

INSTRUCTIONS FOR THE
SECOND ILLINOIS FOREST SURVEY - OCTOBER 1961

Revised 2/15/62

LAKE STATES FOREST EXPERIMENT STATION
FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE
St. Paul 1, Minnesota

TABLE OF CONTENTS

	<u>Page</u>
I INTRODUCTION	1
II FOREST INVENTORY	4
A. The Sample	4
B. Status of Aerial Photography	4
C. Determining the Area of Forest Land	5
D. Collection of Field Plot Data	8
III TIMBER CUT SURVEYS	11
A. Timber Products Reports from Industry	11
B. Stump Tallies on Forest Products Plots	15
C. Cutting Reports by Ownership Classes	16
D. Mill Residues Resulting from Processing Logs and Bolts ..	16
E. Utilization Factors for Converting Timber Products to Timber Cut	16
IV DEFINITIONS, CLASSIFICATIONS AND CODES	22
1. State	23
2. District	23
3. County	23
4. Current Ground Class-Land Area	25
5. Cover Type	27
6. Size-Stocking Classifications	29
7. Area Condition Classes	30
8. Site Classification	30
9. Land Use Trend	30
10. Basal Area	31
11. Stand Age	31
12. Ownership	31
13. Stand Treatment Classification	32
14. Silvicultural Guides to Classifying Stand Treatment	33
15. Prospective Growing Stock Without and With Treatment ...	43
16. Stocking Percent; Desirable, Growing Stock, All Trees ..	43
17. Points Overstocked	43
18. Previous Type, Stand-Size and Density of Stocking	43
19. Summary of Observations	43
20. Tree Numbers	44
21. Species	44
22. Diameter Breast Height	44
23. Merchantable Height	45
24. Cubic Foot Loss	46
25. Stocking and Tree Class	49
26. Point Action	54
27. Cut or Leave	55
28. Timber Quality	55
29. Radial Growth	59
30. Height Change in Ten Years	59

INSTRUCTIONS FOR THE SECOND ILLINOIS FOREST SURVEY

Lake States Forest Experiment Station

October 1961

I. INTRODUCTION

The Forest Survey carries on a comprehensive and continuing inventory of the timber resources of the United States as authorized by Congress in the McSweeney-McNary Forest Research Act of May 1928 and subsequent amendments. Its objectives are to provide up-to-date information on forest land area, timber volume, growth, mortality, timber cut, potential productivity and forest ownership. It is financed to provide this information for states and districts. The interpretation of these facts provides the basis for planning the management and development of the forest resource. Reoccurring surveys at about 10 or 12 year intervals will provide guidance to developmental and management programs.

The first Forest Survey of Illinois was made in 1947 and 1948 by the Central States Forest Experiment Station with the cooperation of the University of Illinois Agricultural Experiment Station and the Division of Forestry, Illinois Department of Conservation. It is reported in Bulletin No. 562 of the University of Illinois Agricultural Experiment Station entitled, "Forest Resources and Industries of Illinois".

The current Survey will be run for the Central States Forest Experiment Station by the Forest Survey Unit stationed at St. Paul, Minnesota. Photo-interpretation began in August 1961. Field-work will be completed in July 1962. Considerable effort was made by certain organizations to obtain such additional cooperation as might be necessary to secure resource information by counties, but without success.

The plan outlined here is the outgrowth of talks with the several cooperators in Illinois. It is designed to utilize the efforts which each organization is able to put into this Forest Survey. The U.S. Forest Service will provide an inventory of the Shawnee National Forest. The Central States Forest Experiment Station (including the Carbondale Research Center) will conduct timber production surveys, coordinate the overall programs, assist with training, service requests for data, and write and publish the State report. The Lake States Station will have prime responsibility for planning, conducting the inventory and computing both inventory and timber cut data. The Division of Forestry, Department of Conservation will assist with collection of timber cut data and providing office space. The Department of Forestry, University of Illinois and the Department of Forestry, Southern Illinois University will assist with arranging and planning the program, with training and with other activities as they may be able to participate. The Agricultural Stabilization and Conservation State Offices will provide office space and use of aerial photos.

The inventory phase of the survey provides for classification of 282,000 forest and nonforest dots on aerial photos; stereoclassification of 7,300 forest points on aerial photos, the establishment of over 600 permanent ground plots on forest land, checking of 5,300 nonforest points and ownership studies in 102 counties. This will yield accuracy levels of close to $\pm 2^5$ percent per million acres and $\pm 2^5$ percent per billion cubic feet 2 out of 3 times.

Timber cut estimates will be based on a canvass of all major primary wood-using industries except that a sample canvass will be made of sawmills.

District boundaries and ~~percent~~ (in 1948) of forest land by counties is shown in figure 1.

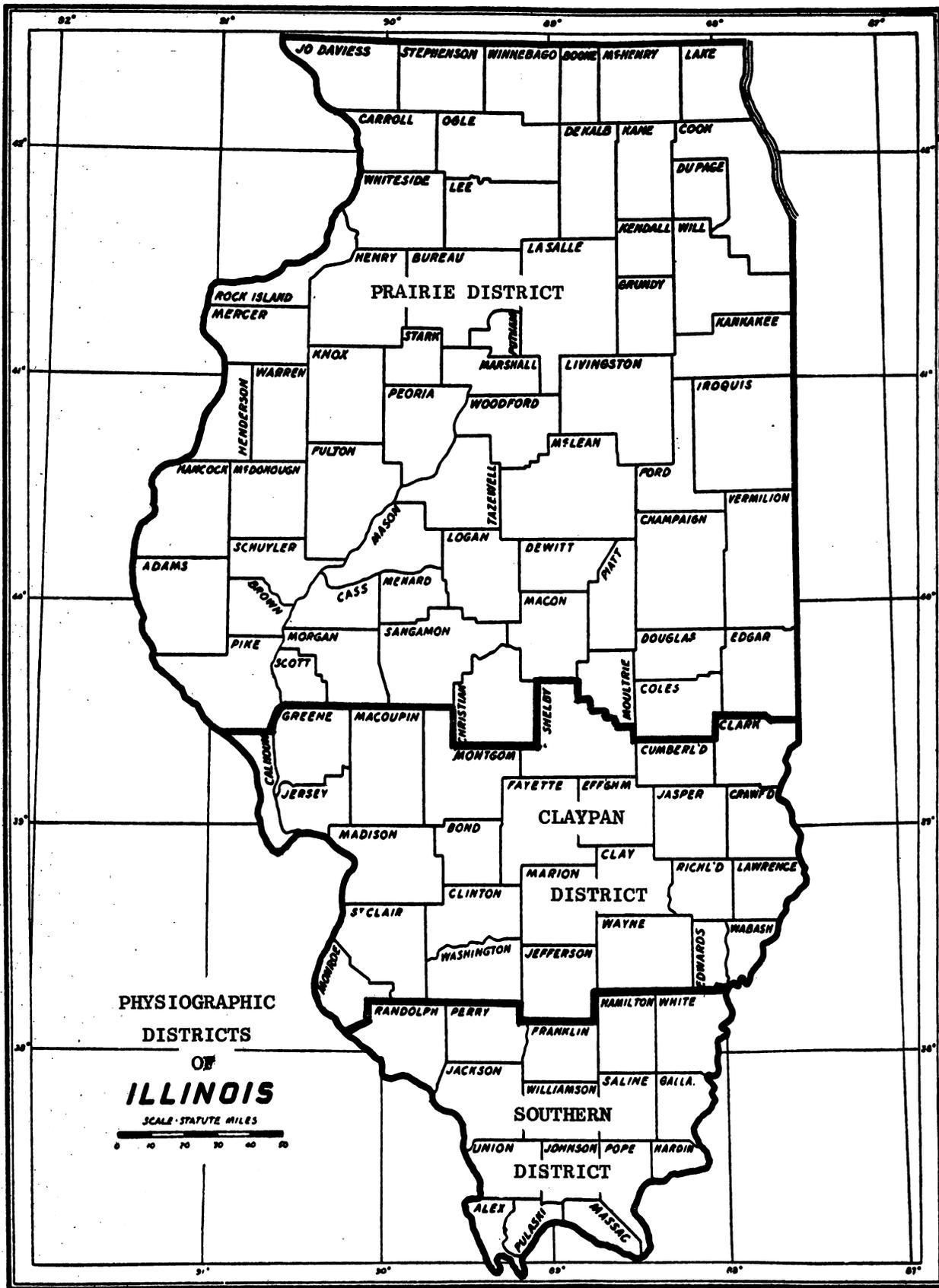


Figure 1.--Forest Survey Districts

II: FOREST INVENTORY INSTRUCTIONS

A. The Sample

A three-stage proportional sample will be used in Illinois. The first stage will be a dot classification made on aerial photographs. The one-acre points will be classified as forest, water or other nonforest. One-fourth of these points will be stereo-classified as to type, stand-size, stocking and site. One-twelfth of the latter points will be checked on the ground and a permanent plot will be established on each commercial forest point.

The selection of sample points will be made on aerial photography using a transparent overlay. This overlay will contain 20 dots which provide for 5 samples of 4 dots each by a "multiple random starts" procedure. This provides a multiple systematic sample, free of bias and not subject to periodicity. Resulting data will be computed as 5 independent samples of the same universe and also as one stratified--systematic sample-as a test of the relative efficiency of the two designs.

The entire state will be used as a sampling area for the following types:

- Northern pine
- Shortleaf-loblolly pine
- Redcedar-hardwoods
- Oak-pine
- Maple-beech
- Aspen-birch
- Oak-gum-cypress
- Pin oak

If not enough samples are obtained in a type they will be combined for volume computing with those of the most similar type. The following types will be sampled as two areas, south and north, because of differences in species mixtures:

- Central mixed hardwoods
- Oak-hickory
- White oak
- Elm-ash-cottonwood

B. Status of Aerial Photography

The oldest aerial photography to be used in Illinois was taken in 1955. It is all on panchromatic film at a scale of 1:20,000. Arrangements have been made for use of contact prints belonging to the Agricultural Stabilization and Conservation Administration and located in the State Office at Springfield. Permission has been obtained to mark plot locations on these prints. Since they will be turned over to another cooperator, the State Forester, when new photos are made they will be available for use at time of remeasurement.

C. Determining The Area of Forest Land

A grid of sample acres on a transparent acetate sheet will be laid over every second aerial photo. Since it is designed to cover two stereomodels, the grid provides 100 percent coverage of the land and water area when every second photo is used. The arrangement of dots is adjusted for scale and overlap specifications so that no area will be covered twice or be unsampled.

The grid provides for 20 points--each representing approximately 128 acres. These points are laid out as five independent samples on a large grid base. The first point in each sample group is randomly selected. The remainder in each group are systematically spaced from the first point. A transparency is oriented by random number over this grid base and points are marked on the grid overlay. Each sample group (start) constitutes a valid sample of the photo area.

The first step in the inventory procedure is to lay the transparent grid (aligned by fiducial marks) over a contact print and classify each sample acre as forest, water, or other nonforest.

The classification of each point will be recorded on a "photo record" port-a-punch card (figure 2) by start and point number. The number of points in each classification in each start will be punched into the card. District and county will be punched into the card so that forest area data can be summarized. Punch position 0 in column 50 of these cards.

The second step is selection of photos to be used for stereo-classification. Since 1/4 of the photos are to be selected, one-half of the photos in one-half of the flight lines will be chosen by random means. After arranging all port-a-punch cards in order by photo number with flight line, draw a random number. If it is odd, select the first of the 2 flight lines. If even, take the second of these two flight lines. Make similar selections from all pairs of flight lines and segregate cards into those selected and those rejected. Similarly, within a selected flight line determine by random number whether the first (odd) or second (even) card from each successive pair should be sampled. Segregate cards to be used in further sampling. Punch position 1 in column 50 of these cards.

The third step is to stereoclassify every forest point on the selected cards. Using a 2 or 4 power stereoscope classify forest cover as softwood, upland hardwood or lowland hardwood; stand-size and stocking into 6 general classes and site into 4 physiographic site classes. These classes for the first forest point on a photo will be punched on the port-a-punch card for the photo. Data for subsequent points on the same photo will be punched on extra cards and filed behind the photo card pending gang punching of locational data. All cards for the stereo-classified points will be punched 1 in column 50.

ILLINOIS FOREST SURVEY

SCALE 1:20,000

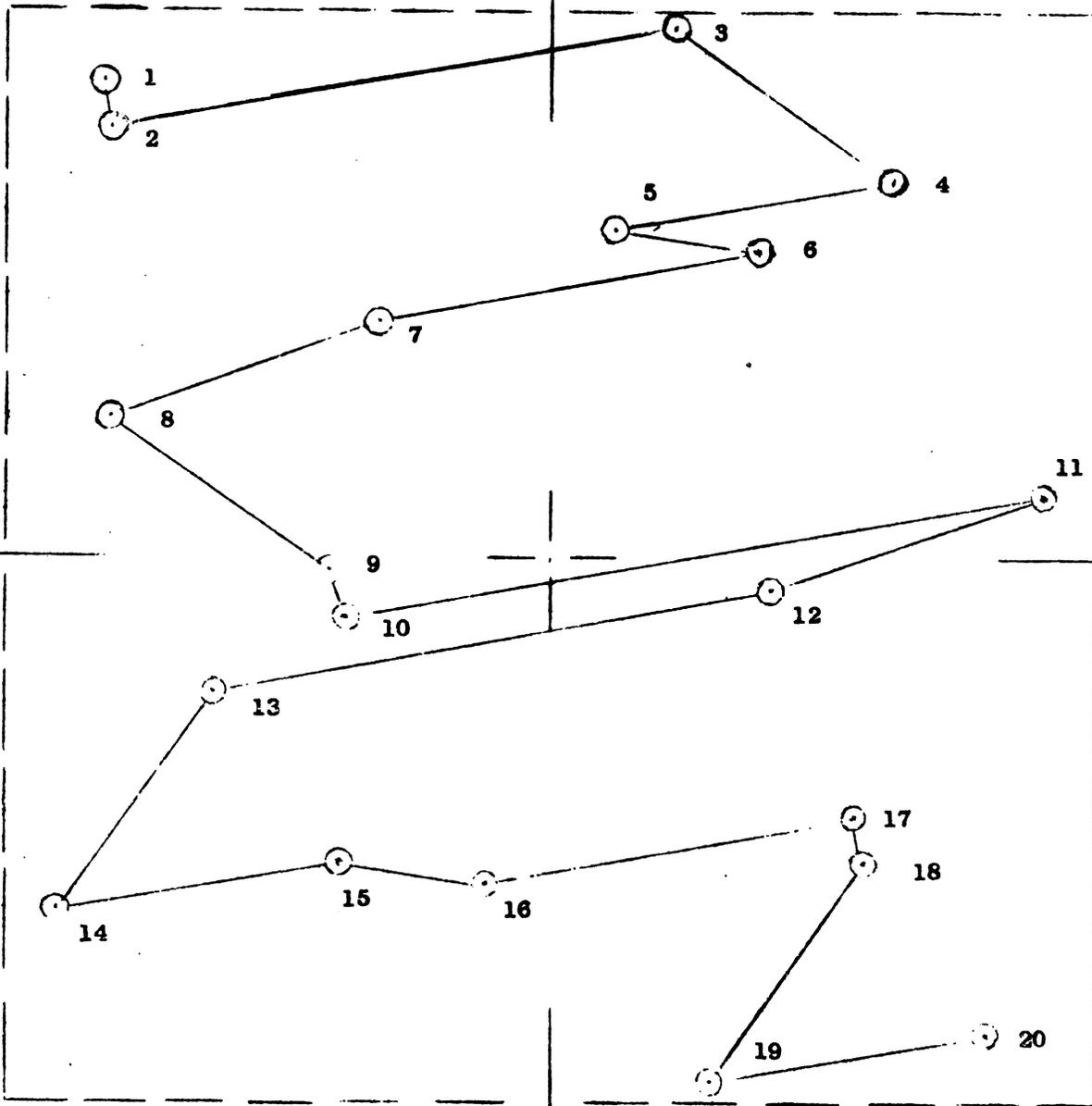


Figure 2.--Illustration of transparent grid composed of 20 sample acres (4 in each of 5 random starts).

