aspen in the lake states. Gross merchantable yeilds may be reduced by up to 25% and stands may have 50% or more of the trees infected with Phellinus. Both bigtooth and quaking aspen are susceptible to infection and rot by Phellinus. Serious infection usually becomes evident in stands older than 40 years.

Identifiers:

1. In more advanced cases of rot, hoof-shaped conks on the trunks will be present. These conks are perennial and, therefore, are very hard. They are usually dark brown to black on the upper surface and tan to white on the lower surface. Presence of conks indicates extensive decay. One conk per pupwood stick indicates 25% of the cross-sectional area is lost to decay.
2. On felled trees or trees broken off, the wood will appear yellowish in color, be punky or spongy in texture, and have black zone lines around the rot.
3. When boring aspen with an increment borer, heart rot can be detected by the following:
   a. There is an obvious difference in the resistance to the increment borer when soft, spongy rot is encountered.
   b. In advanced stages when the rot has formed a cavity, the increment borer may be difficult to extract. It turns easily, but it doesn't withdraw easily. This situation would indicate rot.
   c. The core of wood extracted from a rotten tree will break up easily and will be discolored.

27. HYPOXYLON CANKER IN COMBINATION WITH WHITE ROT OF ASPEN

In some cases, both hypoxylon canker and white trunk rot Phellinus will be present in aspen stands in approximately equal percentages. In this case, this category should be tabulated.

28. HEART ROTS

Heart rots are present in all species of trees and cause the most volume loss of any disease. Heart rots often are more prevalent in trees growing on poorer sites and trees greater than 50 years of age.

Identifiers:

1. Look for fungal fruiting bodies on the tree. Fungal fruiting bodies may be woody, hard perennial conks; fleshy, annual shelf-like mushrooms with pores or teeth on the undersides; or fleshy to leathery coverings usually at bases of branch stubs or at wound sites. In some cases, particularly on birch, a black shapeless mass of fungal tissue will be present on the trunk.
2. In the absence of fungal signs, test for rot by using the increment borer, as follows:
   a. When there is a change in resistance to the increment borer being drilled into the tree, soft, spongy tissue may be encountered, indicating advance stages of rot.
   b. The increment borer is difficult to extract; i.e., it turns easily but does not back out of the tree. This may indicate a hollow cylinder or very soft tissue both of which would indicate heart rot.
   c. The wood core extracted shows obvious signs of rot; i.e., discoloration, black zone lines, punky or broken wood.
3. Look for wounds in the stand. If old fire scars, logging damage or ice storm signs are obvious, heart rot usually is present.

29. DUTCH ELM DISEASE Page 54

Caused by the fungus Ceratocystis ulmi, it is one of the most important forest and shade tree diseases found in Minnesota. This disease has destroyed elm stands throughout the central hardwood region, reaching into northwestern Minnesota and Canada. The fungus grows extensively throughout the vascular system of the tree and is transmitted by the european and native elm bark beetles.

Identifiers:
1. In spring and summer, wilting and flagging (yellowing) of one or more of the upper branches.
2. Discoloration of vascular tissue under bark of branch or main stem.
3. = Dead trees
4. Presence of bark beetle emergence holes in the bark or galleries under the bark.

30. BIRCH DECLINE

Caused by many factors, such as drought, heavy defoliation early in season, off-site conditions, and exposure.

Identifiers:
1. Thin, sparse foliage
2. Probable attack by bronze birch borer which leaves swollen galleries on surface of bark running across the grain of the wood and (2 millimeter) D-shaped emergence holes.
3. Damage progresses from top down.

31. HARDWOOD CANKERS Pages 44 and 46

Hardwood cankers can seriously reduce the quantity and quality of forest products. Two examples of hardwood cankers are nectria canker (Nectria galligena), and eutypella canker (Eutypella parasitica). Nectria canker usually does not kill trees but can cause excessive volume losses. Eutypella canker frequently kills trees less than three (3) inches in diameter, while on larger trees perennial cankers limit the production of quality wood and increase the risk of breakage.

Identifiers: Nectria (target canker)
1. Flattened or depressed areas in bark.
2. Large open-faced target shaped cankers

Eutypella (non-target)
1. Sunken area surrounded by flared callus folds. Bark remains attached to the cankered face.

32. NEEDLE RUSTS

There are several rust diseases of conifers which may cause defoliation and stunting in younger trees when the infestation is heavy.

Identifiers: 1. Small cream colored or yellow pustules on needles during spring and summer.

2. Needles drop in fall.

33. SHOESTRING ROOT ROT - Armellariella mella

Armellariella mellea is the most common root and butt rotting fungus on young conifers. Species attacked include red, jack, Scots, and white pines; white and black spruce; and balsam fir. A. mellea attacks usually result in the death of the young trees, but after the trees reach about 25 years of age they are able to withstand or outgrow an attack. Some mortality can be seen in most red pine plantations, and mortality is greatest in conifer plantations planted on former hardwood sites. Heracide spraying of the hardwood overstory, too, seems to increase the severity of this disease.

Identifiers:

1. Total tree color change from green to light green to red during the growing season.
2. Drooping leaders all over the tree, usually associated with the above mentioned color change.
3. White mycellial fans under the bark at or right below the ground line.
4. Soil encrusted black pitch just below the ground line. Root collar weevil will also cause the soil encrusted pitch; so, don't use this identifier alone.
5. Black shoestrings (rhizomorphs) on dead stumps nearby or on the dead conifers.
6. Single honey colored mushrooms or groups of mushrooms at the base of the trees during September.

40. DISEASES OTHER THAN PREVIOUSLY MENTIONED

This category should be marked when none of the above disease infestation damage is diagnosed. In the case where serious or widespread damage is noticed, the Regional Insect and Disease Specialist should be consulted.

41. BEAVER DAMAGE

Identifiers:
1. Chewed off, broken off trees, teeth marks visible.
2. Tops dragged into water for houses.
3. Flooded areas

42. PORCUPINE DAMAGE Page 117

Many species.

Identifiers:
1. Bark stripping and girdling, primarily in winter.
2. Pitch exudation present from injured area of tree.
3. Dead tops from extensive feeding in past.

43. RABBITS OR MICE Page 115

Many species.

Identifiers:
1. Bark stripped in patches near or at ground level.
2. Small teeth marks.

44. DEER Page 108

Identifiers:
1. Clipping of shoots of many species.
2. Ragged clippings higher than one inch above ground up to about 5 feet.

45. SAPSUCKERS Page 114

Sapsuckers drill small holes (in checkerboard pattern) in bark of many hardwoods. This causes defects in timber and may eventually lead to woodrot and stem breakage at point of attack.

50. OTHER ANIMAL

1. Pocket Gophers - many conifers - girdling at ground level or chewing off of roots.

51. WINDTHROW Page 113

1. Extensive root springing, breakage of trunk or branches at any level.
2. Damage may occur in strips through timber.

52. DROUGHT

Identifiers:

1. Wilting and reddening or small, off-colored foliage.
2. Shallow-rooted species most susceptible.
3. Succession of narrow growth rings may indicate several years of droughty conditions.
4. Attack by bark beetles.
5. Drought may affect all species indiscriminately or may occur only in localized pockets when harshest environmental conditions exist.

53. ICE BREAKAGE

Identifiers:

1. Conifer branches broken off or pulled out of main stem - may be left hanging.
2. Hardwoods specially softer and more brittle species may break off anywhere.

54. FIRE

Identifiers:

1. Blackening of bark.
2. Black faced cankers at base of tree.

55. FLOODING

Identifiers:

1. May occur in low areas - especially associated with beaver cuttings. Foliage turns red and drops off.

56. HAIL INJURY Page 110

Identifiers:

1. Wounding of soft tissues is most common. Wounds will mostly be on upper surfaces and facing one direction (especially west or southwest). May also defoliate trees.
2. May break off younger trees when hail is especially heavy.

57. FROST CRACKS

Identifiers: All Species

1. Long narrow split near base of tree usually extending deep into tree.

58. ENVIRONMENTAL

Identifiers:

1. Scorch Page 112
2. Winter injury Page 117
3. Frost injury Page 109

61. MECHANICAL

1. Breakage or bark injury due to falling trees.
2. Logging injury near base of tree.
3. Snowmobile damage.
4. Other

62. CHEMICAL DAMAGE

1. Herbicide-new shoots contorted and shriveled. (Page 110)
2. Air pollution-general discoloration of foliage. (Page 107)
3. Toxic spills and runoff.

99. In the case where damage cause is not identifiable, mark this category. If in your mind the damage could be serious, consult the Insect and Disease Specialist.

P = Preferred
C = Common but not preferred
R = Rare
* = Important forest pest

HOST LIST OF FOREST INSECTS AND DISEASE COMMONLY FOUND IN MINNESOTA

		CONIFERS										HARDWOODS											
	CATEGORY	all	NP	WP	JP	SCP	SF	WS	BSL	T	C	BSU	All	Ea	Wil	LH	A	Bi	BG	Cot	NH	Wal	O	CH
1.	Defoliators		P	P*	P	P	P	P		P			C-P											
2.	Bark Beetles		P *		P		C	C		C	C					P							P	C
3.	Wood Borers	C											C											
4.	Spittlebugs		P*		P	C																		
5.	White Pine Weevil		R	P*	P	C		R																
6.	Spruce Budworm						P*	C	R	R		R												
7.	Jack Pine Budworm		C		P*																			
8.	Shoot Insects		P		P			P																
9.	Poplar Borer																P							
0.	Root Collar Insects		C	R	C	P																		
5.	Other Insects	C											C											
6.	White Pine Blister Rust			P*																				
8.	Sweet Fern Blister Rust				P	P																		
9.	Scleroderris Canker		P*	C	P	P		C																
0.	Sirococcus Shoot Blight		P																					
1.	Butternut Dieback																							P*
2.	Oak Mortality																						P*	C
3.	Dwarf Mistletoe				R				P*	R		C												
4.	Diplodia Tip Blight		C		C																			
5.	Hypoxylon Canker																P*							
6.	White Trunk Rot																P							
8.	Heart Rots	C											C											
9.	Dutch Elm Disease															P								
0.	Birch Decline																	P						
1.	Hardwood Cankers												C											
2.	Needle Rusts		P		C			P																
3.	Shoestring Root Rot	P											C											
0.	Other eases	C											C											

HISTORY OF MINNESOTA LANDS

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Acknowledgement: The Division of Forestry acknowledges that some of the material used in this Section as being directly quoted from the book entitled "Minnesota Lands" written by Dana, Allison and Cunningham and copyrighted by the American Forestry Association.

HISTORY OF LANDS IN MINNESOTA

FEDERAL LAND POLICIES

With the cession of its western claims by Virginia in 1784, all of the area of which Minnesota is a part became public domain land. Under Article IV of the Constitution this land was under complete control of the United States Congress. The Congress had the power to dispose of and make any needful rules respective to the territory belonging to the United States. Congress followed a basic policy of transferring ownership of the public domain to states, individuals, and corporations after termination of rights of occupancy by the Indians for over a century. It was through this policy that Minnesota received much of the land you manage.