The fourth step is selection of plots for fieldwork. The plan calls for field checking 1/48 of the forest-nonforest dots. Step 2 resulted in selection of 1/4 of the photos in a semisystematic pattern. Now scan the points listed on the right side of the "photo record" cards, counting and marking every 12th point in each start for ground checking. Some of these selected points will be forest and some will be nonforest points. If they are forest points the "photo record" card for that point should be set aside for fieldwork. If nonforest, a photo record card should be prepared. The point should be studied under stereoscope. If it is located in an area which is unquestionably nonforest, no field check will be undertaken. If it might be forest its card should be set aside for ground checking. All cards designated for fieldwork will be punched 2 in column 50. The location of both forest and nonforest ground checks should be pin-pricked and marked by grease pencil on the aerial photo and plotted on a county road map. It is suggested that steps 3 and 4 be handled for each photo before proceeding to the next photo. The forest stereoclassification must be made before plots are selected for fieldwork. Then the selection and scanning of nonforest dots should be done while photos are still set up under the stereoscope. A "Survey Plot Sheet" should be prepared for each point to be ground checked.

The fifth inventory step is ground checking. The chief of party or cruiser will lay out a travel plan to achieve the maximum plot work at least cost. At each point the cruiser will determine whether the sample acre is forest or nonforest. If forest, a permanent plot will be established. If nonforest, only the "ground land classification" need be recorded. In both cases he will punch the ground classification on the photo record card.

The area of forest land will be computed using these cards. Numbers of dots classed as forest, water, and other nonforest will be summarized by "start" and county. Other total numbers of points in each photo class which are found to be in various ground classes will also be determined. The latter will provide correction factors which will be used to adjust the dot county records for each county and to adjust for errors in stereoclassification of type and stand-size density.

D. Collection of Field Plot Data

At each ground check which turns out to be forest land, a permanent plot will be established and a Survey Plot Sheet (figure 4) will be completed. The plot will consist of 10 subplots, well distributed over the acre. An equilateral triangle pattern will be used with one subplot at its center, three at its apexes and two on each side. The subplots are 1 chain apart along the sides of the triangle and six of them are one chain distance from the center subplot. The apex points are 114.3 feet from the plot center. Each subplot is a circular Bitterlich plot with a factor of 37.5. A stick angle-gauge will be used for trees definitely within the plot. Marginal trees should be measured by tape from plot center to center of the tree. A radius of 1.42 feet for each inch of diameter (to closest 1/10 inch) will be allowed. A table titled "Variable Plot Radii by DBH and Percent Slope, Basal Area Factor 37.5" provides radii for various diameters is presented on Forest Survey Tatum Guide No. 8.

Fixed plots at these same points will be used to sample the following:

Seedlings (tree species below 1.0" d.b.h.) and
brush, sod, or slash - 5.26 foot radius

2" class (1.0 to 2.9" d.b.h.) trees - 5.89 foot radius

4" class (3.0 to 4.9" d.b.h.) trees - 6.80 foot radius

Two trees are expected on each subplot in a fully stocked, well distributed stand. Mortality and timber cut will also be classified at each subplot using larger circular samples:

4" class (trees 3.0 - 4.9" d.b.h.), 1/100 acre - 11.8 foot radius

Poles (trees 5.0 to 10.9" d.b.h.), 1/50 acre - 16.6 foot radius

Sawtimber (trees 11.0+ d.b.h.), 1/15 acre - 30.4 foot radius

In addition to being pin-pricked on the aerial photo, the center of the sample plot is referenced on the back of the plot sheet to a starting point which is clearly distinguishable on the aerial photo and on the ground. The starting point is marked XX using paint. The direction and distance to plot center are recorded and line trees are marked X along the line. At the plot center three or four witness trees, if available, will be marked with a painted X on the stump facing plot center.

The plot center will also be the center of subplot 0. Each tree over 1" d.b.h. which is tallied on the subplot will be marked with a 1½-inch horizontal paint mark at breast height on the side toward the subplot center and with a similar vertical mark on the side of the stump facing the subplot center. A number 9 telephone wire stake bent into a circle at one end will be stuck into the ground at plot center and at the center of each subplot. An eight inch length of relatively inconspicuous plastic flagging will be tied to the stake to assist in its relocation. Since these are permanent plots we must be able to relocate them after ten years. Yet the markings must not be prominent enough to affect forest practices.

The cruisers will measure off 114.3 feet to the north to center of subplot 1. Thence, 1, 2, and 3 chains at azimuth 150° to subplots 2, 3, and 4. Thence, at one chain intervals at azimuth 270° to subplots 5, 6, and 7. Thence, at the same interval at azimuth 30° to subplots 8, 9, and X. If the line does not end at center of subplot 1, note the direction and distance from X to subplot 1. Mark position of X on plot sheet.

The use of the tally of ten subplots as one plot sample not only provides a better sample of the acre but facilitates more objective and mechanical classifications. The subplot size is such that two trees are expected on each subplot if the stand is fully stocked (75 square feet per acre) with well distributed trees. Larger trees require more growing space. The Bitterlich plot provides a plot size which increases with tree size. Since basal area is not a good measure of the stocking of seedling and saplings, fixed plots are used for them.

At each subplot the two most dominant trees will be tallied. If no tree is found, the presence of inhibiting brush, sod, or slash will be reported. The two stocking classifications at each of 10 points provide 20 observations which are used to classify stocking, stand-size, stand type, and area (stand) condition. Record of action needed to adequately stock each subplot is also made. This facilitates preparation of a sound recommendation for stand treatment. This measure of stand classification and treatment is known as the Hasel-Larson method.

At each subplot the two most dominant or codominant trees (including culls) of any size are considered to occupy the sample point. If there are additional dominant or codominant trees, the growing space is overstocked.

When a point is occupied by one larger and one or more smaller trees, decision must be made as to whether a smaller tree is dominant or codominant. A tree which gets enough side light so that it is free growing and shows promise of becoming a dominant or codominant tree will be considered to occupy the point. A seedling or sapling size tree of seed or seedling sprout origin will be given preference over one of stem or root sprout origin. Seedlings and saplings under 3.0" dbh of certain species will be given preference in certain type and site situations (table 5).

If the point is dominated by a tree whose stem is not on the plot, the tree will be tallied to provide for stand classification but not for volume computing. If this tree dominates the point to exclusion of other free growing trees it will be tallied twice for stand classification. Similarly, a tree on the point which completely dominates it may be tallied twice; once for both classification and volume computing and once only for stand classification.

In the absence of any qualifying tree, two-thirds or more occupancy by inhibiting shrubs, herbs, sod or slash within the plot radius assigned to seedlings indicates full occupancy by inhibiting cover or condition. To be inhibiting the vegetation or slash must be of such species and/or density as to prevent establishment and growth of a desirable tree.

With one qualifying tree present at a point, one-third to two-thirds occupancy within the plot radius assigned to seedlings by inhibiting cover will be tallied as one-half occupancy by inhibiting cover. With one qualifying tree and less than one-third occupancy no occupancy of inhibiting cover is credited. When no tree or inhibiting condition is found the cruiser will classify the area as nonstocked or nonstockable.

Two observations will be tallied for each point in the center section of the survey plot sheet using standard codes (tatum guide No. 7). These observations report on the trees dominating the point or, if no tree dominates, on the situation found there. Both observations may often be given the same code.

1. If a tree over 5" dbh on the subplot is involved, tally all data which applies. Tree number, species, dbh, merchantable height 4", merchantable height 8", cubic-foot loss, S&T (stocking and tree) class, point action, cut or leave and height change in 10 years will always be given. If the tree is of saw-timber size and on one of the three corner points also tally log quality information by grade, with the board foot cull in each grade. If all is in one grade record x/o in % column for the grade involved and show the board foot loss. If the tree is of sawtimber size and on other than corner points or is a cull on any point, record y/o in % column and board foot loss for entire tree in "Loss" column under grade 3. Record radial growth for all trees 3" dbh and larger found on the three corner points.

2. If a tree is less than 5" dbh, tally tree number, species, dbh, S&T class, and point action. If it is capable of becoming pole size within 10 years also indicate present merchantable height-4" and height change in 10 years. Show seedlings (below 1" dbh) as 000 dbh.

3. If a tree on the subplot completely dominates it, record the tree completely (see 1 above) only once. As a second observation show the same tree number, species, dbh, S&T class, and point action, and record "B" in the merchantable height-8" column. This tree will count as two observations for classifying stand, and as one tree for computing volume and basal area. If a tree off the subplot partially dominates it, tally tree number, species, dbh, S&T class, and point action, and write "A" in the merchantable height-8" column. If a tree off the subplot completely dominates it, record the tree first as noted above and second the same except for showing "AB" in place of "A" in the merchantable height-8" column. "Off plot" trees will be used for classifying the plot but not for volume or basal area computing.

4. If no tree is observed, report tree number (point # 00), S&T class (40, 50 or 60) and point action.

5. When there are more than two trees stocking the subplot, the two most dominant of the dominant and codominant trees will be recorded in the center section of the survey plot sheet and the "additional growing stock trees," 1" dbh ^{and} over, will be recorded in the lower section.

In rating stocking only trees in the dominant and codominant crown classes will be considered. Stocking of all such live trees will be used to classify land area and cover type. For classifying stand size-stockings and stand-age, the dominant and codominant growing stock trees tallied in the center section of the survey plot sheet will be used. For classifying area condition and stand treatment, the stocking of desirable trees, inhibiting conditions and point action on the 20 observations in the center section will be used. For basal area computing, all live trees 3" and larger will be used. For computing timber volume all merchantable trees 5" and larger will be used.

"Additional trees" will be tallied as in 1 and 2 above except that a 9 will be shown in point action to indicate "no recommendation." Log grading, radial growth and height change measurements will be made on "additional trees" as noted in 1 and 2 above.

6. All dead or cut trees 3" dbh and larger which have died or been cut within 3 years prior to the inventory date will be tallied on fixed plots (see Tatum Guide No. 7) and recorded in the lower third of the survey plot sheet. Tree no. (location), species, dbh (or diameter of stump), and S&T class will be indicated. In addition estimated merchantable height-4", cubic foot loss (just prior to death) must be shown for dead trees. For dead and cut trees record 9 in point action column and show mortality class.

When a sample acre is dissected by a line separating forest from nonforest land, those points falling on forest land will be tallied as usual and the number involved will be entered following "fractional plot" at the top of the survey plot record. These data will be used for volume computations. No entry need be made for those points which are on nonforest land. However, substitute points will be taken outside the sample acre on forest land. These should be located one chain to the east, south, or west of the forest points (see black dots on diagram on the survey plot sheet). A substitute point to the east of plot one will be tallied near the bottom of the plot record as plot 1 with E (for east) added in the margin. Trees on these points will be tallied by species, dbh and S&T class. Point action will be given. No other information need be taken on them. Data from these substitute points will be used with that from regular points to classify the forest cover.

III. TIMBER CUT SURVEYS

Periodic timber cut surveys are needed to show the current rate and change of cutting by species, product and ownership throughout the State. The plan that follows covers a survey of 1961 production of forest products in Illinois to be conducted in 1962 to determine the amount of timber cut. Total product output volume will be converted to inventory or cut volume by using converting factors obtained from field studies of woods utilization.

This timber cut plan combines the most promising features of industry and landowner canvasses and the stump count approach for determining the quantity and kinds of timber removed in the State. Field data will be collected for appraising the timber cut by species, tree size, forest product, and ownership on a statewide and district basis. Four sources of data will be used. They are as follows:

A. Timber Products Reports from Industry.

The Station in cooperation with the Division of Forestry, Illinois Conservation Department will make a comprehensive canvass of the primary wood-using industries in the State. Prior to the industry canvass the Station and the Illinois Conservation Department will check industry listings through the various associations, forestry agencies, and individual members of industry.

All pulp, veneer, cooperage, handle, excelsior, charcoal and miscellaneous plants that process logs and bolts cut from timber stands in Illinois will be contacted. A region-wide canvass of such plants is necessary because of the large quantities of raw wood materials that move across the State lines. Also, other producers and consumers of logs and bolts will be contacted, such as distributors of utility poles and piling and mine operators.

1. Sawmills

A survey of 1961 lumber production will be made by the Division of Forestry, Illinois Department of Conservation. This agency will conduct a mail canvass of all sawmills that were actively engaged in sawing lumber and related products during 1961. The nonrespondents will be contacted by the Department's field foresters. A listing of all the active sawmills (by production size) operating in the State has been compiled by this agency.

The Station will determine the cross-boundary movement of lumber logs in 1961. We plan to contact all of the larger sawmills (3 million board feet or more of annual production) in Illinois and adjacent states which customarily obtain logs from more than one state. Information from individual sawmills will be obtained by mailing forms, "Logs, Bolts, and Cordwood Receipts, 1961," Bureau of the Budget No. 40-R2525.3 to each mill asking for a report showing quantities of logs received from the various

states. All reports are expected to be received by mail, eliminating the need for field follow-up. These interstate lumber log data, together with lumber production figures collected by the Illinois Division of Forestry, will provide the information needed for estimating the 1961 output of lumber logs in Illinois.

2. Pulp, Veneer, and Cooperage Mills

Cross-boundary movement of pulpwood, veneer, and cooperage logs is common. To determine the interstate movement of these products, a 100 percent canvass will be made of mills operating in the Central States Region. Information from individual pulpmills will be obtained by mailing forms entitled, "Pulpwood Received, 1961" Bureau of the Budget No. 40-R3110. The data will show separately by species the quantity of pulpwood received from Illinois and from other states. Field follow-up will complete the 100 percent canvass. Following an established schedule of forest product surveys, all of the Central States veneer and cooperage plants were canvassed in 1961 --thus, no attempt will be made to canvass these industries again in 1962.

3. Handle, Charcoal Plants, and Excelsior Mills

A 100 percent canvass will be made of all such establishments drawing raw wood supplies from Illinois. Information will be obtained by mailing form, "Logs, Bolts, and Cordwood Received, 1961" Bureau of the Budget No. 40-R2525.3 to each mill. Field follow-up will complete the 100 percent canvass.

4. Round and Split Mine Material

Previous mine timber surveys in Illinois and other states show that use of round and split wooden mine materials is limited to underground mining operations. A listing of underground mines located in the Central States was compiled for use in the Missouri Timber Cut Survey. This list will be checked by the U.S. Bureau of Mines for completeness and subsequently used for contacting mine operators that use Illinois mine timbers. Information on the quantities of the different kinds of round and split mine materials procured during the year will be obtained by mailing form, "Report on Mine Timber Receipts, 1961" Bureau of the Budget No. 40-R2523.2. The form will be sent to all Illinois underground mine operators and to out-of-state mine operators that customarily use mine timbers cut from Illinois woodlands. Three mailings will be made to these mine operators, followed by a field follow-up on a sample of 25 percent of the nonrespondents.

5. Poles and Piling

Production estimates for poles and pilings will be obtained through contacts with each individual dealer and wholesaler handling these two forest commodities. A listing of individuals or companies that handle these items is being compiled. Information will be obtained by mailing form, "Logs, Bolts, and Cordwood Received, 1961" Bureau of the Budget No. 40-R2525.3. Field follow-up, where necessary, will complete the 100 percent canvass.

6. Fuelwood and Fence Posts

A comprehensive fuelwood and fence post survey was made in Illinois during the first Forest Survey. Results show that almost all of the fuelwood and fence posts were cut from farmer-owned lands. It is proposed that the rate of change in the output of these items be measured through a production index based on data in the U.S. Census of Agriculture. From such information the rate of change registered in the Illinois farm timber cut from 1945 to 1960 could be applied to the first Forest Survey estimate (1947) to come up with revised Statewide production figures for 1961.

7. Forecast of Contacts Required

Contacts that will be made by the Station are as follows:

Type of consumer	Number of contacts by states									
	Total	Ill.	Ind.	Iowa	Ky.	Mo.	Ohio	Lake States		
A. Primary wood-using plants:										
1. Large sawmills <u>1/</u>	10	1	-	-	6	1	-	2		
2. Pulpmills	20	8	1	3	-	1	5	2		
3. Veneer plants <u>2/</u>	61	8	22	2	5	3	16	5		
4. Cooperage plants <u>2/</u>	120	10	5	5	33	50	10	5		
5. Handle plants	18	3	-	-	-	15	-	-		
6. Charcoal plants	6	6	-	-	-	-	-	-		
7. Miscellaneous plants	5	5	-	-	-	-	-	-		
Total	240	41	28	10	46	70	31	14		

B. Other consumers of logs and bolts:

1. Pole and piling dealers	10	10	-	-	-	-	-	-
2. Mine operators	115	70	-	15	15	15	-	-
Total	125	80	-	15	15	15	-	-
Grand Total	365	121	28	25	61	85	31	14

1/ Annual lumber output of 3 million board feet or more.

2/ No canvass of these industries in 1962. A complete canvass of both was made in 1961.

C. Cutting Reports by Ownership Classes

Timber cut estimates by ownership classes are needed to meet the requirements of the Forest Survey. Information from individual owners will be obtained by mailing forms entitled, "Report on Forest Products Logged, 1961" Bureau of the Budget No. 40-R3168, to all public landowners and large industrial timberland owners in Illinois. About 15 contacts will be required to obtain the necessary information, including 4 federal agencies, 1 state agency, and 10 industrial landowners. Reports collected from each of these landowners will show separately the quantity of rough forest products harvested from their lands in 1961. The volume of timber cut from the small industrial holdings will be determined from stump tallies obtained on Forest Survey plots.

D. Mill Residues Resulting from Processing Logs and Bolts

Information on mill residues will be obtained in conjunction with the canvass of local primary wood-using plants. The information requested on both sides of approved Budget Bureau Form No. 40-R2525.2 will provide the plant operator's estimates of the percentages of the total residues by various uses, as well as data on log and bolt consumption. By using these data an estimate of the total volume of plant residues will be made by applying conversion factors, which were developed in special mill studies, to data on log and bolt consumption. Estimates also will be made to show the volume of residues used for various purposes.

E. Utilization Factors for Converting Timber Products to Timber Cut

Generally, production units reported by industry do not conform exactly to forest survey product units because of differences in log rule, size of cords and variations in rough and peeled wood. A set of conversion factors has, therefore, been prepared to meet the varied forms of reporting in the Eastern Central States to convert all records of timber products output to standard units. The standard production units, in turn, will be converted to volume of timber cut by applying factors derived from logging studies. Five hundred sample trees at 30 widely scattered logging operations were measured in Missouri to determine product volume and logging residue per standard unit of measure for each major forest product. These factors, with some minor adjustments based on spot field checks, will be used to convert Illinois timber products output figures to volume cut (table 1).

Table 1. -- Factors for Converting Rough Forest Products to Timber Cut, Missouri (1959-1960 logging season)

TIMBER PRODUCT	C O D E N O.	UNIT OF MEASURE	FROM SAWTIMBER TREES										FROM POLETER TREES										TOTAL CUT FROM GROWING STOCK	FROM OTHER SOURCES										GRAND TOTAL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
			Net volume of product as received at processing plant					Timber products output					Damage & Logging Residue					Total Sawtimber Cut						(Net volume used for products only)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			BF	CF	CF	CF	CF	Sawlog portion	Upper stem	Total	BF	CF	CF	CF	CF	Sawlog portion	Upper stem	Total	Sawing	Upper portion	Total	T. Log-ging P. O.		L/	Total pole-cut.	Limewood More than 4" l"	CF	CF	CF	CF	Trees less than 5" dbh	Cull trees	Dead trees		Non-est land	By-Prod-uct	Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Lumber	(2)	(3)	MBF	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)	(58)	(59)	(60)	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)	(84)	(85)	(86)	(87)	(88)	(89)	(90)	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)	(105)	(106)	(107)	(108)	(109)	(110)	(111)	(112)	(113)	(114)	(115)	(116)	(117)	(118)	(119)	(120)	(121)	(122)	(123)	(124)	(125)	(126)	(127)	(128)	(129)	(130)	(131)	(132)	(133)	(134)	(135)	(136)	(137)	(138)	(139)	(140)	(141)	(142)	(143)	(144)	(145)	(146)	(147)	(148)	(149)	(150)	(151)	(152)	(153)	(154)	(155)	(156)	(157)	(158)	(159)	(160)	(161)	(162)	(163)	(164)	(165)	(166)	(167)	(168)	(169)	(170)	(171)	(172)	(173)	(174)	(175)	(176)	(177)	(178)	(179)	(180)	(181)	(182)	(183)	(184)	(185)	(186)	(187)	(188)	(189)	(190)	(191)	(192)	(193)	(194)	(195)	(196)	(197)	(198)	(199)	(200)	(201)	(202)	(203)	(204)	(205)	(206)	(207)	(208)	(209)	(210)	(211)	(212)	(213)	(214)	(215)	(216)	(217)	(218)	(219)	(220)	(221)	(222)	(223)	(224)	(225)	(226)	(227)	(228)	(229)	(230)	(231)	(232)	(233)	(234)	(235)	(236)	(237)	(238)	(239)	(240)	(241)	(242)	(243)	(244)	(245)	(246)	(247)	(248)	(249)	(250)	(251)	(252)	(253)	(254)	(255)	(256)	(257)	(258)	(259)	(260)	(261)	(262)	(263)	(264)	(265)	(266)	(267)	(268)	(269)	(270)	(271)	(272)	(273)	(274)	(275)	(276)	(277)	(278)	(279)	(280)	(281)	(282)	(283)	(284)	(285)	(286)	(287)	(288)	(289)	(290)	(291)	(292)	(293)	(294)	(295)	(296)	(297)	(298)	(299)	(300)	(301)	(302)	(303)	(304)	(305)	(306)	(307)	(308)	(309)	(310)	(311)	(312)	(313)	(314)	(315)	(316)	(317)	(318)	(319)	(320)	(321)	(322)	(323)	(324)	(325)	(326)	(327)	(328)	(329)	(330)	(331)	(332)	(333)	(334)	(335)	(336)	(337)	(338)	(339)	(340)	(341)	(342)	(343)	(344)	(345)	(346)	(347)	(348)	(349)	(350)	(351)	(352)	(353)	(354)	(355)	(356)	(357)	(358)	(359)	(360)	(361)	(362)	(363)	(364)	(365)	(366)	(367)	(368)	(369)	(370)	(371)	(372)	(373)	(374)	(375)	(376)	(377)	(378)	(379)	(380)	(381)	(382)	(383)	(384)	(385)	(386)	(387)	(388)	(389)	(390)	(391)	(392)	(393)	(394)	(395)	(396)	(397)	(398)	(399)	(400)	(401)	(402)	(403)	(404)	(405)	(406)	(407)	(408)	(409)	(410)	(411)	(412)	(413)	(414)	(415)	(416)	(417)	(418)	(419)	(420)	(421)	(422)	(423)	(424)	(425)	(426)	(427)	(428)	(429)	(430)	(431)	(432)	(433)	(434)	(435)	(436)	(437)	(438)	(439)	(440)	(441)	(442)	(443)	(444)	(445)	(446)	(447)	(448)	(449)	(450)	(451)	(452)	(453)	(454)	(455)	(456)	(457)	(458)	(459)	(460)	(461)	(462)	(463)	(464)	(465)	(466)	(467)	(468)	(469)	(470)	(471)	(472)	(473)	(474)	(475)	(476)	(477)	(478)	(479)	(480)	(481)	(482)	(483)	(484)	(485)	(486)	(487)	(488)	(489)	(490)	(491)	(492)	(493)	(494)	(495)	(496)	(497)	(498)	(499)	(500)	(501)	(502)	(503)	(504)	(505)	(506)	(507)	(508)	(509)	(510)	(511)	(512)	(513)	(514)	(515)	(516)	(517)	(518)	(519)	(520)	(521)	(522)	(523)	(524)	(525)	(526)	(527)	(528)	(529)	(530)	(531)	(532)	(533)	(534)	(535)	(536)	(537)	(538)	(539)	(540)	(541)	(542)	(543)	(544)	(545)	(546)	(547)	(548)	(549)	(550)	(551)	(552)	(553)	(554)	(555)	(556)	(557)	(558)	(559)	(560)	(561)	(562)	(563)	(564)	(565)	(566)	(567)	(568)	(569)	(570)	(571)	(572)	(573)	(574)	(575)	(576)	(577)	(578)	(579)	(580)	(581)	(582)	(583)	(584)	(585)	(586)	(587)	(588)	(589)	(590)	(591)	(592)	(593)	(594)	(595)	(596)	(597)	(598)	(599)	(600)	(601)	(602)	(603)	(604)	(605)	(606)	(607)	(608)	(609)	(610)	(611)	(612)	(613)	(614)	(615)	(616)	(617)	(618)	(619)	(620)	(621)	(622)	(623)	(624)	(625)	(626)	(627)	(628)	(629)	(630)	(631)	(632)	(633)	(634)	(635)	(636)	(637)	(638)	(639)	(640)	(641)	(642)	(643)	(644)	(645)	(646)	(647)	(648)	(649)	(650)	(651)	(652)	(653)	(654)	(655)	(656)	(657)	(658)	(659)	(660)	(661)	(662)	(663)	(664)	(665)	(666)	(667)	(668)	(669)	(670)	(671)	(672)	(673)	(674)	(675)	(676)	(677)	(678)	(679)	(680)	(681)	(682)	(683)	(684)	(685)	(686)	(687)	(688)	(689)	(690)	(691)	(692)	(693)	(694)	(695)	(696)	(697)	(698)	(699)	(700)	(701)	(702)	(703)	(704)	(705)	(706)	(707)	(708)	(709)	(710)	(711)	(712)	(713)	(714)	(715)	(716)	(717)	(718)	(719)	(720)	(721)	(722)	(723)	(724)	(725)	(726)	(727)	(728)	(729)	(730)	(731)	(732)	(733)	(734)	(735)	(736)	(737)	(738)	(739)	(740)	(741)	(742)	(743)	(744)	(745)	(746)	(747)	(748)	(749)	(750)	(751)	(752)	(753)	(754)	(755)	(756)	(757)	(758)	(759)	(760)	(761)	(762)	(763)	(764)	(765)	(766)	(767)	(768)	(769)	(770)	(771)	(772)	(773)	(774)	(775)	(776)	(777)	(778)	(779)	(780)	(781)	(782)	(783)	(784)	(785)	(786)	(787)	(788)	(789)	(790)	(791)	(792)	(793)	(794)	(795)	(796)	(797)	(798)	(799)	(800)	(801)	(802)	(803)	(804)	(805)	(806)	(807)	(808)	(809)	(810)	(811)	(812)	(813)	(814)	(815)	(816)	(817)	(818)	(819)	(820)	(821)	(822)	(823)	(824)	(825)	(826)	(827)	(828)	(829)	(830)	(831)	(832)	(833)	(834)	(835)	(836)	(837)	(838)	(839)	(840)	(841)	(842)	(843)	(844)	(845)	(846)	(847)	(848)	(849)	(850)	(851)	(852)	(853)	(854)	(855)	(856)	(857)	(858)	(859)	(860)	(861)	(862)	(863)	(864)	(865)	(866)	(867)	(868)	(869)	(870)	(871)	(872)	(873)	(874)	(875)	(876)	(877)	(878)	(879)	(880)	(881)	(882)	(883)	(884)	(885)	(886)	(887)	(888)	(889)	(890)	(891)	(892)	(893)	(894)	(895)	(896)	(897)	(898)	(899)	(900)	(901)	(902)	(903)	(904)	(905)	(906)	(907)	(908)	(909)	(910)	(911)	(912)	(913)	(914)	(915)	(916)	(917)	(918)	(919)	(920)	(921)	(922)	(923)	(924)	(925)	(926)	(927)	(928)	(929)	(930)	(931)	(932)	(933)	(934)	(935)	(936)	(937)	(938)	(939)	(940)	(941)	(942)	(943)	(944)	(945)	(946)	(947)	(948)	(949)	(950)	(951)	(952)	(953)	(954)	(955)	(956)	(957)	(958)	(959)	(960)	(961)	(962)	(963)	(964)	(965)	(966)	(967)	(968)	(969)	(970)	(971)	(972)	(973)	(974)	(975)	(976)	(977)	(978)	(979)	(980)	(981)	(982)	(983)	(984)	(985)	(986)	(987)	(988)	(989)	(990)	(991)	(992)	(993)	(994)	(995)	(996)	(997)	(998)	(999)	(1000)	(1001)	(1002)	(1003)	(1004)	(1005)	(1006)	(1007)	(1008)	(1009)	(1010)	(1011)	(1012)	(1013)	(1014)	(1015)	(1016)	(1017)	(1018)	(1019)	(1020)	(1021)	(1022)	(1023)	(1024)	(1025)	(1026)	(1027)	(1028)	(1029)	(1030)	(1031)	(1032)	(1033)	(1034)	(1035)	(1036)	(1037)	(1038)	(1039)	(1040)	(1041)	(1042)	(1043)	(1044)	(1045)	(1046)	(1047)	(1048)	(1049)	(1050)	(1051)	(1052)	(1053)	(1054)	(1055)	(1056)	(1057)	(1058)	(1059)	(1060)	(1061)	(1062)	(1063)	(1064)	(1065)	(1066)	(1067)	(1068)	(1069)	(1070)	(1071)	(1072)	(1073)	(1074)	(1075)	(1076)	(1077)	(1078)	(1079)	(1080)	(1081)	(1082)	(1083)	(1084)	(1085)	(1086)	(1087)	(1088)	(1089)	(1090)	(1091)	(1092)	(1093)	(1094)	(1095)	(1096)	(1097)	(1098)	(1099)	(1100)	(1101)	(1102)	(1103)	(1104)	(1105)	(1106)	(1107)	(1108)	(1109)	(1110)	(1111)	(1112)	(1113)	(1114)	(1115)	(1116)	(1117)	(1118)	(1119)	(1120)	(1121)	(1122)	(1123)	(1124)	(1125)	(1126)	(1127)	(1128)	(1129)	(1130)	(1131)	(1132)	(1133)	(1134)	(1135)	(1136)	(1137)	(1138)	(1139)	(1140)	(1141)	(1142)	(1143)	(1144)	(1145)	(1146)	(1147)	(1148)	(1149)	(1150)	(1151)	(1152)	(1153)	(1154)	(1155)	(1156)	(1157)	(1158)	(1159)	(1160)	(1161)	(1162)	(1163)	(1164)	(1165)	(1166)	(1167)	(1168)	(1169)	(1170)	(1171)	(1172)	(1173)	(1174)	(1175)	(1176)	(1177)	(1178)	(1179)	(1180)	(1181)	(1182)	(1183)	(1184)	(1185)	(1186)	(1187)	(1188)	(1189)	(1190)	(1191)	(1192)	(1193)	(1194)	(1195)	(1196)	(1197)	(1198)	(1199)	(1200)	(1201)	(1202)	(1203)	(1204)	(1205)	(1206)	(1207)	(1208)	(1209)	(1210)	(1211)	(1212)	(1213)	(1214)	(1215)	(1216)	(1217)	(1218)	(1219)	(1220)	(1221)	(1222)	(1223)	(1224)	(1225)	(1226)	(1227)	(1228)	(1229)	(1230)	(1231)	(1232)	(1233)	(1234)	(1235)	(1236)	(1237)	(1238)	(1239)	(1240)	(1241)	(1242)	(1243)	(1244)	(1245)	(1246)	(1247)	(1248)	(1249)	(1250)	(1251)	(1252)	(1253)	(1254)	(1255)	(1256)	(1257)	(1258)	(1259)	(1260)	(1261)	(1262)	(1263)	(1264)	(1265)	(1266)	(1267)	(1268)	(1269)	(1270)	(1271)	(1272)	(1273)	(1274)	(1275)	(1276)	(1277)	(1278)	(1279)	(1280)	(1281)	(1282)	(1283)	(1284)	(1285)	(1286)	(1287)	(1288)	(1289)	(1290)	(1291)	(1292)