GRANTS TO THE STATE

TRUST FUND LANDS

Trust Fund Lands are lands granted to the State by the United States and are held by the State in trust for the public. Proceeds from the sale or use of such lands must be used for specified public purposes. For example, proceeds from certain lands must be used for school purposes. Trust fund lands are generally under the control of the Division of Forestry. Trust fund lands may be sold only at public sale after published notice. The Division of Game and Fish, and other public agencies, occasionally acquire trust fund lands by condemnation which is considered legally equivalent to a public sale. Trust fund lands bordering on public waters are withdrawn from sale by state law and may be sold only when specifically authorized by the Legislature. Trust fund lands may be leased for various purposes ranging from iron mining to lakeshore cabin sites.

SCHOOL TRUST FUND

The Organic Act passed by Congress in March 1849 established a territorial government for Minnesota and reserved sections 16 and 36 of each township for the purpose of being applied to school and education in the territory. A later Enabling Act passed by Congress in February, 1857, had provisions for lieu selections wherever parts of these sections had been disposed of or were meandered waters. Lands received in lieu of were called "indemnity school" or "lieu lands". Since that time the State has submitted lists for these selections with the final one being 1960. The Constitutional Convention of 1857 discussed the handling of school lands, and it was determined that the lands must be sold at public auction at a minimum of $5.00 per acre, the principal to be reserved forever and the income

from this fund be distributed to school districts in proportion to the number of students enrolled.

UNIVERSITY TRUST FUND

In February of 1851, the University was created by the Territorial Legislature. The Enabling Act of Congress in February, 1851, directed the Secretary of the Interior to reserve from sale not to exceed two townships for support of the University. These lands were selected by the Governor and approved by the Commissioner of the General Land Office. The State Legislature in March, 1868, put the administration of this grant under the State Land Office (State Auditor) with the proceeds going into the permanent University Fund. In 1931 the administration of this land was turned over to the Department of Conservation. In 1863 the Legislature accepted a grant of 120,000 acres based on 30,000 acres per representative and senator for the establishment of a College of Agriculture. By 1912 all of these lands had been disposed of and the income put into the University Permanent Fund.

SWAMP

Congress in 1849 granted to Louisiana "the whole of those swamp or overflowed lands which may or are found unfit for cultivation". Proceeds from sale were to be used exclusively, as far as necessary, for the construction of levees and drains. Similar grants were made in 1850 to twelve other states, accepting the lands shown by the notes of the public-land surveyors or by selecting the land through their own agents. Minnesota, Wisconsin, and Michigan were the only states which followed the former course. Land had to be 50 percent or more swamp to qualify.

Although the Act specified that the sale of such lands should be devoted to drainage, the State spent no money for this purpose. About 34 percent of the area was granted to railroads. In 1881 an amendment was passed stating that swamp lands were to be sold in the same manner as school lands and that a permanent fund be created, the proceeds to be apportioned to schools.

INTERNAL IMPROVEMENT

A Federal statute of September 4, 1841, granted 500,000 acres of land for purposes of internal improvement to the nine public-land states then in the Union. It was not until 1866 that the State was aware that such a statute existed. After several years controversy, it was decided to use the money from the sale of such lands for railroad bonds. About 99 percent of the funds so derived were used for this purpose. An amendment to the Constitution adopted in 1898 dedicated future

income from the Internal Improvement Land Fund to the State Road and Bridge Fund.

OTHER FEDERAL GRANTS

SALT SPRING LANDS

The Enabling Act of 1857 provided a land grant of all salt springs within the State, not exceeding 12 in number, with 6 sections of land adjoining. They were to be selected by the Governor and to be used as the Legislature so directed. Some 7,600 acres were granted to a company which failed to find any water of commercial value. The Legislature in 1873 placed the remainder at the disposal of the University for the support of the Geological and Natural History Survey. Proceeds from such lands go directly to the University.

BURNTSIDE STATE FOREST

In 1903 Congress at the request of the State Forestry Board gave indication it was willing to grant the State of Minnesota 20,000 acres of public land for forestry or experimental purposes. This area was selected in St. Louis county and was granted by Congress in 1904 with the provision that the land should be used for forestry purposes only. This land is under the control of the Division of Forestry. Income from this land is used by the Division for forestry purposes. (A large proportion of this land is now part of the Boundary Waters Canoe Area).

RAILROAD LANDS

Beginning in 1854 Congress granted lands to the Territory of Minnesota to aid in the construction of railroads. These lands were alternate sections of public lands to a distance of six miles on each side of the railroad track. The legislature of the Territory or future State of Minnesota in turn was to grant the land to railroad companies authorized to receive grants under its acts of incorporation and Legislative Acts. Other grants were received up to 1866. However, in 1865, Congress increased the size of the grants to include alternate odd-numbered sections to a distance of ten miles on each side of the railroad with lieu selections to a distance of twenty miles. Federal grants of public lands to the state to aid railroad construction totaled over 8 million acres. A direct grant to the Northern Pacific Railroad of nearly 2 million acres brought the total to about 10 million acres of public domain land granted for railroad construction purposes. This figure comprises 20 percent of all the land area of Minnesota and was by far the largest grant made by Congress for any single purpose. In addition, some of the railroads received 2,900,000 acres of the 4,700,000 acres of Swamp land granted Minnesota.

LAND ACQUIRED BY STATE

VOLSTEAD LAND

In 1908, the Volstead Act of the United States Congress made all unentered but unpatented public lands in Minnesota subject to all of the provisions of the law of the State relative to the drainage of swamp and overflowed lands and authorized the establishment of liens against such lands to meet their share of the cost in connection with any drainage project. With this encouragement, vast acres of swamp lands were included in drainage districts. The Federal Goverment refused to pay the taxes assessed against its lands adjoining drainage ditches; and in 1963, the State bought these lands from the Federal Government for their appraised value less the amount of the ditch bond taxes and accumulated interest. In this transaction the State purchased approximately 33,000 acres. The receipts from these lands are put into the State Forest Fund.

50 - 50 LANDS

Under Chapter 89 Minnesota Statutes, the counties of the state may elect to turn over tax-forfeited land to the state for management. These lands must be classified as Conservation lands. If such lands are accepted by the Commissioner of Conservation, they shall be devoted to forestry, watersheds, parks, game refuges, game management area, flood control, public hunting grounds, and other conservation uses. At the present time, Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Fillmore, Goodhue, Houston, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mahnomen, Marshall, Mille Lacs, Pine, Red Lake, Roseau, St. Louis, Sherburne, Stearns, Wabasha, Wadena and Winona counties have some land under this 50 - 50 agreement. This land may or may not be within a state forest but does assume state forest status. The counties receive 50% of the gross income from these lands. They can be released from state forest status by resolution of the County Board and approval of the Commissioner of Conservation provided these tracts are found to be more valuable for agriculture or for the construction of industrial development as outlined in M.S.A. 89.01 Subdivision 5 and subject to sale the same as other lands not reserved.

PILLSBURY LANDS

The land was a gift to the State of Minnesota from ex-Governor John S. Pillsbury. It was composed of 990.55 acres of cut-over pine lands in Cass County near Gull Lake. Governor Pillsbury died before he completed conveying the land to the State, and in 1902 his widow deeded the land to the State of Minnesota designating the University of Minnesota as beneficiary to receive two-thirds of all income ever derived from the land. This constituted the first forest reserve which is now part of the Pillsbury State Forest.

OTHER

Other lands have been purchased, such as administrative sites; however, in 1963 the Minnesota State Legislature passed a Natural Resources and Recreation Act which provided money for the acquisition of land within the Minnesota Memorial Hardwood State Forest located in southeastern Minnesota.

OTHER STATE OWNED LANDS

There are other state agencies owning land in Minnesota and on many of these the Division of Forestry has no jurisdiction. Some land owning agencies are the Division of Parks and Recreation, Highway Department, Welfare Department, Department of Corrections and Others. On the Division of Parks and Recreation lands the Division of Forestry sells timber if any timber is to be sold. The Division of Forestry also aids other Divisions of the Department in leasing their lands especially for pole line rights of way.

TAX-FORFEITED LANDS

Tax-forfeited lands are owned by the State by virtue of forfeiture for nonpayment of taxes. Except for Conservation area lands, which are covered in a later paragraph, tax-forfeited lands are held by the State in trust for the taxing district in which they lie and are generally under the control of the County Board. Tax-forfeited lands may be sold only at public sale after published notice. When any such lands are timbered, the appraisal of the timber value must be approved by the Commissioner of Conservation through the Division of Forestry before they may be sold. Tax-forfeited lands may be acquired by State agencies for public purposes by resolution of the County Board. When so acquired, the lands are no longer held in trust for the taxing district.

TAX-FORFEITED LANDS (COUNTY)

Tax-forfeited lands are lands that have forfeited to the state for failure to pay taxes. These lands are held in trust for the taxing districts to support local governmental activities within. These lands are administrated by the counties under the supervision of the County Board. Some counties employ a County Land Commissioner to manage these lands. In other counties the County Auditor and the County Board take a more active part.

Laws governing tax-forfeited lands date back to the first legislature under Minnesota General Laws Chapters 1 and 2, 1859 - 1860. The legislature failed to take into consideration the passing of the title to these tax-forfeited lands to the State, but rather anticipated that

they would be redeemed by the original owner or would possibly be purchased by tax title by other people. Other legislatures attempted to pass these titles to the State on forfeited lands. Prior to 1916 failure by county auditors and county boards to act under the provisions of the law made little headway in attempting to pass title. The State Supreme Court added still another setback to tax-forfeiture title when they ruled there could be no forfeiture to the State or title to a purchaser until a notice of the right to redemption had been given the original owner. Numerous laws were passed to clarify title to tax-forfeited lands, however, in 1936 new laws became effective providing that tax delinquent lands would forfeit to the State after seven years and the State would thereby assume ownership. These lands are then State lands held in trust for the taxing districts and administrated by counties subsequently taking on the name of the county lands. Other laws have been passed since then clarifying tax-forfeiture land and timber policies.

The law provides that receipts from tax-forfeited lands be apportioned as follows: School districts 40%, county 30%, organized townships 20% and the State 10%. In case of unorganized townships, their share goes to the county who then received 50%. This expense of running the tax-forfeited land department and certain bonded indebtedness is deducted from the receipts prior to apportionment. If the county board elects to make funds available for forest development, these funds are deducted before apportionment.

When tax-forfeited lands are sold, the title to the land is passed from the State to the new owner. Because of the past these titles are not considered too saleable and therefore title clearing may become an expensive undertaking.

The Division of Forestry is charged with certain responsibilities in the administration of tax-forfeited lands. This is discussed in the Cooperative Forest Management Manual.