PERCENTAGE DISPOSITION OF PLANT RESIDUES

Instructions: For plant or plants for which production is reported on the other side of this form, consider separately any of the following residues derived: coarse softwood, fine softwood, coarse hardwood, and fine hardwood residues. Enter your best estimate of the percentage of each that is used for various purposes indicated, or is not used. Entries on each line across the page should total to 100 percent in the "Total Residues" column.

Character of Residues	Total residues	Used Residues				Unused residues
		For 1/ fiber products	For fuel		For 4/ other use	
			2/ Industrial	3/ Domestic		5/
	Percent	Percent	Percent	Percent	Percent	Percent
<u>From softwoods:</u>						
Coarse <u>6/</u>	100					
Fine <u>7/</u>	100					
<u>From hardwoods:</u>						
Coarse <u>6/</u>	100					
Fine <u>7/</u>	100					

- 1/ All residues from this plant which go to another plant for use in manufacture of any fiber product, such as pulp, hardboard, roofing felt, etc.
- 2/ All residues used as fuel by any industrial plant, including the plant at which the residues were produced.
- 3/ Include residues used as domestic fuel whether sold or given away.
- 4/ Livestock bedding, mulch, small dimension and specialty items, etc.
- 5/ Include all residues burned as waste, etc.
- 6/ Residues suitable for chipping such as slabs, edgings and veneer cores.
- 7/ Residues not suitable for chipping such as sawdust and shavings.

REPORT ON FOREST PRODUCTS LOGGED, ILLINOIS, 1961

Name _____

Business Address _____

Total acreage owned in Illinois _____

Commercial forest acreage in Illinois _____

INSTRUCTIONS

Please fill out and return promptly in the accompanying envelope which requires no stamp. Information on individual operations will be held confidential. Please list the amounts and kinds of material harvested from the lands indicated, regardless of whether the owner or owners logged the land. If complete records are not available, please give your best estimates.

A. ROUGH FOREST PRODUCTS LOGGED

Report in board feet (specify log rule _____).

Species	Lumber	Veneer	Pulpwood	Cooperage	Cabin	Mine
	logs	logs	logs	logs	logs	timbers
<u>Thousand board feet</u>						
Softwoods						
Cedar	:	:	:	:	:	:
Cypress	:	:	:	:	:	:
Pine, shortleaf	:	:	:	:	:	:
Pine, white	:	:	:	:	:	:
Hardwoods						
Ash	:	:	:	:	:	:
Basswood	:	:	:	:	:	:
Birch	:	:	:	:	:	:
Cottonwood	:	:	:	:	:	:
Elm	:	:	:	:	:	:
Gum, black	:	:	:	:	:	:
Gum, sweet	:	:	:	:	:	:
Hickory	:	:	:	:	:	:
Maple, hard	:	:	:	:	:	:
Maple, soft	:	:	:	:	:	:
Oaks, white	:	:	:	:	:	:
Oak, post	:	:	:	:	:	:
Oak, black	:	:	:	:	:	:
Oak, red	:	:	:	:	:	:
Sycamore	:	:	:	:	:	:
Yellow-poplar	:	:	:	:	:	:
Walnut	:	:	:	:	:	:
Other	:	:	:	:	:	:
ALL SPECIES	:	:	:	:	:	:

(OVER)

IV. DEFINITIONS, CLASSIFICATION AND CODES

This section is designed to provide a ready field reference. For further material on definitions the Forest Survey section (Chapter 4810 of the Forest Service Handbook) should be consulted. Forest Survey Tatum Guide No. 7 (inside back cover of these instructions) is a basic part of this section. The upper part of the guide presents photo and ground classification of land, cover type, stand-size, stocking and site. The middle portion gives other stand or plot classifications and the lower part gives tree and point classifications.

This section supplements Tatum Guide No. 7. The information presented here follows the order for recording data on the survey plot sheet (Fig. 4).

1. STATE

Code Illinois as 1

2. DISTRICT

<u>Code</u>	<u>District</u>
1	Southern
2	Claypan
3	Western Prairie
4	Northeastern Prairie

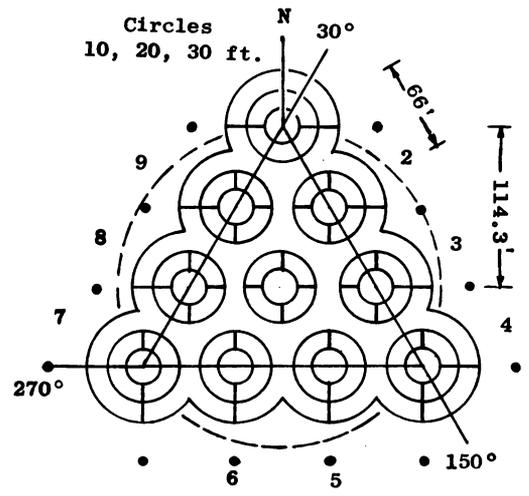
3. COUNTY

<u>Code</u>	<u>County</u>	<u>Code</u>	<u>County</u>	<u>Code</u>	<u>County</u>
1	Adams	35	Hardin	69	Morgan
2	Alexander	36	Henderson	70	Moultrie
3	Bond	37	Henry	71	Ogle
4	Boone	38	Iroquois	72	Peoria
5	Brown	39	Jackson	73	Perry
6	Bureau	40	Jasper	74	Platt
7	Calhoun	41	Jefferson	75	Pike
8	Carroll	42	Jersey	76	Pope
9	Cass	43	Jo Daviess	77	Pulaski
10	Champaign	44	Johnson	78	Putnam
11	Christian	45	Kane	79	Randolph
12	Clark	46	Kankakee	80	Richland
13	Clay	47	Kendall	81	Rock Island
14	Clinton	48	Knox	82	St. Clair
15	Coles	49	Lake	83	Saline
16	Cook	50	LaSalle	84	Sangamon
17	Crawford	51	Lawrence	85	Schuyler
18	Cumberland	52	Lee	86	Scott
19	DeKalb	53	Livingston	87	Shelby
20	DeWitt	54	Logan	88	Stark
21	Douglas	55	McDonough	89	Stephenson
22	DuPage	56	McHenry	90	Tazewell
23	Edgar	57	McLean	91	Union
24	Edwards	58	Macon	92	Vermilion
25	Effingham	59	Macoupin	93	Wabash
26	Fayette	60	Madison	94	Warren
27	Ford	61	Marion	95	Washington
28	Franklin	62	Marshall	96	Wayne
29	Fulton	63	Mason	97	White
30	Gallatin	64	Massac	98	Whiteside
31	Greene	65	Menard	99	Will
32	Grundy	66	Mercer	100	Williamson
33	Hamilton	67	Monroe	101	Winnebago
34	Hancock	68	Montgomery	102	Woodford

LS-4800-10
(Sept. 1961)

Fig. 4 - SURVEY PLOT SHEET

State , District , County , Plot , Fractional plot , Start ,
 Curr. ground cl. , S. I. , B.A./A live tr. Ownership ,
 Use trend , Stand-age , Stand treatment ,
 Prospective growing stock without treatment , with treatment ,
 Stocking percent, Desirable trees , Gr. st. trees , All trees ,
 Points overstocked , Previous T, S-D .



Species: Observ.	Size-class: Observ.	Stocking : Observ.	Site tree
	Sawtimber :	Desirable :	Species
	Poletimber:	Acceptable :	Age
	S & S :	Cull & N.C. :	Total height
	Nonstocked:	Inhibiting :	Pts. overstocked
		Nonstockable:	Pts. understocked
		Nonstocked :	

Tree No.	Spec-ies	D.B.H.	Merch. height	Cubic foot loss	Pt. S & T class	Cut ac- tion	Log Grade				Radial growth		Ht. change		Mort. class
							3	2	1	10	20	10 years	10 years	CF	
0															
0															
1															
1															
2															
2															
3															
3															
4															
4															
5															
5															
6															
6															
7															
7															
8															
8															
9															
9															

LOCATION: County Name _____ T. _____ R. _____ Flight # _____ Photo # _____ Dot # _____

Owner and address: _____

Starting point: _____

COURSE TO PLOT:

Direction	:	°	:	°	:	°	:	°	:	°	:	DIAGRAM TO PLOT LOCALITY:
	:		:		:		:		:		:	(show section # and subdivision)
Distance (chains)	:		:		:		:		:		:	
To	:		:		:		:		:		:	

WITNESS TREE: Direction and distance from acre center to tree:

Tree number	_____	Direction	_____	°Distance	_____	feet.	:
Tree number	_____	Direction	_____	°Distance	_____	feet.	:
Tree number	_____	Direction	_____	°Distance	_____	feet.	:
Tree number	_____	Direction	_____	°Distance	_____	feet.	:

Cruiser _____ Date _____

Tallyman _____

Notes: _____

Tree	:	Stick	:	indicator	:	loss	:	grade	:	loss	:	Tree	:	Stick	:	indicator	:	loss	:	grade	:	loss
------	---	-------	---	-----------	---	------	---	-------	---	------	---	------	---	-------	---	-----------	---	------	---	-------	---	------

_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

4. Current Ground Class-Land Area

The code for current ground class includes 4 digits. These classify land, forest cover, stand-size stocking and area condition from left to right. The first of these is dealt with here.

Land Area: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

Forest Land Area: Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest use. It includes all forested lands and lands suitable for forest trees which have not been developed for nonforest purposes. It does not include urban or thickly settled residential and resort areas, city parks, orchards, farm steads, improved roads, or lands developed and maintained for nonforest use by fencing, seeding, etc. The minimum area for classification of forest land, or classes of forest land, is one acre. Roadside, streamside, and shelterbelt strips of timber must be at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams and clearings shall be classed as forest if less than 120 feet in width.

Commercial Forest Land: Forest land which is producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. Industrial wood includes commercial products such as sawlogs and pulpwood but excludes fuelwood and fence posts.

Unproductive Forest Land: Forest land incapable of yielding crops of industrial wood because of adverse site conditions. Includes sterile and poorly-drained sites, and steep rocky areas. These lands ordinarily are valuable for watershed cover and many areas also are useful for grazing, recreation, or other purposes.

Productive-Reserved Forest Land: Productive public forest land withdrawn from timber utilization through statute or administrative regulation. Includes lands physically suitable for the growing of timber crops but reserved for exclusive uses such as national parks, wilderness areas, municipal watersheds, etc.

The following key has proven helpful. It is designed for use with the Hasel-Larson method. Areas to be classified must be one acre in size or 120 feet wide.