TAX-FORFEITED LANDS (CONSOLIDATED CONSERVATION)

At the turn of the century with logging declining, more emphasis was placed on an agricultural economy and it was thought that the many thousands of acres of wet lands could be converted to farming in northern Minnesota. In 1887 the legislature under pressure allowed organization of local drainage districts. This law had very little effect in the timbered regions, however, in 1909 the legislature authorized the payment of assessments on undeveloped state owned swamp lands in the drainage districts. In 1908 the Congress passed the "Volstead Act" which permitted the establishment of liens on unperfected homesteads and other public lands in the drainage districts. The laws made it possible for a few land owners to petition for the construction of drainage ditches, thus the assessments were charged

against all lands supposedly benefiting from the drainage. With all this encouragement, many miles of ditches were built in the drainage districts at a cost of millions of dollars. Much of the drained land was never occupied, others were abandoned because the land was too poor to develop and pay ditch assessments. Consequently, it forfeited. By 1930, the districts were in extremely difficult financial positions and the counties took them over to protect themselves, but in a number of cases the burden was so great they could not carry the load.

The Act of April 19, 1929, M.S.A. 84A.01 of the Minnesota Legislature created in the counties of Beltrami, Lake of the Woods, and Koochiching, the Red Lake Game Reserve with specific boundaries authorizing the State to take absolute title, free from any trust in favor of the taxing district to all parcels of tax-forfeited land outside the corporate limits of cities and villages under the provisions of the Tax-Forfeiture Act of 1927 for assuming payment of assessments. It was required that all lands be classified as to the suitability for agriculture, forestry, or game productions. It allowed for the sale of lands more suited for agriculture and timber production than game production, with provisions covering receipts. In 1931 a similar act was passed (Chapter 84A.20) referring to certain counties, namely Aitkin, Roseau, and Mahnomen in which the State would assume the ditch bonds in return for clear title for lands in the drainage District. This act described the lands as suitable for use for afforestation, reforestation, flood control projects and other public uses. In 1933 a third act (Chapter 84A.31) was enacted that took in Marshall County. This act resulted in a reforestation project for that county.

Under these acts the land was placed under the management of the Department of Conservation. M.S.A. provide for the administration of tax-forfeited lands and required county boards to classify these lands as "Agriculture" or "Non-Agriculture". In 1949 the legislature combined receipts from the lands acquired under these acts into "Consolidated Conservation Area Funds". The act specified what items of income are to flow into the fund and what is to be paid out.

LEASED LANDS

This type of land has carried a number of names which has caused confusion and misunderstanding. This was due to various Federal Laws and Agencies controlling them. The name most commonly used was Land Utilization Projects (L.U.P.) lands. These projects were designed to move settlers to more settled and profitable areas.

Federal purchase of submarginal agricultural lands was authorized by the National Industrial Recovery Act of June 16, 1933. Supervision of this was assigned initially to the Federal Emergency Relief Administration, which in turn assigned responsibility for the planning of

agricultural demonstration projects to the Land Policy Section of the Agricultural Adjustment Administration and for the planning of wildlife projects to the Bureau of Biological Survey in the Department of Agriculture. Many changes in the administration of the program have subsequently taken place.

This included lands in Beltrami, Carlton, Koochiching and Lake of the Woods counties. If specified that the lands must be used for public purposes, conservation, and land utilization and reserved to the United States 75% of the minerals and all of the fissionable materials.

Another area was in Pine County which was placed under the administration of the National Park Service. In 1943 it was deeded to the State and is now part of St. Croix Park. It specified the lands must be used for park and recreational purposes. This land is under the jurisdiction of the Division of Parks and Recreation.

THE BELTRAMI ISLAND PROJECT

The Beltrami Island Development Project in Beltrami, Lake of the Woods and Roseau Counties was initiated at the request of the Minnesota Department of Conservation and the Minnesota Rural Rehabilitiation Corporation, and was formally approved by the Federal Emergency Relief Administration on December 27, 1934. The lands were leased to the State in 1940 for 50 years for use as a wildlife refuge. In 1942, Executive Order 9091 designated them as the Beltrami Wildlife Management Area under the general custody of the Fish and Wildlife Service in the Department of the Interior, but made no change in the lease to the State. Although the lands are still in federal ownership, they are generally classed as State lands because of the long-term lease to the State, and are so treated. This land is under control of the Division of Game and Fish. When timber is sold the sale is conducted by the Division of Forestry.

THE PINE ISLAND PROJECT

The Pine Island Project consisted of approximately 20,000 acres in Koochiching and Lake of the Woods Counties and was leased to the Division of Lands and Forestry by the Department of Agriculture subject to supervision and certain approval by the United States Forest Service. Later the land was deeded to the State. It is now a part of the Pine Island State Forest.

OTHER LEASED LANDS

This is limited almost entirely to administrative sites such as for towers. There are very few leases of this type remaining but there may always be some because of the Division's inability to purchase the land. Such land is under the jurisdiction of the Division of Forestry but subject to the restrictions provided in the lease.

ADMIN 1000 (Rev. 1/78)

STATE OF MINNESOTA

Office Memorandum

DEPARTMENT NATURAL RESOURCES
FOREST INVENTORY

TO : All Personnel Engaged in Phase II Inv. DATE: 11/28/83

FROM : Bob Peura - Inventory Unit Supervisor
By Dan Reick

PHONE: 218-327-1749

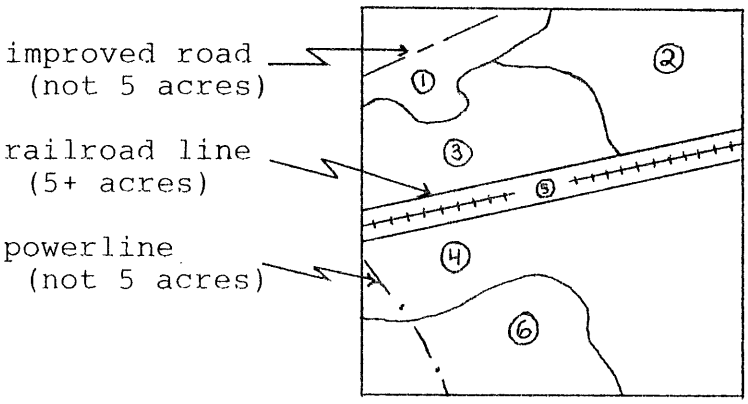
SUBJECT: Manual Revisions

Enclosed are revised pages to be inserted into your Phase II Forest Inventory manual. Please be sure to read through these new pages and become familiar with the changes.

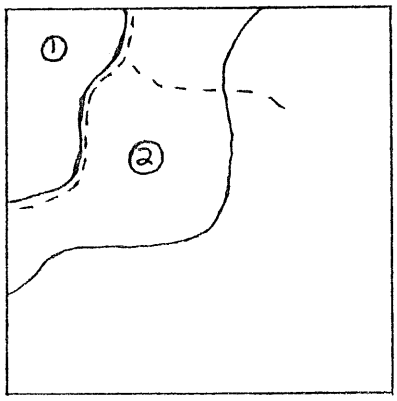
If there are any questions concerning the new procedures, please call the Forest Inventory Office in Grand Rapids.

RCP/DER/pn

When a railroad line, road, powerline, etc. is in excess of 5 acres, it will be assigned a Type Sequence Number and a data sheet completed. When determining the location of type lines for an improved road, always map from right-of-way to right-of-way.



Cover types that are to end at an unimproved road, trail, stream or ditch, must have a solid line parallel to one side of that ditch, trail etc.; otherwise the cover type will be understood to cross them.



COLUMNS 4 - 5: ALTERATION NUMBER

These columns will be used after the original survey has been completed. They are necessary to flag a change (alteration) which has occurred to a type.

For the initial survey, enter "00" in these columns.

The Phase II intensive forest inventory records data which describes the forest land cover type as it is at the time it is inspected.

Any major change from the original cover type description will require a corrected description of that cover type.

When it is determined that the original cover type description is in error or has changed, a corrected cover type description must be recorded as soon as possible.

These alterations of a cover type will be recorded on the yellow form F280/1 "Cover Type Examination Data Sheet".

The recording and submission of alterations can originate with the Game Manager, Park Superintendent, County Land Commissioner, or other land managers. These alterations should, however, be channeled through the local field forester in the Dept. of Natural Resources.

Further instructions on submitting alterations are found in this manual as a Separate section starting on Page 33.

A-22
Rev. 11/73

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

TOWNSHIP PLAT

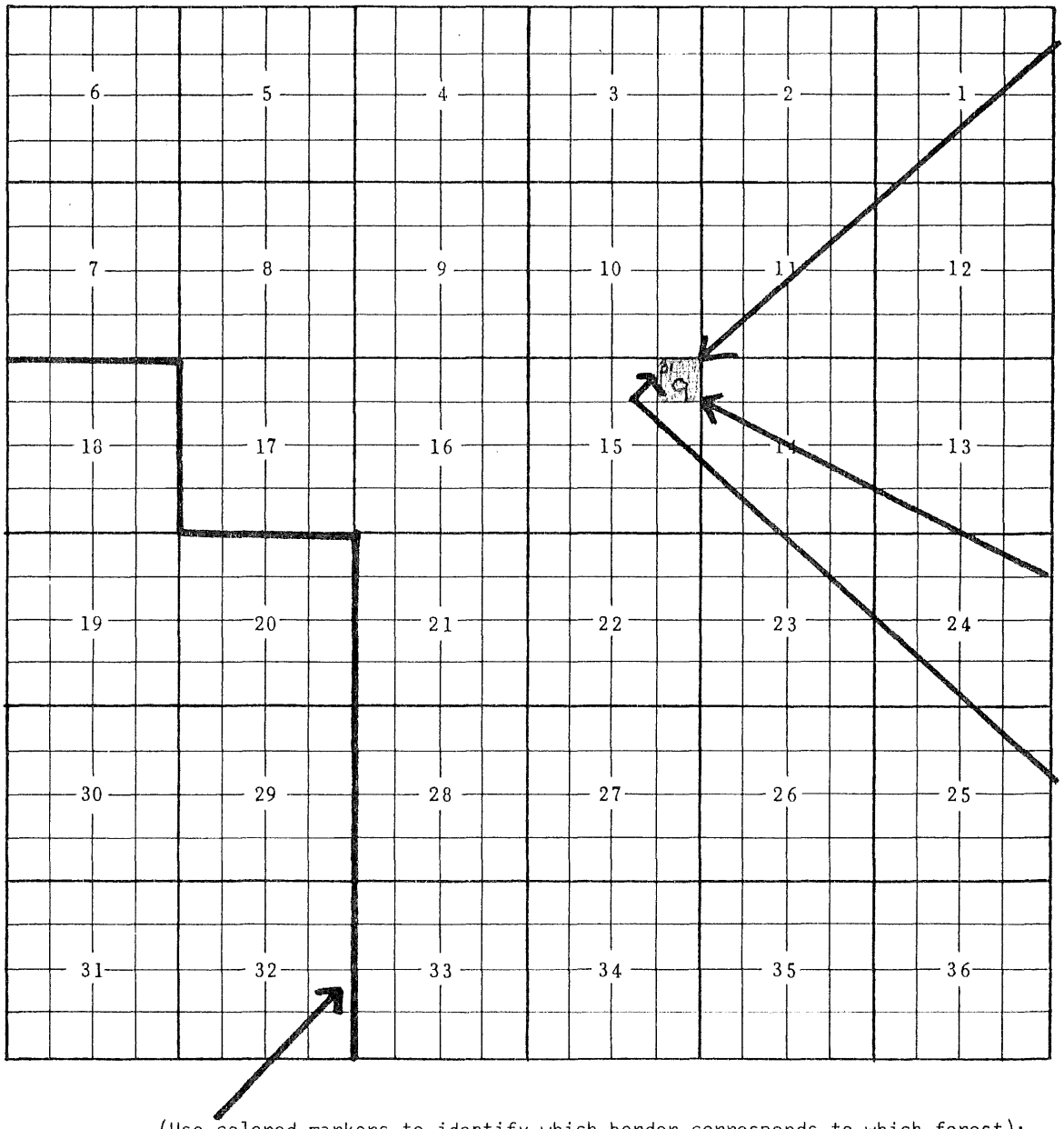
TOWN 184

RANGE 42

COUNTY Brokl

State RAD # 314

Cpt #



Use colored pencils to dis
ingish land ownership:

Red is State l
Green is Count
Brown is Parks and Rec.
Blue is Fish and Wildlife
Yellow is Law Enforcement, Water, Miner
Orange is Priv
Grey is Privat Industrial
Violet is Fede

Large numbers indicate Acquisition Status. See Page 7.3 of this manual

Small numbers indicate lots represents the number of acre rounded off.

Remarks: (Use colored markers to identify which border corresponds to which forest):

Border Johnson State Forest

TYPE MAPPING SYMBOLS

Roads: improved (Class 1-4)

unimproved (Class 5)

Railroad:

Powerline/Pipeline:

River or Stream

Ditch:

Significant Condition: ✳ - location within the cover type

NOTES:

1. Road classification is based on the State Forest Road Plan which classifies roads into 5 categories (see p. A3.1). For inventory purposes, roads which meet the criteria for a class 4 or better road are considered IMPROVED. All other roads are considered UNIMPROVED.

2. It is very important to be consistent when mapping roads, or other features, from section to section. Include all roads, trails, rivers, railroads, etc. and be sure they are mapped consistently throughout the township. Compare and match each section to all adjoining sections.

3. If the area of the road including the right-of-way comprises 5 acres or more, make it a type. Other features (RR, powerline, rivers, etc.) which comprise 5 acres will also be made types. Always put the appropriate type mapping symbol within the type lines. If the road, powerline, etc. does not make 5 acres, put in just the appropriate symbol, no inclusion is required.

4. When mapping roads along section lines, place them on one side of the section line. Again, be consistent across the township.

5. When the type line follows along an administrative line, draw the red type line next to the blue administrative line.

6. Use the symbol for significant conditions to indicate the location of significant point features, e.g. eagle/osprey nest.

DESCRIPTION OF FOREST ROAD CLASSES

IMPROVED:

Class 1: multi-purpose, two lane, hard-surfaced, with a two foot minimum shoulder width. Designed for 55 mph speed. Roadway width 26 ft.

Class 2: multi-purpose, two-lane, all-weather gravel, with no shoulder. Designed for 40 mph speed. Roadway width 22 ft.

Class 3: multi-purpose, two-lane, all-weather gravel, with no shoulder. Designed for 25 mph speed. Roadway width 18 ft.

Class 4: multi-purpose, one-lane. Designed for 20 mph speed. Roadway width 14-16 ft.

UNIMPROVED:

Class 5: minimum design necessary for intended use. For use during winter or dry periods only. Road maintenance is minimal. May serve as recreational trails.

Class 1-4 roads all have ditch requirements and a right-of-way of 66 feet across private property.

GRAND RAPIDS MAPPING - COPY OF TYPE MAP

Due to the use of an automatic digitizer for encodement of type maps into a form which a computer can understand and manipulate, the section maps must be subject to some rather strict control.

GENERAL: In order to keep the amount of area error due to line width to a minimum, the pencil used shall be a 0.5 mm automatic drafting pencil. All type lines shall be in red, administrative boundaries shall be in blue, and sequence numbers, type designations, linear symbols such as trails, streams, pipelines shall be in black. For lead, use only that which you receive from the Inventory Unit. Use no other, as some may bleed and/or rub off.

PARTICULARS:

1. When a linear feature (utility line, pipeline, ditch, etc.) crosses a type, make sure that the features of the symbol do not bisect type boundaries; e.g.:

Correct

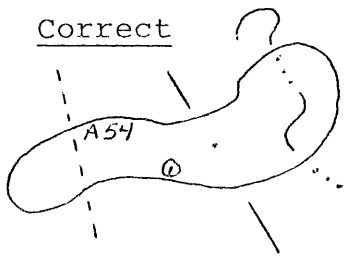


Fig. 1

Incorrect

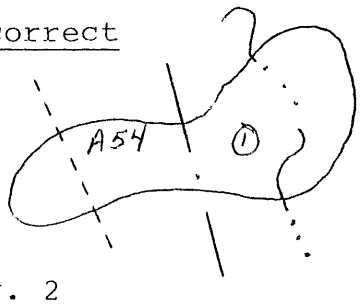
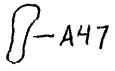


Fig. 2

In the case of Fig. 1, the type boundaries are not bisected by linear map features. In Figure 2, they are. Fig. 2 would cause the need for redraft of map in order for the automatic digitizer (AD) to read it.

When labeling a type, keep alpha-numeric characters (type identifiers) at least two line widths from type boundary (see Fig. 1 and Fig. 2). This too is for the sake of the AD.

Note: If type is too small for above, do this: 

2. When making the final matex, extend all type lines to the end of the matex. When the type is an inclusion in the adjacent section, draw it as a dotted line.

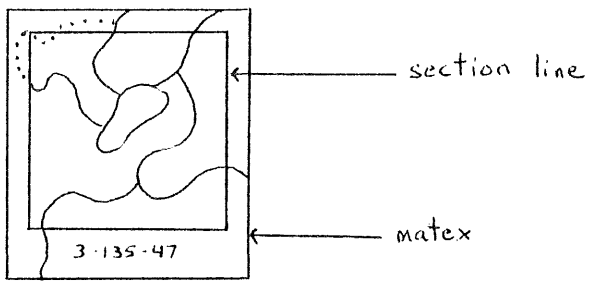
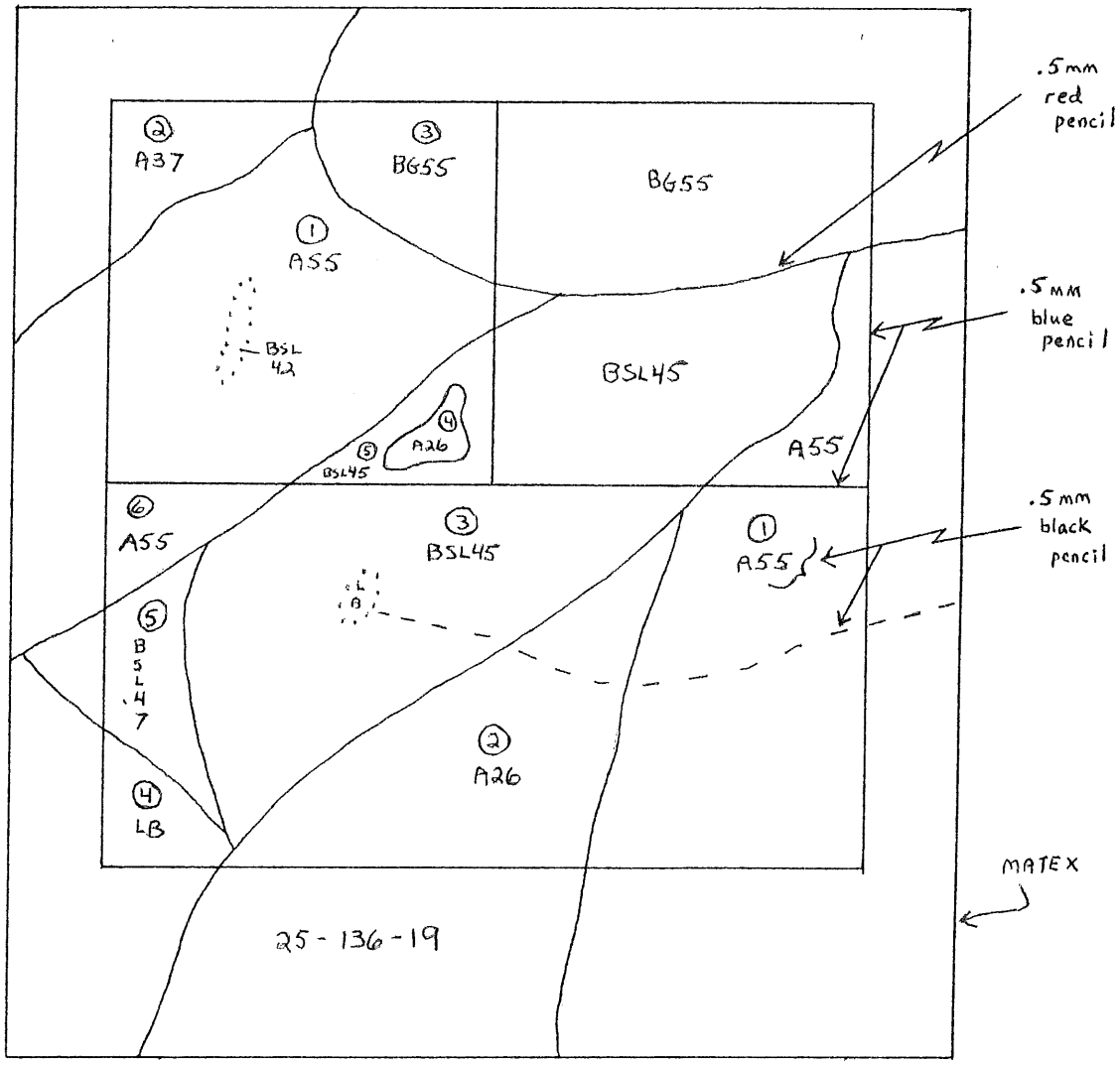


Figure 5: Final matex as submitted to Grand Rapids - compatible with computer graphics system.