<u>Key #</u>	<u>Characteristics</u>	<u>Classify or refer to Key #</u>
1a.	Rivers, lakes, ponds-----	Water
1b.	Other land area-----	2
2a.	Land developed for nonforest uses <u>except pastured lands</u> -----	Other nonforest
	1. Urban and residential areas	
	2. Industrial developments	
	3. Farmsteads and settlements	
	4. Resort areas	
	5. Improved roads and maintained right-of- ways	
	6. City parks	
	7. Orchards	
2b.	Pastured land and land not developed for nonforest uses---	3
3a.	Heavily grazed land-----	4
	Use these characteristics as evidence:	
	1. Fencing	
	2. Stock ponds	
	3. Presence of stock	
	4. Abundant stock droppings	
	5. Compact, soddy ground cover	
	6. Cattle trails	
	7. Absence of low ground cover	
	8. Heavy clipping of palatable plants	
3b.	Land not heavily grazed-----	7
4a.	Less than 10 percent stocked with forest tree cover (growing stock, cull and noncommercial trees)-----	Other nonforest
4b.	More than 10 percent stocked with forest tree cover-----	5
5a.	More than 10 percent stocked with forest trees but less than <u>25</u> percent stocked with growing stock trees-----	100 Wooded pasture (nonforest)
5b.	More than 25 percent stocked with growing stock trees-----	6

- 6a. Land incapable of yielding crops of industrial wood because of adverse site condition (total height at maturity below 40 feet) Unproductive forest land
- 6b. Productive forest land--Land capable of yielding crops of industrial wood 9
- 7a. Land that does not and has never had 10 percent forest tree cover. There are no stumps present and land history indicates no past tree cover (marsh, bog, prairie) Other nonforest
- 7b. Land having evidence of 10 percent forest tree cover, present or past 8
- 8a. Land incapable of yielding crops of industrial wood because of adverse site conditions Unproductive forest land
- 8b. Productive forest land--Land capable of yielding crops of industrial wood 9
- 9a. Public land withdrawn from timber utilization through statute or administrative regulations (National parks, wilderness areas, municipal watersheds, etc.)..... Productive-reserved
- 9b. Land not withdrawn from timber utilization Commercial forest

5. Cover Type

Forest type will be determined for all forest land in the basis of composition of the stand on the sample acre. Nonstocked forest land will be classified to the forest type best suited on the soil. Stereoclassifications will be made by eye; ground classifications using the Hasel-Larson method of analyzing the sample acre.

Types will be determined on the basis of majority of stocking by trees of various species considering both size and spacing of trees. Where no species comprises a majority of a stand, types will be determined on the basis of plurality of stocking. Dominant or codominant trees of both growing stock and cull trees are to be considered in classifying cover type.

Since specific forest cover types cannot be recognized and classified on aerial photos it is necessary to use general classes: softwoods, upland hardwoods and lowland hardwoods. On the ground softwoods will be subdivided into shortleaf-loblolly or northern pine, upland hardwoods into redcedar-hardwoods, oak-pine, white oak, oak-hickory, central mixed hardwoods, maple-beech, and aspen-birch, and lowland hardwoods into pin oak, oak-gum-cypress and ash-elm-cottonwood. Pure stands of cottonwood or willow will be designated by an overpunch.

<u>Code</u>	<u>Item</u>
0	<u>Shortleaf-loblolly pine</u> : Forest in which 50 percent or more of the stand is shortleaf and/or loblolly pine.
1	<u>Redcedar-hardwoods</u> : Forest in which 50 percent or more of the stand is hardwoods but in which redcedar makes up 25 percent of the stand.
2	<u>Oak-pine</u> : Forests in which 50 percent or more of the stand is hardwoods (usually upland oaks) but in which hard pines make up 25-49 percent of the stand.
3	<u>White oak</u> : Forests in which 50 percent or more of the stand is white oak.
4	<u>Oak-hickory</u> : Forests in which the upland oaks and hickories singly or in combination comprise over 50 percent of the stand, except for stands classed white oak, redcedar-hardwoods, or mixed hardwoods.
5	<u>Central Mixed Hardwoods</u> : Forests in which yellow poplar, maple, beech, basswood, black walnut, elm, and northern red oak make up over 50 percent of the stand, except for stands classed maple-beech and elm-ash-cottonwood.
6	<u>Maple-beech</u> : Forests in which maple and/or beech comprise 50 percent or more of the stand.
7	<u>Pin oak in Illinois Districts 1 and 2</u> : Forest in which pin oak makes up 50 percent or more of the stand. <u>Aspen-birch in Illinois Districts 3 and 4</u> : Forests in which aspen or white birch comprise 50 percent or more of the stand.
8	<u>Oak-gum-cypress in Illinois Districts 1 and 2</u> : Bottomland forests in which 50 percent or more of the stand is tupelo gum, pecan, swamp oaks or southern cypress singly or in combination except for stands classed pin oak. <u>Northern pine in Illinois Districts 3 and 4</u> : Forests in which white, red, Scotch or jack pine singly or in combination comprise 50 percent or more of the stand.
9	<u>Elm-ash-cottonwood</u> : Forests in which 50 percent or more of the stand is elm, silver maple, sweet gum, sycamore, boxelder, ash, or cottonwood singly or in combination. Overpunch with X if pure cottonwood or Y if pure willow stands.

6. Size-stocking Classifications

In order to improve the accuracy of photo classifications only six classes (Tatum Guide No. 7) will be used. These are designed to divide the forest into sawtimber, poletimber, and other stands and to separate each into good and fair stocking classes. Nonstocked stands are grouped with poor and medium density seedling and sapling stands.

The classification made on the ground will provide a more detailed breakdown. It will be made using the Hasel-Larson technique. Both stand-size and stocking classes will be based upon the stocking of growing stock trees. Stocking is a measure of area occupancy by trees of specified classes; dominant and codominant crown classes.

Sawtimber Stands: Stands at least 10 percent stocked with growing-stock trees with half or more of this stocking in sawtimber or poletimber trees and with sawtimber stocking at least equal to poletimber stocking.

Sawtimber trees are live trees of commercial species at least 9.0 inches in diameter breast height for eastern softwoods and 11.0 inches in diameter breast height for hardwoods containing at least one merchantable sawlog.

A merchantable sawlog is defined as a log (a) with a minimum top diameter of 8 inches, (b) with a minimum length of 8 feet, (c) containing at least 50 percent sound volume; and (d) meeting the minimum log-grade or tie and timber specification. "Local-use" logs of poorer quality are not included even though used locally.

Poletimber Stands: Stands at least 10 percent stocked with growing-stock trees with half or more of this stocking in sawtimber or poletimber trees and with poletimber stocking exceeding that of sawtimber stocking.

Poletimber trees are defined as live trees of commercial species 5.0 - 8.9 inches in diameter breast height for softwoods, and 5.0 - 10.9 inches in diameter breast height for hardwoods, and of good form and vigor.

Sapling and Seedling Stands: Stands at least 10 percent stocked with growing-stock trees with more than half of this stocking in saplings and/or seedlings.

Seedlings and saplings are well established live trees of commercial species less than 5.0 inches in diameter and of good form and vigor.

Nonstocked Areas: Commercial forest lands less than 10 percent stocked with growing-stock trees.

Stocking: Stocking is a measure of area occupancy using dominant and codominant growing stock trees.

Well Stocked: 70 percent or more stocked.

Medium Stocked: 40 to 69 percent stocked.

Poorly Stocked: 10 to 39 percent stocked.

Nonstocked: Less than 10 percent stocked.

7. Area Condition Classes

Area condition is a classification of commercial forest land based upon stocking by desirable trees and other conditions affecting current and prospective timber growth.

The goal in stocking is to have at least 70 percent of the area occupied by desirable growing stock within the next 10 years. The degree to which stocking of desirable trees is short of this goal and the presence or absence of adverse conditions will be used in rating the condition of the stand (or area if not stocked).

Condition class will be recorded in one of five classes (Tatum Guide No. 7).

8. Site Classification

The photo interpreter will classify site into four site index (at 50 years) classes; guiding largely on physiography and where ground is relatively level on general soil types.

Code 2. Good site (S.I. 75+), bottomland, alluvial soil.

Code 3. Medium site (S.I. 55-74), lower slope (primarily a moist or shaded site consisting of coves, ravine bottoms, the lower $\frac{1}{4}$ of SE, S, SW, W, and the upper $\frac{3}{4}$ of NW, N, NE, and E slopes), or loessal or limestone soils in level areas.

Code 4. Poor site (S.I. 35-54), upper slope (primarily a dry site consisting of ridge tops, the upper $\frac{3}{4}$ of SE, S, SW, W, and the upper $\frac{1}{4}$ of NW, N, NE, and E slopes), or sand, sandstone or gravel soils in level areas.

Code 5. Unproductive sites (S.I. below 35), excessively dry or wet areas.

This classification will be made on every stereo point and recorded on the photo record card. It will not be shown on the survey plot sheet.

In addition, site index will be measured at each forest plot. One dominant tree which has been free growing since its youth will be measured for total height and total age. This tree may be on or near the sample acre. It will be recorded at the right of the summary section of the survey plot sheet. Insofar as possible the following species will be used to measure site in the types shown.

Types 0 and 2	-	shortleaf pine
1	-	post oak
3	-	white oak
4, 5, and 7s	-	white, black or post oak
6	-	hard maple
7n	-	aspen
8s	-	black gum
8n	-	white pine'
9	-	elm or cottonwood

Site index at 50 years will be looked up in site curves and recorded to the closest even foot. When suitable trees over 15 feet tall are not available, site index must be estimated based on ocular appraisal of soil drainage and vegetation.

9. Land Use Trend.

Use trend will be classified at each ground check point to measure the amount of change in land use, by causes, since the previous Forest Survey.

10. Basal Area

The basal area per acre of all live trees (including cull and noncommercial) over 3" d.b.h. will be estimated from the tally and recorded. It is an aid in guiding the cut or leave tally. It may be computed by the following formula:

$$4 (\# \text{ trees}) - 1/4 (\# \text{ trees}) = \text{basal area/acre}$$

where # trees equals 3/4 of 4" d.b.h. class trees
+ all trees over 5" d.b.h.

11. Stand Age

Age of the main stand will be indicated for both even and uneven-aged stands. It will be determined by boring one or a few free growing trees in the main stand. If the stand is uneven-aged indicate an X overpunch.

12. Ownership

Land ownership will be looked up in the county courthouse for the land on which each forest plot is located. The following classification will be used.

Code Item

- 0 National Forest lands: Federal lands which have been designated by Executive Order or Statute as National Forests and purchase units and other lands under the administration of the Forest Service.
- 1 Bureau of Indian Affairs: Indian tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.
- 2 Other federal: Lands held by the Bureau of Land Management and other Federal Government agencies.
- 3 State: Lands owned by the State or leased by the State for more than 50 years.
- 4 Other public: Lands held by county municipal, school, or other public agencies.
- 5 Forest industry--pulp: Owned by pulp and paper companies.
- 6 Forest industry--lumber: Land owned by companies or individuals which produce over 100,000 board feet of lumber annually.
- 7 Forest industry--other: Land owned by companies or individuals which produce (either as primary or secondary manufactures) the equivalent of 100,000 board feet or more annually. Where an owner qualifies in more than one industry group, classify according to the product using the largest cubic volume of timber. Includes lands held under long-term lease where the lessor assumes all costs and risks of ownership of the surface rights, maintain record of such leased areas separately from fee simple holdings.

Code Item

- 8 Farmer-owned lands. Lands owned by operators of farms. A farm operator is a person who operates a farm by performing the labor or directly supervising it. A farm is a place, operated as a unit, of 10 or more acres, from which the sale of agricultural products totaled \$50.00 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products totaled \$250.00 or more annually. Lands leased from nonfarm owners are excluded. When an owner qualifies as both farmer and forest industry the ownership should be classed forest industry if of significant commercial importance (intermittently operated farm sawmills would not meet this criterion unless they saw over 100,000 board feet per year). Lands owned by retired farmers or wives of farmers should be classified as farmer-owned.
- 9 Miscellaneous private lands. Privately owned lands other than forest industry or farmer-owned lands. Include undivided interests.

Each forest plot also will be given a size of ownership classification (Tatum Guide No. 7) which is based on area of commercial forest land in the U.S.A. This will be determined through personal contact with the owner, by mailed questionnaires or other means.

13. Stand Treatment Classification

The primary stand treatment classification for each sample acre will be indicated by a three digit code. The first digit will indicate the need for cutting, stand improvement or reforestation. The second will show need for special protection to maintain productivity; and the third will give size of the type-stand-size stocking class area in which the acre falls. Only the first needs more detailed explanation.

The class of treatment needed (if any) to put the stand (or area) into more productive condition for future growth will be indicated. Minimum commercial cut is 3 cords (or 500 board feet per acre). As a rule only the major type of treatment needed will be indicated though many stands need several kinds of treatment. Stand improvement as used here includes weeding and cleaning in young sapling stands and thinning in older immature stands.

Code Treatment

- 1 No treatment: Stands needing little or no harvest cutting, stand improvement or regeneration.
- 2 Harvest cut: A commercial cut of mature or of near mature trees. May include cut of younger, low quality trees not wanted as residual growing stock and cut or kill of cull and noncommercial trees. Code X over 2 if reforestation is also needed to achieve stocking of desirable species.
- 3 Commercial stand improvement: A commercial cut in an immature stand designed to improve the composition and character of the stand by removing or killing trees of less desirable species, form and condition. Code X/3 if reforestation also is needed to achieve stocking of desirable species.

Code Treatment

- 4 Noncommercial stand improvement: An improvement operation (in a young or immature stand) which will yield less than 3 cords or 500 board feet per acre. Code X/4 if reforestation also is needed to achieve stocking of desirable species. The primary job here is improvement of the existing stand.
- 5 Site preparation only: Preparation of site in stands with adequate seed sources but with seed beds unfavorable to natural regeneration. Includes ground scarification, removal of sod, brush or competing vegetation. The primary job here is to obtain regeneration.
- 6 Site preparation and reforest: Preparation of site and reforestation in areas which have neither adequate seed sources nor seed beds favorable to natural regeneration. The primary job here is to obtain regeneration.
- 7 Reforest only: Seeding or planting in areas which do not have adequate seed sources, but which do have favorable seed beds.

14. Silvicultural Guides to Classify Stand Treatment

One objective of the Forest Survey is to classify the stand treatment needed to provide each sample acre with at least 70 percent desirable growing stock during the next 10 years. Point action is a basic classification used for evaluating the stand treatment needed. Stand treatment depends upon (a) what is found on and near the points, and (b) silvicultural practices which will improve the situation. The forests of Illinois have been mistreated with resulting presence of cull trees, poor growing stock trees and undesirable species. Hence, the main job is rehabilitation. Many desirable species are present but most of them are intolerant and special provision must be made to reproduce them. Both tree and shrub growth are naturally aggressive and poor stocking almost always is a result of the action of man.

The native forests of Illinois are almost entirely hardwood, although a few islands of the northern conifers and the southern pines and cypress may be found. The amount of redcedar (which is very easily killed by fire) is now increasing but redcedar will seldom be found as a type. Oak-hickory is the largest type. In Southern Illinois, the moister oak-hickory sites produce a larger proportion than the driest sites of such valuable species as yellow-poplar, black walnut, white ash, sweetgum and black cherry--hence, are classed central mixed hardwoods. Farther north, red and white oak, basswood, ash, black walnut and hard maple are the more valuable species of the central mixed hardwood type.