Scale: 4" = 1 mile

NE Quarter - Private NW Quarter - County S½ - State

AERIAL PHOTO CORNER RECORD SYMBOLS

To be recorded on the reverse side
of aerial photography

Land corner, recovered: (over pin-prick on back side of photo) 

BT: Bearing tree

IP: Iron pipe

MON: Permanent monument, stone or concrete

WM: Witness mark, capped pipe, stake or other marker indicating direction (azimuth) and distance to corner

SP: Scribed post

YT: Yellow tag marker

Note - when it has been determined that the corner location is different than the USGS quad map indicates, the new corner locations are sent to the Forest Inventory Office in Grand Rapids where they are recorded on the final maps. When the changed corner location is used, the original corner (that corner indicated on teh USGS 7½' quad map) will be indicated with the following symbol:

 - original land corner as shown on USGS 7½' quad

Please be aware that the above note is for the information of map users - this does not signify any changes in field crew procedures (See page A.7).

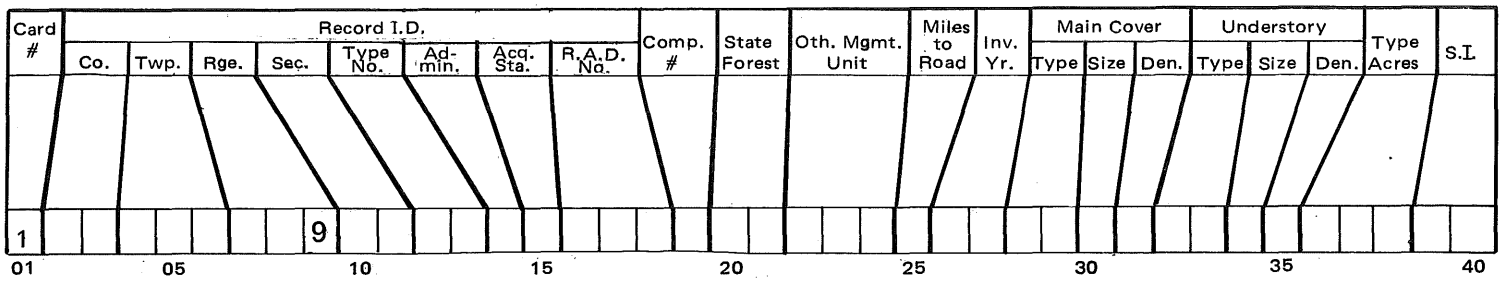
Finally, the individual iniating the corner change must signoff on the matex before submitting it to Grand Rapids.

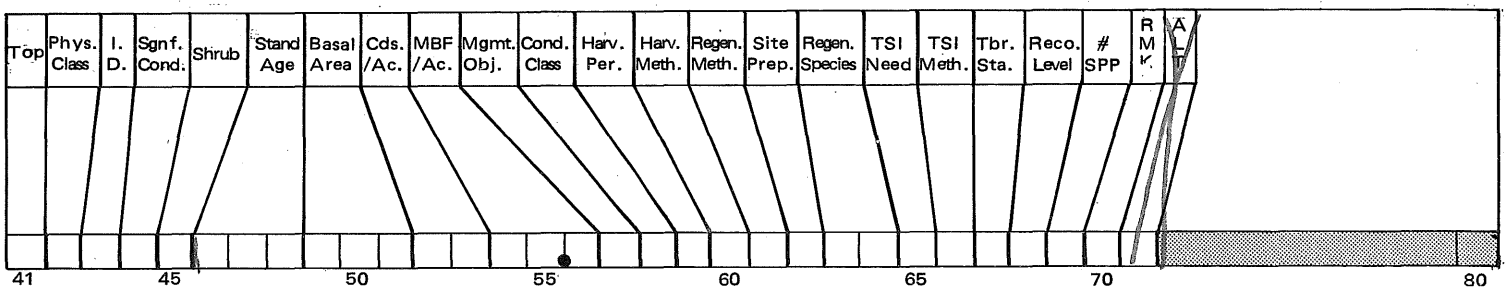
NA-01956-01
(F-280)
Rev. 2-78

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

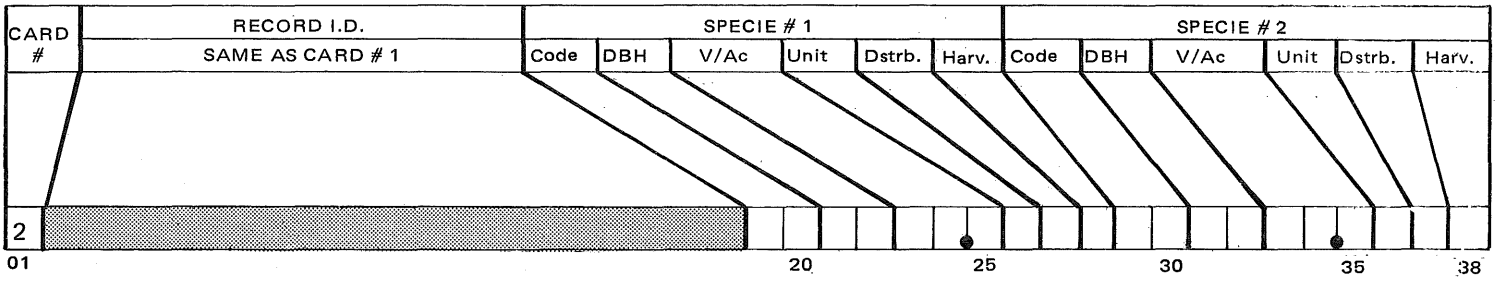
COVER TYPE EXAMINATION DATA SHEET

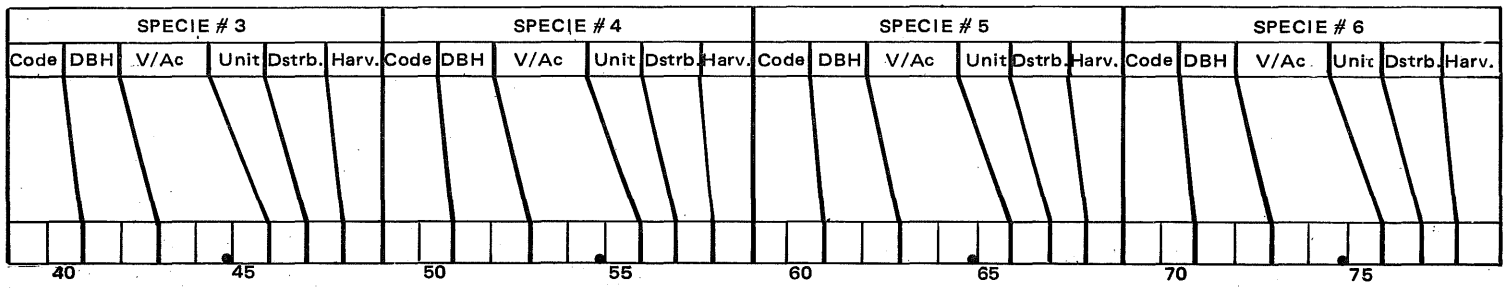
Cover Type Data



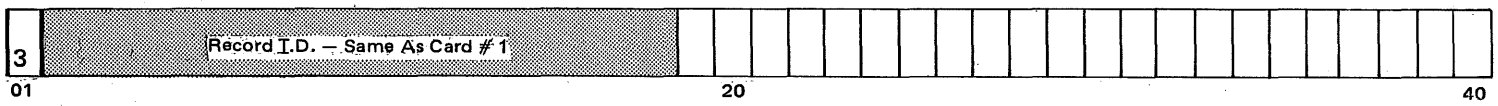


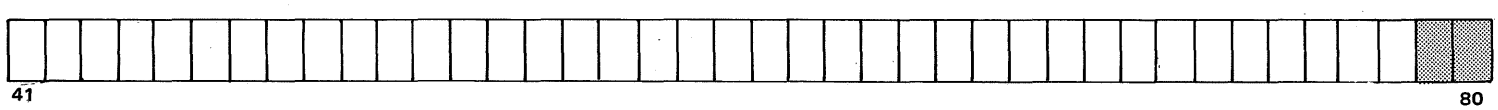
Stand Composition





Remarks





Field Inspected by_____Date: Reviewed by_____Date:

ANGLE GAUGE

IBM FOREST INVENTORY

MERCHANTABLE TYPE DATA SHEET 10 FACTOR

CUMULATIVE 104.18 MINUTE ANGLE GAUGE TALLY SHEET

0-5 NON-MERCHT.		NO. OF PLOTS
SPEC.	NO. OF TREES	

SPEC.	NO. CULL TREES	VOL. IN CDS. - MERCHANTABLE STEMS OVER 5" D.B.H. TO 4" TOP — NO. OF 8' STICKS PER TREE: 1	2	3	4	5	6	7	8	TOTAL ÷ NO. OF SAMPLES − DEFECT DEDUCTION = NET CDS./ACRE
		1 2 2 3 4 5 6 7 8 8 9 10 11 12 13 13 14 15 16 17	1 3 4 6 7 8 10 11 13 14 16 17 18 20 21 23 24 25 27 28 29 31 32 34 35 37 38 40 41 42	2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82	2 5 7 10 12 15 17 20 22 25 27 30 32 35 37 40 42 45 47 50 52 55 57 60 62 64 67 69 72 74 77 79 82 84 87 89 92 94 97 99	3 6 9 12 15 18 20 23 26 29 32 35 38 41 44 47 50 53 56 58 61 64 67 70 73 76 79 82 85 88	3 7 10 13 17 20 24 27 30 34 37 40 44 47 50 54 57 60 64 67	4 8 11 15 19 23 27 30 34 38 42 46 49 53 57	4 8 12 17 21 25 29 33 37 42	
		1 2 2 3 4 5 6 7 8 8 9 10 11 12 13 13 14 15 16 17	1 3 4 6 7 8 10 11 13 14 16 17 18 20 21 23 24 25 27 28 29 31 32 34 35 37 38 40 41 42	2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82	2 5 7 10 12 15 17 20 22 25 27 30 32 35 37 40 42 45 47 50 52 55 57 60 62 64 67 69 72 74 77 79 82 84 87 89 92 94 97 99	3 6 9 12 15 18 20 23 26 29 32 35 38 41 44 47 50 53 56 58 61 64 67 70 73 76 79 82 85 88	3 7 10 13 17 20 24 27 30 34 37 40 44 47 50 54 57 60 64 67	4 8 11 15 19 23 27 30 34 38 42 46 49 53 57	4 8 12 17 21 25 29 33 37 42	
		1 2 2 3 4 5 6 7	1 3 4 6 7 8 10 11 13 14 16 17	2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32	2 5 7 10 12 15 17 20 22 25 27 30 32 35 37 40	3 6 9 12 15 18 20 23 26 29 32 35	3 7 10 13 17 20 24 27	4 8 11 15 19 23	4 8 12 17	
		1 2 2 3 4 5 6 7	1 3 4 6 7 8 10 11 13 14 16 17	2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32	2 5 7 10 12 15 17 20 22 25 27 30 32 35 37 40	3 6 9 12 15 18 20 23 26 29 32 35	3 7 10 13 17 20 24 27	4 8 11 15 19 23	4 8 12 17	
		1 2 2 3 4 5 6 7	1 3 4 6 7 8 10 11 13 14 16 17	2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32	2 5 7 10 12 15 17 20 22 25 27 30 32 35 37 40	3 6 9 12 15 18 20 23 26 29 32 35	3 7 10 13 17 20 24 27	4 8 11 15 19 23	4 8 12 17	
		1 2 2 3 4 5 6 7	1 3 4 6 7 8 10 11 13 14 16 17	2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32	2 5 7 10 12 15 17 20 22 25 27 30 32 35 37 40	3 6 9 12 15 18 20 23 26 29 32 35	3 7 10 13 17 20 24 27	4 8 11 15 19 23	4 8 12 17	

SPEC.	NO. CULL TREES	VOL. IN HUNDREDS BD. FT. SCRIBNER TO 6" TOP (MOST CONIFERS & ASPEN) — NO. OF 16' LOGS PER TREE: 1/2	1	1 1/2	2	2 1/2	3	3 1/2	4	5	TOTAL ÷ NO. OF SAMPLES - DEFECT DEDUCTION = NET BD. FT. /ACRE
		3 6 9 12 14 17	5 10 16 21 26 31 36 42 47	7 14 22 29 36 43 50 58 65 72 79 86 94 101 108 115 122 129	9 18 27 36 45 54 63 72 81 90 99 108 117 121 135 144 153 162	11 22 33 44 55 66 77 88 99 110 121 132 143 154 165 176 187 197	13 26 39 52 65 78 91 104 117 130 143 156	15 30 45 60 75 90 105 120 135	16 33 50 66 82 99 116 132 149		
		3 6 9 12 14 17	5 10 16 21 26 31 36 42 47	7 14 22 29 36 43 50 58 65 72 79 86 94 101 108 115 122 129	9 18 27 36 45 54 63 72 81 90 99 108 117 121 135 144 153 162	11 22 33 44 55 66 77 88 99 110 121 132 143 154 165 176 187 197	13 26 39 52 65 78 91 104 117 130 143 156	15 30 45 60 75 90 105 120 135	16 33 50 66 82 99 116 132 149		
		3 6 9 12 14 17	5 10 16 21 26 31 36 42 47	7 14 22 29 36 43 50 58 65 72 79 86 94 101 108 115 122 129	9 18 27 36 45 54 63 72 81 90 99 108 117 121 135 144 153 162	11 22 33 44 55 66 77 88 99 110 121 132 143 154 165 176 187 197	13 26 39 52 65 78 91 104 117 130 143 156	15 30 45 60 75 90 105 120 135	16 33 50 66 82 99 116 132 149		
		3 6 9 12	5 10 16 21 26 31	7 14 22 29 36 43 50 58 65 72 79 86	9 18 27 36 45 54 63 72 81 90 99 108	11 22 33 44 55 66 77 88 99 110 121 132	13 26 39 52 65 78 91 104	15 30 45 60 75 90	16 33 50 66 82 99		
		3 6 9 12	5 10 16 21 26 31	7 14 22 29 36 43 50 58 65 72 79 86	9 18 27 36 45 54 63 72 81 90 99 108	11 22 33 44 55 66 77 88 99 110 121 132	13 26 39 52 65 78 91 104	15 30 45 60 75 90	16 33 50 66 82 99		
		VOL. IN HUNDREDS BD. FT. SCRIBNER TO 8" TOP (HARDWOODS & OLD GROWTH PINE)									
		3 6 9 12 15 19	6 12 18 24 30 36 42 48 54	8 17 26 34 42 51 60 68 76 85 94 102 110 118 127	11 22 33 44 55 66 77 88 99 110 121 132 143 154 165	14 27 40 54 68 81 94 108 122 135 148 162 175 189 202 215 229 242	16 32 48 64 80 96 112 128 144 160 176 192	18 37 56 74 92 111 130 148 166 185	21 42 63 84 105 126 147 159 180	26 51 76 102 128 153	
		3 6 9 12 15 19	6 12 18 24 30 36 42 48 54	8 17 26 34 42 51 60 68 76 85 94 102 110 118 127	11 22 33 44 55 66 77 88 99 110 121 132 143 154 165	14 27 40 54 68 81 94 108 122 135 148 162 175 189 202 215 229 242	16 32 48 64 80 96 112 128 144 160 176 192	18 37 56 74 92 111 130 148 166 185	21 42 63 84 105 126 147 159 180	26 51 76 102 128 153	
		3 6 9 12 15 19	6 12 18 24 30 36 42 48 54	8 17 26 34 42 51 60 68 76 85 94 102 110 118 127	11 22 33 44 55 66 77 88 99 110 121 132 143 154 165	14 27 40 54 68 81 94 108 122 135 148 162 175 189 202 215 229 242	16 32 48 64 80 96 112 128 144 160 176 192	18 37 56 74 92 111 130 148 166 185	21 42 63 84 105 126 147 159 180	26 51 76 102 128 153	
		3 6 9 12	6 12 18 24 30 36	8 17 26 34 42 51 60 68 76 85	11 22 33 44 55 66 77 88 99 110	14 27 40 54 68 81 94 108 122 135 148 162	16 32 48 64 80 96 112 128	18 37 56 74 92 111 130	21 42 63 84 105 126	26 51 76 102	
		3 6 9 12	6 12 18 24 30 36	8 17 26 34 42 51 60 68 76 85	11 22 33 44 55 66 77 88 99 110	14 27 40 54 68 81 94 108 122 135 148 162	16 32 48 64 80 96 112 128	18 37 56 74 92 111 130	21 42 63 84 105 126	26 51 76 102	
		3 6 9 12	6 12 18 24 30 36	8 17 26 34 42 51 60 68 76 85	11 22 33 44 55 66 77 88 99 110	14 27 40 54 68 81 94 108 122 135 148 162	16 32 48 64 80 96 112 128	18 37 56 74 92 111 130	21 42 63 84 105 126	26 51 76 102	

Remarks

PLOT	BA	AVE DBH
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Avg.		

MAIN COVER

TYPE	SIZE	DENSITY

UNDERSTORY

TYPE	SIZE	DENSITY

Age & Site Data

Tree No.	Spp.	DBH	Total Ht.	Age	S.I.
1					
2					
3					
4					
5					
Avg.					

Record #1

FOREST RECONNAISSANCE TALLY GUIDE

Column 1
CARD NUMBER: The card number has been entered. You do nothing in this column.

Column 2-3
COUNTY: Record the standard code number of the County in which the stand is located.

Column 4-5-6
TOWNSHIP: Record the number of the township in which the stand is located.

Column 7-8
RANGE: Record the number of the range in which the stand is located.

Column 9
INDICATES range east or west and has already been coded. You do nothing in Column 9.

Column 10-11
SECTION: Record the number of the section in which the stand is located.

Column 12-13
TYPE NUMBER: Record the number of the type within the section.

Column 14
ADMINISTRATOR:
0 - None of the Below
1 - State Forestry
2 - State Fish and Wildlife
3 - State Parks and Recreation
4 - Other State Agencies
5 - County
6 - Private

Column 15
ACQUISITION STATUS:
0 - None of the below
1 - Trust Fund (School or Swamp)
2 - Acquired Land
3 - Consolidated Conservation
4 - L.U.P. (Leased)
5 - 50-50 Land
6 - University
7 - Volstead
8 - Salt Spring
9 - Tax-Forfeited

Column 16-17-18
REGION/AREA/DISTRICT: Record the code number of the Division of Forestry district in which the stand is located.

Column 19
COMPARTMENT: Record the number of the compartment in which the stand is located

Column 20-21
STATE FOREST: Record the standard code number of the state forest in which the stand is located.

Column 22-23-24
OTHER MANAGEMENT UNIT: Record the code number of any management unit, other than a state forest, in which the stand is located

Column 25
DISTANCE TO ROAD: 0. 0 - 1 Mile
All weather ↑
1. 1+ - 2 Miles
2. 2+ - 3 Miles
3. 3+ - 4 Miles
4. 4+ - 5 Miles
5. 5+ - 6 Miles
6. 6+ - 7 Miles
7. 7+ - 8 Miles
8. 8+ - 9 Miles
9. 9+ Miles

Column 26-27
YEAR: Record the last two digits of the year in which the reconnaissance is completed.

Column 28-29
COVER TYPES:

Commercial Forest Types
01 - Ash [redacted] (Ea)
06 - Willow (Will.)
09 - Lowland Hardwoods (LH)
12 - Aspen (A)
13 - Birch (Bi.)
14 - Balm of Gilliad [redacted] (BG)
15 - Cottonwood (COT)
20 - Northern Hardwoods (NH)
25 - Walnut (Wal.)
30 - Oak (O)
40 - Central Hardwoods (CH)
51 - White Pine (W.P.)
52 - Norway Pine (N.P.)
53 - Jack Pine (J.P.)
54 - Scotch Pine (Sc.P.)
60 - Spruce Fir (SF) (Balsam Fir)
61 - White Spurce (WS)

71 - Black Spruce, Lowland (BSL)
72 - Tamarack (T)
73 - White Cedar (C)
74 - Black Spruce, Upland (BSU)
81 - Red Cedar (RC)

Nonstocked Commercial Forest Types (Deforest)
83 - Lowland Grass (L.G.)
84 - Upland Grass (U.G.)
85 - Lowland Brush (L.B.)
86 - Upland Brush (U.B.)

Noncommercial Forest Types (Unproductive)
75 - Stagnant Spruce (SX) S.I. 23 or less
76 - Stagnant Tamarack (TX)
77 - Stagnant Cedar (CX)
78 - Offsite Aspen (AX)
79 - Offsite Oak (OX)

Nonforest Types
91 - Agricultural (Agr.)
92 - Industrial Dev. (I.Dev.)
93 - Recreation Dev. (REC)
94 - Roads (Rd.)
95 - Rock Outcrop (R.O.)
96 - Permanent Water (L)
97 - Non-permanent Water (LF)
98 - Marsh (Mh.)
99 - Muskeg (Ms.)

Column 30
COVER SIZE: (Diameter)
0 - Not applicable for type
1 - 0 to 1"
2 - 1+ to 3"
3 - 3+ to 5"
4 - 5+ to 9"
5 - 9+ to 15"
6 - 15+"

Column 31
COVER DENSITY:

Code	Seedlings & Saplings 0-1" 1-5" Stems/acre	Poletimber 5-15" Cords/acre	Sawtimber 15" & Larger Bd.Ft./acre
0	0 - 250	0.0 - 3.0	0 (625) 1,250
1	251 - 750	3.1 (5) 7.5	1,251 (2,500) 3,750
2	751 - 1250	7.6 (10) 12.5	3,751 (5,000) 6,250
3	1251 - 1750	12.6 (15) 17.5	6,251 (7,500) 8,750
4	1751 - 2250	17.6 (20) 22.5	8,751 (10,000) 11,250
5	2251 - 2750	22.6 (25) 27.5	11,251 (12,500) 13,750
6	2751 - 3250	27.6 (30) 32.5	13,751 (15,000) 16,250
7	3251 - 3750	32.6 (35) 37.5	16,251 (17,500) 18,750
8	3751 - 4250	37.6 (40) 42.5	18,751 (20,000) 21,250
9	4251 +	42.6 (45) +	21,251 (22,500) +

Column 32-33-34-35
UNDERSTORY TYPE, SIZE, DENSITY: Use the same codes as used for cover type, size, and density.