The silvicultural practices are summarized in this section for the principal forest types. With few exceptions these follow six publications:

"Recommended Forest Practices for Illinois Hardwood Timber Types," (Revised edition, 1957). Illinois Technical Forestry Association.

"How to Farm Your Forest" (Third Printing, July 1958). Miscellaneous Release No. 11, Central States Forest Experiment Station, published by the Southern Illinois University.

"Forest Planting Practices for Illinois". Recommended by Illinois Technical Forestry Association.

"Management and Inventory of Southern Hardwoods". Agricultural Handbook No. 181.

"Timber Management Guide; Central Mixed Hardwood Type". U. S. Forest Service, Milwaukee, 1953.

Timber Management Guide; Oak-Hickory Type. U. S. Forest Service, Milwaukee, Wisconsin, 1958.

For less common types, other timber management guides prepared for U. S. Forest Service, Milwaukee will be followed. These include shortleaf pine and shortleaf pine-oak type, eastern redcedar and hardwood eastern redcedar timber types, northern hardwoods type, white pine type and aspen-paper birch type.

Major credit goes to Dr. L. S. Minckler for preparation of the following summary.

Improper cutting, continued grazing, and fire has resulted in both even and uneven-aged stands in most types. Hi-grading has converted stands which might have been even-aged to general use class stands or caused an even-aged condition on a small area within an uneven-aged stand. Also, partial cutting has tended to maintain uneven-aged stands in that condition. Types tend to be similar over large areas but stands with the same species composition, stocking structure, and site are usually small. Restrictions against moving plots sometimes result in sample acres falling in mixtures of classes. Even-aged samples are unlikely except in such types as cottonwood, willow, and pin oak or in plantations and old field stands.

Some form of clear cutting (including shelterwood) and group or single tree selection are the primary silvicultural systems recommended for use in Illinois. Clear cutting may be used when advanced reproduction is present or some means of reforestation is anticipated. It seldom should be used over large areas; usually not over 10 acres. In some cases, if needed treatments were made, the residual stand would be so sparse that a complete clear cutting would be preferable. This generally will be true of mature and over-mature stands. Even, here, however, the need for seed supply may dictate the leaving of seed trees or a shelterwood. The system to use depends on condition of the stand, the state of advanced reproduction, seed bed condition and seeding habits of desired species.

Reproduction of the more tolerant of the desirable species may be established without openings in the overstory. The reproduction of the less tolerant of the desirable species and good growth of most desirable species in uneven-aged stands are favored by selection or improvement cuttings.

Cull trees and poor growing stock should be cut or killed. Holes in the canopy from about 1/10 to 1/2 acre in size should be created to provide more light and growing space to remaining trees. Openings with a diameter equal to at least the height of the surrounding trees will allow good growth of understory trees. Seed stock of the desired species should always be favored.

Rotation age or dbh to which trees should be grown vary by species, site, aim of the owner and intensity of management. Rotations for production of sawtimber are used for the Forest Survey of Illinois. Maturity dbh range is shown for type and general site class in table 2. The corresponding sawtimber rotation age for managed stands is: cottonwood or willow 30 years, pin oak 50 years, other bottomland hardwoods 70 years, yellow poplar 75 years, and mixed upland oaks and white oak 85 years. For unmanaged stands consider 35 years for cottonwood or willow, 55 years for pin oak, 80 years for other bottomland hardwood types and for yellow poplar, and 90 years for other upland hardwood stands. These should be adjusted, if necessary to agree with desired dbh at maturity. Vigorous growing stands of quality trees should be held to a longer rotation.

Natural regeneration will be sought whenever possible. Evaluation of the chances of the establishment and growth of desirable species may be made using table 3. If natural regeneration cannot be obtained by use of proper harvest or improvement practices, artificial regeneration may be required (see below).

General Practices By Forest Condition Classes

In general, the following practices are recommended in determining the stand treatment classification:

Uneven-aged stands

A. Large sawtimber stands.

1. Usually a combined harvest and improvement cut removing mature and low-quality trees and killing of culls is required. Removal of all advanced tree growth is seldom desirable.
2. Site preparation for natural regeneration in openings, if needed. Artificial regeneration, if needed.
3. Weeding and/or release in clumps of sapling reproduction.

B. Small sawtimber and pole stands.

1. An improvement cut and cull killing treatment sometimes accompanied by removal of scattered ~~merchantable~~ ^{mature} trees.
2. Thinning in dense groups of pole timber.
3. Site preparation for natural regeneration in openings, if needed. Artificial regeneration, if needed - rarely.
4. Weeding and/or release in clumps of sapling reproductions.

C. Small pole and sapling stands.

1. Thinning in dense groups of pole timber plus improvement treatment, if needed.
2. Weeding and/or release in clumps of sapling reproduction.
3. Reforest if there are sufficiently large areas (about 1/2-acre or more) which do not have potentially satisfactory stocking of desirable trees.

Table 2.--Desirable amount and distribution of growing stock in uneven-aged stands

Type	Height of mature dominants	Basal area <u>l/</u> of well distributed trees		D.B.H. at sawtimber maturity		
		3" - 10.9"	11' - 16.9"		17"	Total
	Feet	Square feet per acre		Inches		
Oak-hickory	80+	22	31	26	79	20-24
and Central mixed hardwoods	65-80	22	27	17	66	18-22
	Less than 65	20	23	9	52	16-18
Elm-ash-cottonwood	90+	22	34	38	94	22-28
Oak-gum-cypress	70+	22	31	26	79	22-28

l/ These are basal areas (of well distributed trees over 3" d.b.h.) to which stands should be reduced in selection or improvement cutting, if possible.

Table 2. -- Requirements for natural regeneration of most important species

Species	Advanced reproduction	Seed Supply	Germination conditions	Ground competition	Opening size for good growth	Relative growth rate
Yellow-poplar	Seldom present.	Abundant if seed trees within 400-500 ft. Seed viable in litter 3-4 years.	Mineral soil, thin litter or freshly disturbed litter and moist soil. Best germination when seed mixed with soil.	Intolerant to overtopping competition.	Diameter equal to height of overstory trees or greater.	Rapid. Will outgrow all competition with equal start on good sites.
Upland white, black, scarlet, and red oaks.	Usually present. Occurs as seedling sprouts.	Abundant every 2-4 years if seed trees within 100 ft., further by squirrels.	Litter not seriously inhibiting.	Moderately tolerant to competition. Will live for many years under canopy but will not grow. White oak is most and scarlet least tolerant.	Height of overstory trees or greater.	Moderate. Some other competition will outgrow it especially on good sites.
Hickory	Usually present.	Abundant every 1-3 years if seed trees within 100 ft., further by squirrels.	Litter not seriously inhibiting.	Tolerant to competition. Will live many years overtopped.	1/2 height of overstory trees or greater.	Slow. With equal start most other species will outgrow it.
Ash	Often present, especially green ash in bottomlands.	Abundant nearly every year if seed trees present within 300-400 ft.	Bare soil, thin litter or disturbed litter and moist soil.	Moderately tolerant to competition. Will live 8-12 years under canopy.	3/4 height of overstory trees or greater.	Green ash fast. Will surpass most competitors except cottonwood, yellow-poplar, and willow. White ash moderately rapid.
Black walnut	Seldom present.	Abundant, most years if seed trees present within 75 ft.	Litter not seriously inhibiting.	Intolerant to overtopping competition.	Height of overstory trees or greater.	Slow. Most competition will outgrow it.
Cottonwood	Practically never present.	Very abundant every year almost everywhere in bottomlands.	Requires wet, bare silt or mud during time of germination.	Very intolerant. Must be free of competition.	Twice height of overstory trees or greater.	Very fast if free to grow. With equal start will outgrow all competition except willow.
Sweetgum, silver maple, sycamore.	Seldom, sweetgum sometimes.	Abundant almost every year within 400-500 ft. of seed trees.	Mineral soil, thin litter, or disturbed litter and wet soil of 2-3 weeks duration.	Intolerant to overtopping vegetation. Sweetgum most tolerant.	Height of overstory trees or greater.	Rapid if free to grow. Only willow and cottonwood grow faster.
Pin oak	Abundant up to 2-3 years after seed crop. Some usually present at all times.	Very abundant about every 2 years within 150 ft. of seed trees, also spread widely by flood waters.	Litter not seriously inhibiting.	Intolerant to overtopping vegetation.	1-1/2 height of overstory trees or greater.	Moderately rapid. Will outgrow other species on heavy, poorly drained soils.
Cherry bark red oak	Present near overstory trees of this species but these are scarce.	Not known. Apparently abundant on good seed years near seed trees.	Apparently same as other oaks.	Intolerant to overtopping vegetation.	Height of overstory trees or greater.	Less rapid than associated pin oak.

Even-aged stands

A. Large sawtimber at rotation age.

1. Harvest cut and kill culls. Make provision for regeneration, if not available, by one of the following methods: (a) leave seed trees, (b) leave shelterwood, (c) cut in strips or patches to provide seed from surrounding timber, or (d) reforest.
2. Site preparation for natural or artificial regeneration, if needed.

B. Pole and sawtimber stands below rotation age.

1. Thinning plus needed improvement treatment according to stocking guides for type and age.

C. Seedling and sapling stands.

1. Weeding and/or noncommercial thinning as needed to improve species composition.
2. Cut or kill large holdover trees, if present.

Specific practices by types and condition classes.

Uneven-aged stands of oak-hickory, white oak, central mixed hardwoods, oak-gum-cypress, and bottomland hardwoods.

A. Sawtimber stands.

In sawtimber stands remove mature and poor quality trees (killing the culls) usually as a harvest cut or as a stand improvement. The treatment classification is likely to be a harvest cut in mature stands or a stand improvement in younger stands. Opening from about 1/10 to 1/2 acre may be needed to insure natural regeneration and good growth of desirable species. If a seed source for such regeneration is lacking and advanced reproduction is not present, planting may follow the cut.

In heavily stocked sawtimber stands cut back to recommended basal areas (Table), keeping as good a balance between d.b.h. classes as may be possible. In understocked sawtimber stands make improvement cut and/or take steps to insure regeneration.

Clearcutting of the larger trees in uneven-aged stands of mixed sawtimber and poles may be recommended if (a) the residual of desirable trees after "cut and kill" is less than 20 percent of optimum stocking and desirable reproduction is present, or if (b) the residual stand is less than 50 percent of optimum stocking when more than half are undesirable trees. If desirable reproduction is not present the residual trees of desired species shall not be cut but left for seed trees.

B. Poletimber stands

Make an improvement cut to remove undesirable merchantable trees. Such a cut may be classed as commercial or noncommercial. Kill culls, thin dense stands to recommended basal areas. Create openings for regeneration in understocked stands. Site preparation and/or reforestation may be needed to insure regeneration.

C. Restocking stands

Thin dense groups, weeding out potential culls that may be competing with reproduction. Artificial regeneration with or without site preparation may be needed if there are large areas (about 1/2 acre or more) which do not have potentially satisfactory stocking of desirable species.

Even-aged stands of oak-hickory, mixed hardwoods, bottomland hardwoods, and oak-gum-cypress

A. Sawtimber stands at rotation age.

Harvest cut merchantable trees and kill culls. If areas has established desirable reproduction, clear cut. If not, use seed tree, shelterwood, or clear cut strips or patches to provide seed from surrounding timber. Artificial regeneration may be necessary, following the cut. If regeneration by flooding is unlikely and cottonwood reproduction is desired, cut and reforest.

B. Stands below rotation age.

Make intermediate cuts to remove low quality trees and to kill culls. This may be in the form of a commercial thinning or a noncommercial stand improvement.

Basal area and rotation guides for even-aged stands of different ages are presented in table 4. If the stands are overstocked cut back to these recommended basal areas. If stands are understocked the following actions are indicated:

Pin oak and bottomland hardwoods

Age 10: Do not clear-cut because of low density. Take necessary steps to regenerate area. Age 20, 30: Clear-cut if (a) density (basal area) is less than 1/4 shown in table, (b) commercial products are available, and (c) desirable reproduction on the ground is adequate. If advanced reproduction is not present, (a) leave residual stand and make site treatment for natural regeneration; or (b) clear-cut and plant together with needed site preparation. Age 40: same as ages 20 and 30, except density limit is 1/3 that shown.

Table 4 .--Desirable stocking in even-aged stands.

Type	Number of trees or basal area <u>1/</u> by age class					Sawtimber rotation age <u>2/</u>
	Age 10	Age 20	Age 30	Age 40	Age 60	
	<u>No. of Trees</u>	<u>Basal area in sq. ft. per acre</u>				<u>Years</u>
Cottonwood (or willow)	250	80	90	--	--	30
Pin oak	800	55	65	75	80	60
Oak-gum-cypress	800	60	70	85	95	70
Yellow-poplar	600	50	65	80	90	75
Oak-hickory (or white oak)	1,000	35	50	65	80	85

1/ Basal area after thinning.

2/ For managed stands.
Allow additional time for unmanaged stands to develop trees
of desired DBH at maturity.

Cottonwood or cottonwood-willow

Do not clear-cut good quality cottonwood regardless of density, except at rotation age. Begin making intermediate cuts in stands 10-15 years old. Remove suppressed trees and low quality dominants or codominants. Kill culls. Remove badly leaning cottonwood. In making cuts try to keep the crown canopy closed to reduce the growth of more tolerant undesirable species.

Yellow poplar

Avoid clear cutting of yellow poplar of good quality regardless of density. Steps must be taken to obtain regeneration.

Oak-hickory

Age 10: Do not clear-cut because of low density.

Age 20, 30: Same as for pin oak and bottomland hardwoods except density limit is 1/5.

Age 40: Same but density limit is 1/4.

Age 60: Same but density limit is 1/3.

Criteria For Reforestation

Planting will generally be needed in three situations: Old fields not suitable for pasture or crops, nonstocked and nonstocking forest land, and forest land that should be converted to different species (stand conversion). Detailed recommendations on planting practices are given in "Forest Planting Practices for Illinois", 1957 revision prepared by the Illinois Technology Forestry Association.

Old Fields

These are abandoned pasture or cropland not satisfactorily stocked to desirable tree species and with no prospect of being satisfactorily stocked in 10 years. A rough guide to minimum stocking would be the age 10 data in table .

Generally, fields with 40 percent or more of the area occupied by brush or nontimber seedlings or saplings will require brush eradication plus planting. Fields with less brush can be interplanted to 400-800 trees per acre.

Nonstocked forest land

If seed trees are present, and if the ground conditions are favorable, areas in Illinois will almost always develop reproduction within 10 years. Areas with dense brush or sod may not regenerate and site preparation will be required for either natural or artificial regeneration. Planting will be required if seed supply is absent.

Stand conversion

Few places in Illinois are suitable for stand conversion and the process is often difficult and costly. The following cases could be considered for stand conversion.

- A. From "scrub" oak in sand hill country of central and northern Illinois to conifers.
- B. From oak-hickory ridges below oak site index 50 in southern Illinois to southern pine.
- C. Convert excellent upland sites above site index 85 to yellow-poplar and black walnut (in south) and northern red oak and black walnut when these species are absent.
- D. Convert poorly stocked stands on bottomland sites which would be favorable for growth of cottonwood to that species. These conversions can be accomplished only by "all out" methods which remove in a sustained way all competing vegetation. The job can be done, but will be costly. It should be done only if desirable trees cannot be obtained by other means.

15. Prospective growing stock without and with treatment.

These classifications consist of 3 digits covering forest cover type, stand-size stocking and area condition which may be expected in 10 years if no treatment is made and which may be expected in 10 years if the recommended stand treatment is made. These will both be based upon analysis of 20 observations at 10 points about the sample acre.

16. Stocking percent; desirable, growing stock, all trees

The percent of stocking of desirable trees, growing stock trees and all trees at 20 observations will be recorded to the closest 5 percent.

17. Points overstocked

Any point with 3 or more live trees will be considered overstocked. The number of such overstocked points will be recorded. Ten points overstocked will be recorded as X.

18. Previous type, stand-size and density of stocking

Space is provided to indicate the estimated type and size stocking which would likely have been obtained on the sample acre if the Hasel-Larson method had been used 10 years earlier. This should be estimated for each ground plot.

19. Summary of observations

The next section on the survey plot sheet provides a place for summarizing observations made at 10 points and tallied below on the form. Numbers of live forest trees (including excess trees) will be summarized by species as an aid in classifying type. Numbers of growing stock trees recorded in the 20 observations will be summarized by tree size class to facilitate stand-size classification. Numbers of observations (totaling 20) in

various stocking classifications under S&T class will be summarized as basis for determining stocking percent of desirable, growing stock and all trees. Density of growing stock will be used in stand size-density classifying. The number of points overstocked and understocked will be determined from the tally and recorded in this section.

20. Tree number

The first digit of tree number indicates the point within the sample acre. The second reports the sector of the point where the tree is located. Eight sectors of 45° each are laid out and numbered in a clock-wise direction beginning at north. The third indicates distance from the center of the point in 5-foot bands. A tree falling between the 5- and 10-foot radii is coded as 2.

Two lines on the survey plot sheet will be used to record observations at each of the 10 points whether or not trees are found at a point.

Any live trees in excess of 2 on the point will be tallied below the "9" tree code. All trees which have died within 3 years and stumps which have been cut within 3 years will be tallied near the bottom of the form. Complete tree number codes will indicate the location of excess, dead and cut trees.

21. Species

Species will be indicated by a 2-digit code (Tatum Guide No. 7).

22. Diameter breast height

Diameter breast height normally will be measured with a diameter tape carefully and tautly stretched in a horizontal plane around the tree trunk at 4½ feet above average ground level. Previous to measurement all moss or bark likely to break off during measurement or check measurement should be removed by hand. On slopes, d.b.h. will be measured 4½ feet above the ground on the uphill side of the tree. On leaning trees, d.b.h. will be taken at right angles to the lean 4½ feet along the upper side. Fence-line trees containing, or suspected of containing, wire will be measured for diameter at the normal 4½-foot height. Wire will be considered a culling defect. In case of irregularities at d.b.h. (swellings, bumps, depressions, branches, etc.) diameter will be measured immediately above the irregularity at the place where it ceases to affect the normal stem form. If the stem forks immediately above d.b.h., measure diameter below the swell at the place where the fork ceases to affect the normal stem form. When the stem forks below d.b.h. consider the tree as two trees and measure diameter at a point 3½ feet above the likely cutting point above the fork. Indicate the point of measurement on side of the tree facing plot center with a (usually horizontal) paint line.

Code d.b.h. 1" and larger to nearest 0.1 inch; 15.8 inches as 158. Code seedlings as 00.

Stump diameter outside bark will be measured or estimated to the closest 1/10 inch at a point 6 inches above the average ground level for pole timber and 1 foot above average ground level for sawtimber-size trees which have been cut within the last three years. These measurements will be entered in the DBH column. DBH outside bark of dead trees will be measured or estimated and recorded.

Both dead trees which have died within 3 years and stumps which have been cut within 3 years will be measured on fixed plots:

4" DBH class trees on 1/100 acre	-	11.8' radius
6, 8 and 10" trees on 1/50 acre	-	16.6' radius
12"+ class trees on 1/15 acre	-	30.4' radius

23. Merchantable Height

Timber volumes will be estimated using composite volume tables and measurements of d.b.h. and merchantable height from sample trees. The tables are made for use with merchantable height measurements to flexible tops with a minimum of 4" for total volume and 8" for sawtimber volume.

Net volume will be determined for the sawlog portion of the tree in board feet, International 1/4-inch Rule, and for all merchantable material in the main stem of the tree in cubic feet or cords. The net volume of hardwood limbs will be computed by use of conversion factors. Division of the sawtimber-size tree into component parts is illustrated for hardwoods by the accompanying chart.

In the sawtimber-size tree, that section of the bole between stump ~~or butt off~~ and the upper limit of sawlog merchantability is called the sawlog portion or lower stem. The upper stem is that portion of the main stem of a sawtimber tree from the merchantable top of the lower stem to a point where it is limited by branches, deformity, rot, or a minimum top diameter of 4 inches, d.o.b. The upper stem or any portion of it should not depart more than one-fourth of a 90 degree arc ($22\frac{1}{2}^\circ$) from the general course of the lower stem (short abrupt crooks excepted). When branches appear it is always the largest, more or less vertical one following the general course of the lower stem. The upper stem stops when it is no longer the largest branch of the fork following the general course of the lower stem, is limited by rot, sweep or limbiness, or becomes less than 4 inches d.o.b.

Other portions of the tree include stump, rotten cull sections, limbs and twigs. Limbwood includes sound cull sections and branches to a minimum of 4 inches d.o.b. No restriction is made to quality or length of individual pieces of limbwood except that they be live and sound.

Merchantable height is the distance from stump (generally about 6 inches above average ground level for poles and 12 inches for sawtimber) to that point where the stem or main fork reaches the minimum diameter inside bark, or becomes unmerchantable for other reasons.

Deduction will be made for intervening cull sections as well as cull in merchantable sections. To be classed as merchantable a section must be at least 8' long. Merchantable sections longer than 8' will be increased by 2-foot intervals.

Measure both sawtimber and total merchantable height for each merchantable sawtimber tree and total merchantable height for each merchantable poletimber tree. Record to the nearest full even (two) foot interval.

Material must be sufficiently straight and sound to make standard pulpwood now or standard sawlogs now or prospectively; thus, sawlogs must be of grade 3 or tie and timber quality or potential; and pulpwood must be relatively straight, at least 50 percent sound and free of excessive knottiness. Substandard material is not included even though it may be used currently.

For want of better guides, the standards for pulpwood merchantability will be applied to cubic foot volume. "Relatively straight" indicates sticks whose scaling diameter in inches plus crook or sweep departure does not prevent it from going through a 16" diameter chipper (a 14" sum is recommended for field use). Larger sticks will be scaled for cull like sawlogs. Excessive knottiness is limited by:

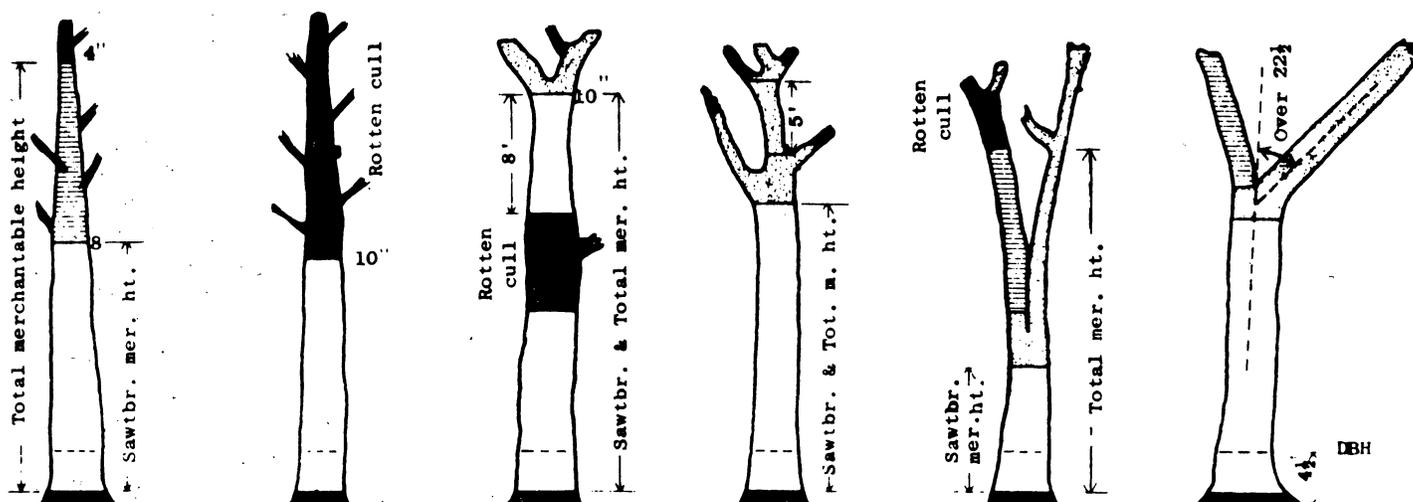
1. One limb or fork exceeding 2" in diameter whose average knot collar measured flush with stem is larger than $\frac{2}{3}$ of the diameter of the main stem at point of occurrence.
2. The sum of diameters of limb collars whose limbs exceed 2" in diameter, shall not exceed $\frac{2}{3}$ of the diameter of the stem at point of occurrence (within a 6" vertical span). Refer to section F below for guides to determining the percent of cull.

24. Cubic Foot Loss

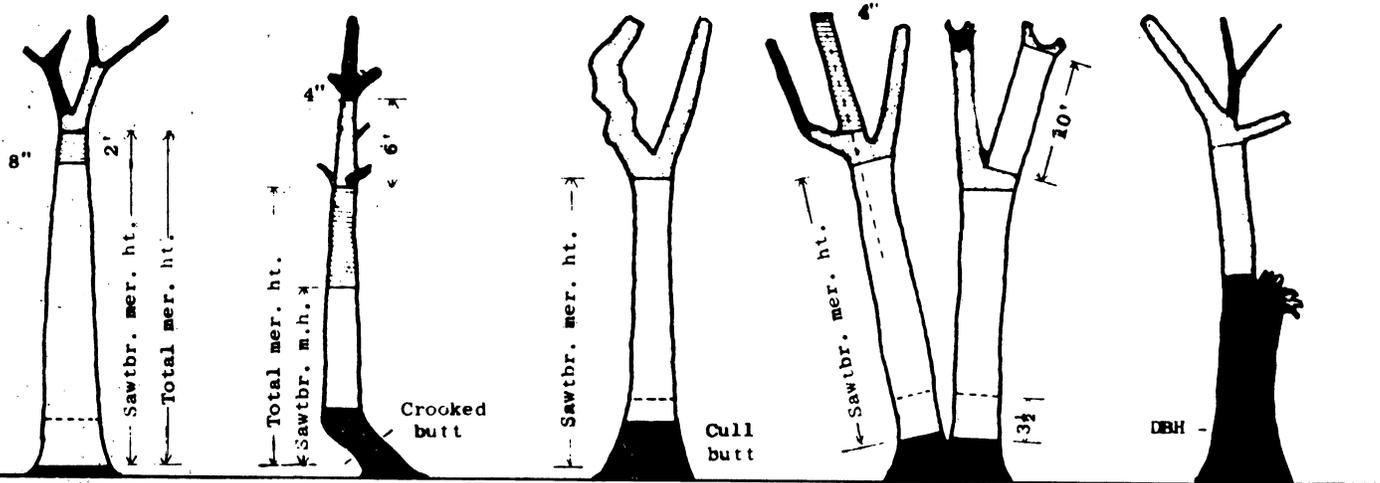
The cubic foot loss of scale due to cull will be determined for each section of tree using judgment as to extent of cull loss, a table (Tatum Guide No. 8), which gives gross volume in bolts of different sizes and figure 5, "Determining Proportion of Cull," cull sizes loss in the tree may be summarized on the back of the survey plot sheet. Judgment may be guided somewhat by the following "rules of thumb" which were prepared by Gilbert F. Begemen, Jr., following fieldwork on the Missouri Cull Study. More complete guides may be developed when the report of that study is done. Until then defect indicators need not be tallied.

Fig. 5-- MERCHANTABILITY IN HARDWOOD SAWTIMBER TREES

□ Sawlog section ▨ Upper stem ▩ Limbs ■ Waste



A B C D E F



G H I J K

Merchantable height is the distance from stump height (generally about 6" above average ground level ^{1/} for poles and 12" for sawlog trees) to 8" DOB for sawtimber and to 4" DOB for cubic foot volume (except when cull, deformity, or limbs limit merchantability sooner). Merchantable height will be measured up the stem and largest (in diameter) limb which is within ¹/₄ of a 90° arc from the general course of the lower stem and not disqualified for other reasons. All sawlog or upper stem sections must be at least 8' long to be considered merchantable. Limb wood sections must be at least 1' long and 4" DOB.

Material must be sufficiently straight and sound to make standard pulpwood now or standard sawlogs now or prospectively; thus, sawlogs must be of grade 3 or tie and timber quality or potential; and pulpwood must be relatively straight, at least 50% sound and free of excessive knottiness. A straight line extended between the centers of the two ends of an 8' stick must not fall outside the bark. Pulpwood merchantability is limited when the knot collar of one limb measured flush with the stem exceeds ²/₃ of the stem DOB or when the aggregate diameters of the knot collars (of limbs over 2" DOB within a 1' vertical span exceed the average stem diameter of that span. Substandard material is not included even though it may be used currently.

A soundness factor will be used to deduct for cull sections (including butt off) in the merchantable stem as well as for loss of scale in merchantable sections. Sections imbedded with wire will be butted off. No deduction will be made for cull in limbwood.

Diameter (DBH) of trees will be measured 4 1/2' above average ground level ^{1/} (or at the point above 4 1/2' where abnormality ceases to affect the normal stem form in the case of irregularities at DBH). Stems of a tree forking below breast height will be tallied as individual trees. DBH will be measured at right angles to the stem.

^{1/} Except on uphill side on slopes, on upper side of leaning trees, or at a fork below DBH.