Column 36-37-38
ACRES: Record the number of acres in this type.

Column 39-40
SITE INDEX: Record the actual site index of the stand. Measure only trees 25' in height or taller. [redacted]

Column 41
TOPOGRAPHY:
1 - Level
2 - Rolling
3 - Steep

Column 42
PHYSIOGRAPHIC CLASS:
1 - Xeric Site: Very dry, droughty site where excessive drainage seriously limits both growth and species occurrence such as thin soiled ridge tops and jack pine plains.
2 - Xeromesic Site: Moderately dry site where excessive drainage limits growth and species occurrence to some extent such as oak ridges and jack pine assoc.
3 - Mesic Site: Deep, well drained soils offering favorable management condition.
4 - Hydromesic Site: Poor drainage or frequent flooding limits species occurrence such as better drained bottomland hardwood sites and hard pan soils of coniferous forests.
5 - Hydric Site: Growth and species occurrence are seriously limited by excess water such as wet, frequently flooded river bottoms and spruce bogs.

Column 43
INSECT, DISEASE, DAMAGE (remark)
0 - Healthy: no significant problems
1 - Light Insect: noticeable signs
2 - Heavy Insect: more than 50% affected
3 - Light Disease: noticeable signs
4 - Heavy Disease: more than 50% affected
5 - Combination of Insect & Disease
6 - Mortality or Cull: significant % affected
7 - Weather: significant weather damage
8 - Animal: significant animal damage
9 - Other Damage or Cause unknown

Column 44
SIGNIFICANT CONDITIONS: remark
0 - None or none known
1 - Unusual Botanical Features
2 - Unusual Geological Features
3 - Unusual Historical Features
4 - Unusual Scenic or Recreation Potential
5 - Eagle or Osprey Nesting Site
6 - Active Deer Yarding Area
7 - Other Unusual Wildlife Feature
8 - Other Features (remark)

Column 45
SHRUBS: (vegetation less than 10' tall)
0 - None to light stocking (0-39%)
1 - Conifers: medium stocking (40-69%)
2 - Conifers: dense stocking (70+%)
3 - Hazel/Alder: medium stocking
4 - Hazel/Alder: dense stocking
5 - Other tall shrubs[a]: medium stocking
6 - Other tall shrubs[a]: dense stocking
7 - Low shrubs[b]: medium stocking
8 - Low shrubs[b]: dense stocking
9 - Condition unknown (snow, not observed)

(a) Examples: Cherry, Red Osier, Elderberry, Hawthorne, Cranberry, Bush Honeysuckle, Juneberry, Mountain Maple

(b) Examples: Blueberry, Labrador Tea, Leather Leaf, Rasberry, Arrowwood

Column 46-47-48
STAND AGE: Record the actual age of the stand.

Column 49-50-51
BASAL AREA/ACRE: Record the actual basal area per acre of the stand

Column 52-53
CORDS/ACRE: Record the actual cord volume per acre for any timber that is from 5" DBH to 15" DBH to a 4" top diameter - all species.

Column 54-55-56
THOUSANDS OF BD.FT./ACRE: Record the actual Bd.Ft. volume per acre in thousands for any timber that is 15" or larger DBH to a 6" top diameter - all species.

Column 57
MANAGEMENT OBJECTIVE:
0-Natural Maintenance of Present Type
1-Forced Maintenance of Present Type
2-Natural Conversion of Present Type
3-Forced Conversion of Present Type

Column 58
CONDITION CLASS:
0 - Nonstocked (except regeneration)
1 - High Risk: those stands which will not survive or will have a net volume loss before the next management period (10 years).
2 - Mature: any stand at or beyond rotation age and which does not fit into the above category.
3 - Immature: any stand less than [redacted] rotation age and which does not fit into the above categories.
4 - In the Process of Regeneration: stands which have been cut over but a final stocking survey has not been made.

Types less than 10 yrs.

Column 59
HARVEST PERIOD:
0 - Not Applicable or Nonmerchantable size.
1 - Harvest: 0 to 5 years
2 - Harvest: 0 to 10 years
3 - Reserve: but of Merchantable size.

Column 60
HARVEST METHOD:
0 - Not applicable or None Prescribed
1 - Clearcut
2 - Other Regeneration Cut[a]
3 - Intermediate Cut[b]

(a) e.g.,seed tree, shelterwood, [redacted]
(b) e.g., commercial thin, salvage, sanitation, Selection

Column 61
REGENERATION METHOD:
0 - Not Applicable or None Needed
1 - Natural Regeneration
2 - Hand Plant
3 - Machine Plant
4 - Direct Seed

Column 62
SITE PREPARATION:
0 - Not Applicable or None Needed
1 - Hand Prep
2 - Aerial Herbicide
3 - Ground Herbicide
4 - Bulldozer
5 - Machine Scalp
6 - Other Mechanical
7 - Prescribe Burn
8 - Other (remark)

CARD 1
Column 63-64

CARD 2
Column (19-20)(29-30)(39-40)(49-50)etc.
SPECIES

BASH	01-Ash, Black	36-Oak, Scarlet	SOAK
AELM	02-Elm, American	38-Ash, White	WASH
SMAP	03-Maple, Soft	39-Ash, Green	GASH
RELM	04-Elm, Red	41-Hickory, Bitternut	BHK
ROCE	05-Elm, Rock	42-Hickory, Shagbark	SHIC
WIL	06-willow	43-Hackberry	HACK
ASP	12-Aspen, Trembling	45-Box Elder	BOXE
PBIR	13-Birch, Paper	51-Pine, White	WP
BG	14-Balm of Giliad	52-Pine, Norway	NP
COT	15-Cottonwood	53-Pine, Jack	JP
LASP	16-Aspen, Largestooth	54-Pine, Scotch	SCP
POP	17-Poplar, Hybred	55-Pine, Ponderosa	PONP
RMAP	21-Maple, Red		
HMAP	22-Maple, Hard	61-Spruce, White	WS
BASS	23-Basswood	62-Balsam Fir	BF
YBIR	24-Birch, Yellow	63-Spruce, Colorado	CSPR
WAL	25-Walnut	64-Spruce, Norway	NSPR
BUTT	26-Butternut	65-Spruce, Blk.Hills	
CHER	27-Cherry	71-Spruce, Black	BSPR
ROAK	31-Oak, Red		
BOAK	32-Oak, Black	72-Tamarack	TAM
EOAK	33-Oak, English	73-Cedar, White	WCED
WOAK	34-Oak, White		
OAK	35-Oak, Burr		
		81-Cedar, Red	RCED
		99 Miscellaneous	

Column 65
T.S.I. NEEDS:
0 - Not Applicable or None Needed
1 - Noncommercial Thinning
2 - Pruning
3 - Release
4 - Other (remark)

Column 66
T.S.I. METHOD:
0 - Not Applicable
1 - Hand Tools
2 - Mechanical
3 - Aerial Herbicide
4 - Ground Herbicide
5 - Other (remark)

Column 67
TIMBER STATUS:
0 - Not Applicable
1 - Normal Timber Harvesting Allowed
2 - Restricted Timber Harvesting Allowed
3 - No Timber Harvesting Allowed

Column 68
RECONNAISSANCE LEVEL:
1 - Photo Only
2 - Air Checked
3 - Field Checked
4 - Type Comparison

Column 69
NUMBER OF SPECIES: Record the total number of Species that data was collected on in "Stand Composition Section" Card 2.

Column 70
ENTRY IN REMARKS
0 - No remark made
1 - Yes, a remark has been made

Column 71
ALTERATION NUMBER: To be used only for changes to the original type area after the basic survey. Enter "0" during

STAND COMPOSITION SECTION
Card 2

Pertains only to the merchantable size timber within a type (5" or larger D.B.H.).

The first 18 columns are reserved for identification. You do nothing with the first 18 columns.

Column 19-20
SPECIE: Record the code number for the specie from the Species Code List.

Column 21-22
DIAMETER BREAST HEIGHT: Record the estimated average diameter of the specie identified in Column 19-20.

Column 23-24-25
VOLUME/ACRE: Record the estimated volume per acre of the above specie over the entire stand area.

Column 26
VOLUME UNITS:
[redacted]
1 - Cords/Acre
2 - Thousand Bd. Ft./Acre

Column 27
DISTRIBUTION:
1 - Specie is distributed throughout the type.
2 - Specie is in clusters throughout the type.
3 - Specie is in a single cluster within the type.

Column 28
HARVEST?: Record the code number representing whether this species in the type should be harvested within the next 10 years.
0 - No
1 - Yes

REMARKS SECTION
Card 3

The first 18 columns are reserved for identification. You do nothing with the first 18 columns.

Record up to 62 characters of print, items that pertain to conditions found in the stand. Be brief.

Aspen g-1 p-2
ASH g-8 p-15
WP g-8 p-12
ELM g-4 p-8
NP g-6 p-10
BASS g-2 p-4
JP g-5 p-8
BG g-1 p-2
BSpr g-10 p-20
OAK g-3 p-6
TAM g-5 p-10
WCED g-10 p-20
PBIR g-2 p-4
YBIR g-8 p-15
HMAP g-8 p-15
SMAP g-2 p-4

Years to reach bh by site

B.F g 10 p 20
W.S. g 10 p 15

TYPE MAPPING SYMBOLS

Improved road: (gravel, asphalt, etc.) ═══════

Unimproved road: (dirt, cart or snowmobile trail, etc.) - - - - - - -

Railroad: ┼┼┼┼┼┼┼┼┼

Drainage ditch: —— —— ——

Utility line: (other than within road right-of-way) ——·——·——

Pipeline: ——— o ——— o ———

River or stream: (not ditch) ——— ... ——— ... ———

-Water boundaries of a river should also be delineated if of significant width.

State forest boundaries - brown border

State land within a state forest - red border

State land outside a state forest - yellow border

County land - green border

AERIAL PHOTO CORNER RECORD SYMBOLS

TO BE RECORDED ON THE REVERSE SIDE OF AERIAL PHOTOGRAPHY

Land Corner, recovered (over pin-prick on back side of photo)

BT Bearing tree

IP Iron pipe

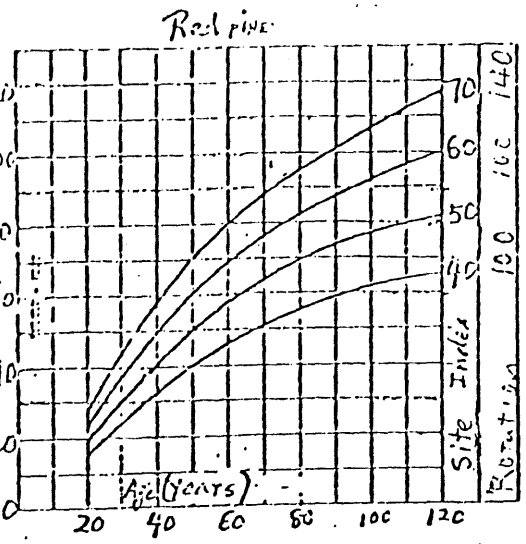
SP Scribed post

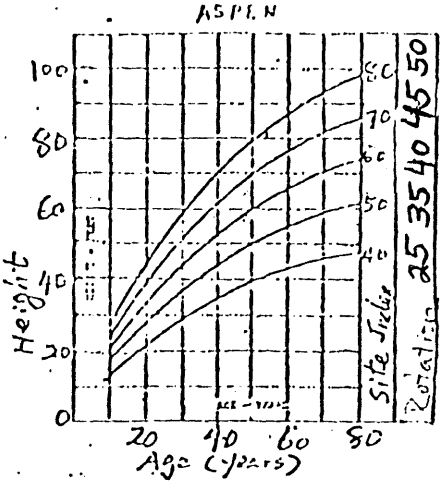
YT Yellow tag marker

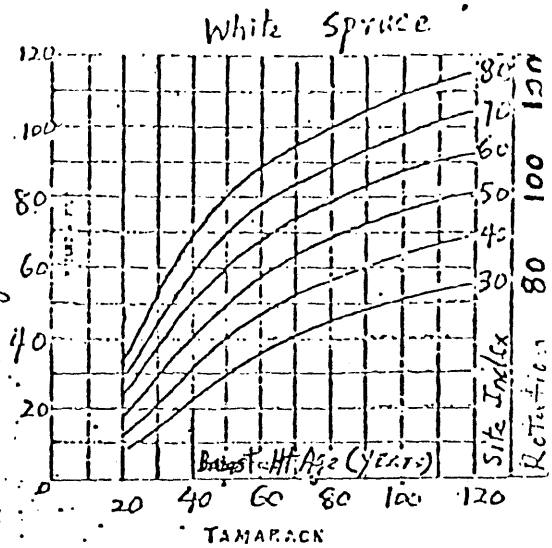
MON Permanent monument, stone or concrete

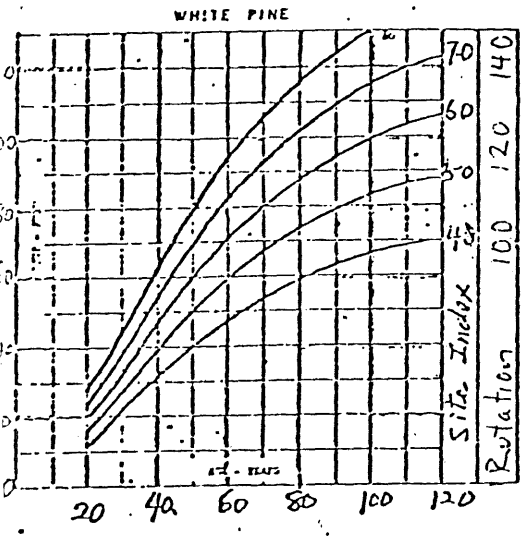
WM Witness Mark, capped pipe, stake or other marker indicating direction (azimuth) and distance to corner

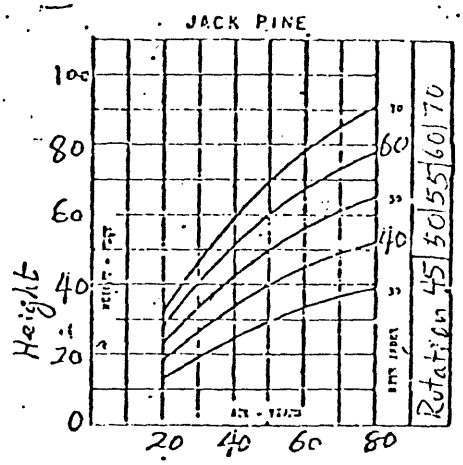
Site Index Curve

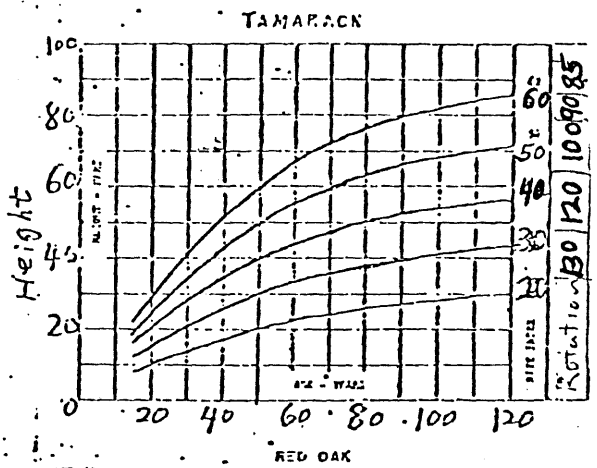


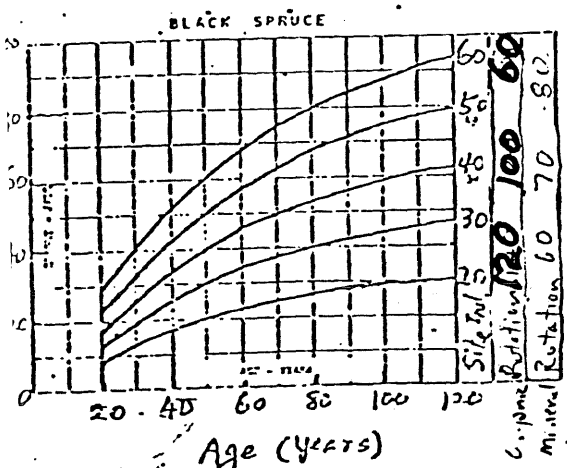


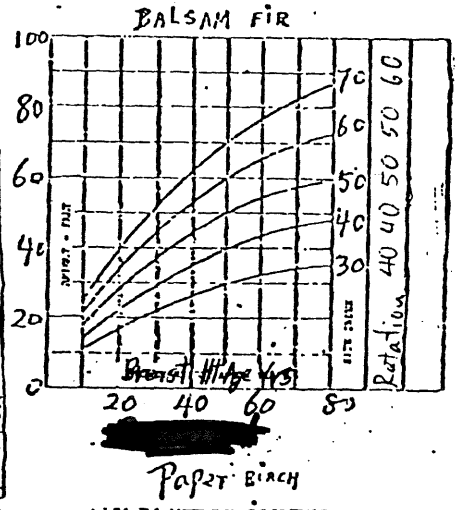


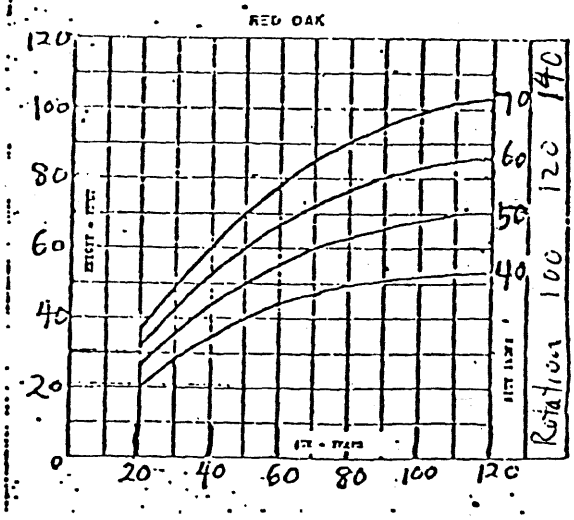


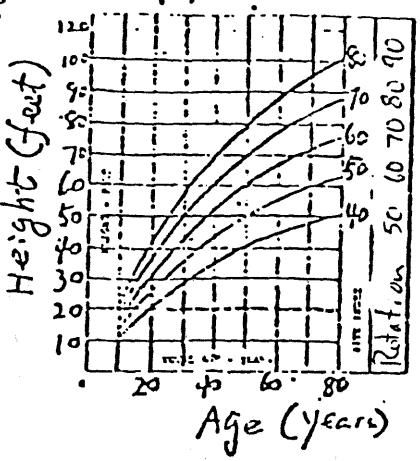


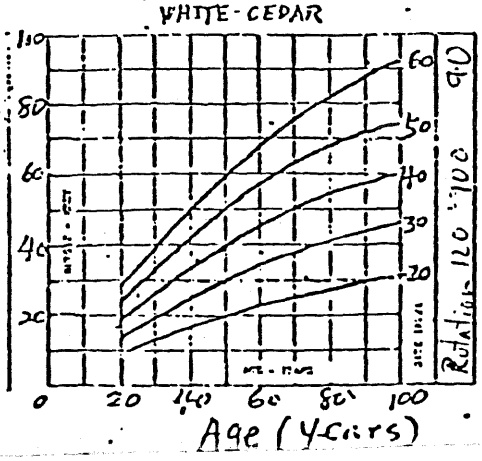




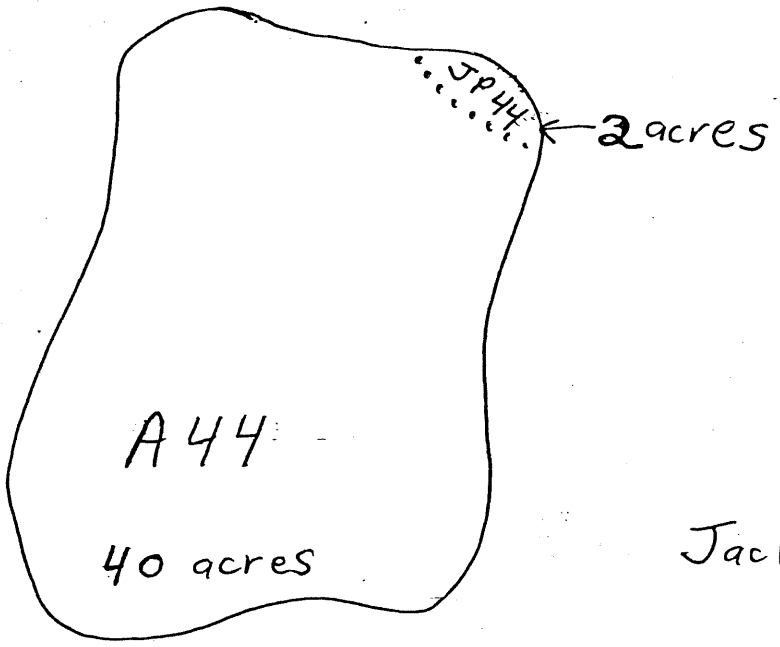








Volume Reduction for Inclusions



Aspen Type
Jack Pine Inclusion

40 cords JP / 2 plots = 20 cds/acre of JP for Inclusion

20 cds/acre X 2 acres = 40 cords JP Total

40 cords / 40 acres = 1 cord JP/acre for Type —
located in a single cluster