A Guide to Major Defect Indicators and Associated Rot

1. Fire Holes: An open fire hole will usually produce an accompanying butt swell. The rot will usually extend upwards in the bole to about 1 foot above swollen portion of trunk. However, if there is an indication of ant dens, add one foot more to deduction (two feet above swollen portion). String rot is the worse kind; it will normally progress a little higher in the bole (2 feet above swollen portion).
2. Fire Seams: Where the callus tissue has an inward curling effect, the prospects of rot are great. The rot extends upward in the bole in an inverted cone shape. In practice, the tip of the cone of rot will usually extend 1/2 foot above the visible fire seam. Where the callus tissue is not raised or swollen and is completely healed over, the cull deduction is normally very negligible. As a rule of thumb, figure the cull deduction as 1/5 of the diameter of the stump at the bottom of the inverted cone and the top of the inverted cone to stop at the height of the visible fire seam.
3. Stem Bulges: These defect indicators normally occur above d.b.h. The stem bulge actually is caused by a number of factors such as grubs, borers, ant dens, etc. either singly or in combination. In practice, deduct the entire cylinder from 1 foot above the stem bulge to 3 feet below the stem bulge for an average sized tree (12" d.b.h.). Adjust the deductions for smaller or larger sized in the 3 to 1 ratio. Important to remember is the fact that rot proceeds down the bole faster than up the bole. (in the approximate 3 to 1 ratio).
4. Branch Collars - Closed: Where there are healed over branch collars, there are two types, convex and concave. Normally there is little to no cull deduction for the convex type. The concave type of branch collar indicates that there is a breakdown of tissue. In practice, deduct 1 foot of bole for each 3 inches of branch collar diameter.
5. Branch Collars - Open: Two things to keep in mind on open branch collars are whether they are situated such as to catch moisture and whether they are healing over or not. In practice, an open branch collar open to direct moisture and not healing over will cause a cull deduction of 1 foot (per each 4" diameter of collar). The other type of collars (open, but healing) are usually not serious.

6. Grub holes: The grubs usually just work on the sapwood (xylem). Normally, they will cause just a grade defect unless there are several located in a 1-foot section. However, if there are ants or beetles associated with the grubs, the damage is usually much more severe (indicated severity gauged by the amount of swell of the stem).
7. Ant holes: Ant emergence holes are indicated by a small ($\frac{1}{4}$ ") puckered up protuberance. Again, unless there are several located within a small section (1 foot) the damage is such as not to cause a cull deduction.
8. Woodpecker holes: There is normally no cull deduction for woodpecker holes unless there are a number of other defect indicators associated with them.
9. Branch stubs: Live or dead branch stubs with tight collars (no openings) indicate very little and mostly no rot associated. However, if there are openings (usually indicated by branch fragments) the cull deduction for 1-7 inch diameter collars are normally less than 1 foot. In practice, treat a tight branch stub as having no cull deduction and treat one with an opening as an open branch collar (number 5).

25. Stocking and Tree Class

Under the Hasel-Larson method of diagnosing and classifying the forest it is necessary to make a number of observations about the sample acre, classifying the stocking situation. A point may be stocked with a desirable tree, an acceptable tree, a cull or noncommercial species, or inhibiting vegetation. It may be temporarily nonstocked or not be stockable. These classifications are indicated by the first of 2 digits in the "S&T Class" column of the survey-plot sheet. Two such observations will be made at each of 10 points in this survey. Dead trees and stumps do not contribute to stocking but will be tallied if the tree has died or been cut within 3 years.

The second digit in the code is used to classify dominance of trees which is needed for stratifying growth samples. Trees are classed dominant, codominant or suppressed. This digit is also used to separate rotten and sound cull trees.

Code Item

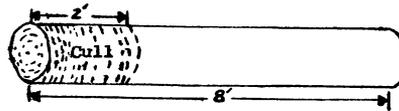
- | | |
|----|---|
| 11 | <u>Desirable tree-dominant</u> : A desirable tree is a growing stock tree of any commercial species 3.0" or larger in dbh with a crown more than 1/3 filled with foliage of good color and normal size; capable of yielding now or prospectively at least one sawlog of grade 2 or better quality or two 100" sticks of standard quality pulpwood or a merchantable 25-foot pole; without any apparent physical weakness, pathogens or insects present which are likely to kill or seriously deteriorate the tree within 10 years; not beyond sawtimber maturity; and capable of earning 3 percent rate of compound interest (value not volume). This value increment is obtained |
|----|---|

This guide may be used for calculating percent of sawtimber or total volume lost in a section of a tree and the cull (or soundness) factor for the entire tree.

A. CULL SECTION

If section of bole is affected, deduct percent of log length affected.

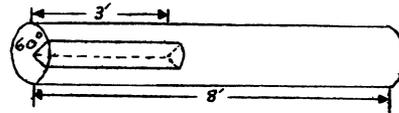
Example: $\frac{2}{8} = 25$ percent cull in section



B. CULL SECTOR

If sector is affected, multiply percent of circle times percent of length.

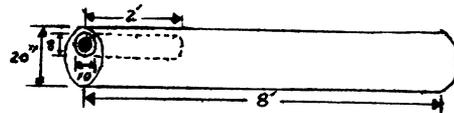
Example: $\frac{60^\circ}{360^\circ} \times \frac{3}{8} = 6$ percent cull in section



C. INTERIOR CULL

Square out interior cull as a percent of total volume of the section. For board foot cull add one inch to width and to thickness; for cubic foot cull use actual dimensions of rot. For board foot loss divide width and thickness by the scaling diameter (average d.i.b., small end) minus one; for cubic foot divide by scaling diameter. Multiply fractions by percent of log affected. Proportions may be looked up or interpolated in F. below.

Example: $\frac{8}{20-1} \times \frac{10}{20-1} \times \frac{2}{8} = 6$ percent cull in section

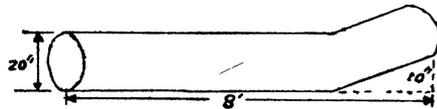


D. CROOK

Multiply proportion of diameter displaced times proportion of log length affected by crook.

Example: $\frac{10}{20} \times \frac{2}{8} = 12$ percent cull in section

No reduction of cubic foot volume will be made unless the sum of displacement plus diameter exceeds 14 inches.

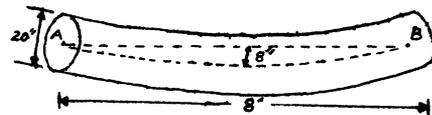


E. SWEEP

Determine sweep departure and subtract 1 inch for 8 foot logs or 2 inches for 16 foot logs. Divide by scaling diameter.

Example: $\frac{8-1}{20} = 35$ percent cull in section of 8 foot bolt.

If a straight line between A and B falls outside the bark, the affected section is over 50 percent cull. No reduction of cubic foot volume will be made unless the sum of sweep departure plus diameter exceeds 14 inches.



F. TABLE OF PROPORTIONS

Proportion of scaling diameter, log length or circle involved may be looked up directly or interpolated from this table.

Numerator	Denominator										
	6	8	10	12	14	16	18	20	22	24	36
	Percent										
2	33	25	20	17	14	12	11	10	9	8	6
4	67	50	40	33	29	25	22	20	18	16	11
6		75	60	50	43	38	33	30	27	25	17
8			80	67	57	50	44	40	36	33	22
10				83	71	62	56	50	45	42	28
12					86	75	67	60	54	50	33
14						88	78	70	64	58	39
16							89	80	73	67	44
18								90	82	75	50

DISTRIBUTION OF VOLUME IN THE TREE

To convert from percent cull in a section to cull percent for tree, multiply proportion of section lost times percent of tree volume in that section. If loss occurs in more than one section of the tree, find the percent of tree volume lost from each section and then add these percents to find total cull portion of the tree.

Tree size Bolts	Logs	Bolt Number									
		1	2	3	4	5	6	7	8	9	10
(8')	(16')	Percent of Tree Volume									
2	1	56	44								
3	1½	41	33	26							
4	2	33	28	22	17						
6	2½	27	23	19	17	14					
7	3	24	21	18	15	12	10				
-	3½	22	19	17	14	12	9	7			
-	4	20	18	15	13	11	9	8	6		
	5	18	15	13	12	10	9	8	6	5	3

Example: A 1-log tree has 56% of tree volume in the butt bolt, 44% in the second.

when radial growth (in rings per inch) multiplied by dbh (in inches) does not exceed 133. A tree is growing at a rate of 3% per annum if its radial growth in inches exceeds the following in 10 years (reduce radial growth requirement by .10" if height growth is unrestricted):

10-year radial		10-year radial		10-year radial	
DBH	growth inches	DBH	growth inches	DBH	growth inches
11	0.82	18	1.35	25	1.87
12	0.90	19	1.42	26	1.95
13	0.97	20	1.50	27	2.02
14	1.05	21	1.57	28	2.10
15	1.12	22	1.65	30	2.25
16	1.20	23	1.72	32	2.40
17	1.27	24	1.80		

Well established trees smaller than 3" dbh will be considered desirable if of a species suitable for the type and site (table 5). Desirable trees are the kind of growing stock forest managers aim to grow.

Dominant trees are those trees whose crowns are (a) definitely above the general level of the canopy or (b) in the general canopy but competing with trees of poorer development. This corresponds to Lake States tree classes 0, 1 and 2.^{1/} These are free growing trees and tend to be the most vigorous growers.

1/ The Lake States tree classifications referred to in this section include:

- 0 Open-grown: Isolated trees.
- 1 Head dominants: Dominating surrounding trees with crowns definitely above the general level of the canopy.
- 2 Strong dominants: In competition with trees of the same crown class but of poorer development.
- 3 Conditional dominants and codominants: Competing with trees of the same crown class and development and not in immediate danger of being crowded out.
- 4 Weak dominants and codominants: Competing with trees of better development.
- 5 Intermediates: Competing with trees of higher crown class and development occupying small holes in the canopy.
- 6 Suppressed: Trees definitely below the general level of the canopy.

For the entire classification or more detail refer to, "A Tree Classification for Aspen, Jack Pine and Second Growth Red Pine," Journal of Forestry, Volume 41, No. 4, April 1943.

- 12 Desirable tree-codominant: Desirable tree is defined above. Codominant trees are trees whose tops form the general crown canopy level but are in competition with trees of equal or better development. This group corresponds to Lake States tree classes 3 or 4. Growth of these trees is somewhat restricted by competition.
- 13 Desirable-Suppressed: See desirable tree above. Suppressed trees, as used here, includes both those trees under the general level of the canopy and all "intermediates" (which occupy small holes in the canopy). This corresponds to Lake States tree classes 5 and 6. These will be used for volume computation but will not be used in measuring stocking. Always tally suppressed trees near bottom of plot record sheet.
- 21 Acceptable tree-dominant: An acceptable tree is a growing stock tree which does not qualify as a desirable tree. Dominant trees are defined above.

- 22 Acceptable tree-codominant: See above definition.
- 23 Acceptable tree-suppressed: See above definition.
- 34 Sound cull tree: A live tree 5" and larger dbh that does not contain a sawlog now or prospectively primarily because of roughness, poor form or species (noncommercial). Cull trees are not considered growing stock. Trees formerly classed "poor poles" will be included here.
- 35 Rotten cull tree: A live tree 5" and larger dbh that does not contain a sawlog now or prospectively primarily because of rot.
- 40 Inhibiting vegetation or slash: Stocking of brush, herbs or sod or concentrations of slash which occupies sufficient space to prevent reproduction and growth of tree species.
- 50 Nonstocked (bare): Stockable areas which are not stocked by live trees or inhibiting vegetation or slash.
- 60 Nonstockable: Areas which are not stockable with commercial trees because of water, rock, marsh, conflicting uses, etc.
- 07 Stump (cut by man): Stumps of trees over 3" dbh which are believed to have been cut within the 3-year period preceding the inventory.
- 08 Dead tree-salvable: Trees over 5" dbh which are believed to have died within 3 years and are worth salvaging (at least 50 percent of gross volume is salvable).
- 09 Dead tree-not salvable: Trees over 3" dbh which are believed to have died within 3 years but are not worth salvaging.

Table 5 .--Classification of desirable species according to forest type group and site, Central States Region.

Species	Shortleaf loblolly pine Oak-pine	White oak and oak-hickory			Central mixed hwdws. (south)	Central mixed hwdws. (north)	Maple-beech (north)	Elm-ash-cottonwood (north)	Elm-ash-cottonwood (south)	Oak-gum-cypress	Pin oak	Redcedar hardwoods
		Poor site (40-64) ^{1/}	Medium site (65-79)	Good site (80+)								
Ash, white				D	D	D						
Ash, green								D	D	D		
Basswood				D		D	D					
Beech							D					
Cherry, black				D	D		D					
Cottonwood								D	D	D		
Cypress									D	D		
Elm								D	D			
Kentucky coffeetree					D							
Hickory, shellbark										D	D	
Hickory, mockernut				D	D	D	D					
Hickory, Shagbark				D	D	D	D					
Hickory, bitternut				D	D	D	D					
Maple, soft								D	D	D		
Maple, hard							D	D				
Oak, black	D	D	D	D	D	D						D
Oak, bur				D	D	D						
Oak, chestnut		D	D									
Oak, post		D										D
Oak, cherrybark and Shumard					D	D			D	D	D	
Oak, pin and Oak, willow										D	D	
Oak, northern red				D	D	D	D	D	D			
Oak, scarlet and southern red		D	D	D	D							D
Oak, swamp white								D		D	D	
Oak, white	D	D	D	D	D	D						D
Pecan										D	D	
Pine, southern	D	D	D									
Pine, white							D	D				
Redcedar				D	D							D
Sweetgum					D	D			D	D		
Black gum										D		
Sycamore					D	D		D	D	D		
Walnut, black					D	D	D	D				
Yellow-poplar					D	D	D		D			

^{1/} Total height at maturity.

^{2/} Includes swamp white oak and swamp chestnut oak.

26. Point Action

At each of 10 points on the sample acre two samples of stocking will be taken and two recommendations for point action will be made as a basis for evaluating needed stand treatment. Point action depends on the situation found at the point. The aim is to obtain two desirable trees at each of the 10 points.

The following point action classes will be used. These are designed to guide classification of stand treatment for the sample acre.

<u>Code</u>	<u>Item</u>
0	<u>No action</u> -nonproductive or nonforest area.
1	<u>No action</u> . When a desirable tree is on or overtopping the point or likely to occupy it within 10 years.
2	Cut mature or near mature growing stock tree. Regeneration, harvest, or salvage cuttings. Code X/2 if planting also is recommended.
3	Cut immature growing stock tree over 5" d.b.h. (presumably marketable). Code X/3 if planting is also recommended.
4	Cut or kill sapling growing stock and cull (including noncommercial) trees (presumably unmarketable). Code X/4 if planting also is recommended.
5	Cut, kill, or remove other unwanted vegetation or slash to stimulate natural regeneration.
6	Prepare site (cut, kill, or remove other unwanted vegetation or slash) and plant or seed.
7	Plant or seed only.
8	Site preparation only

27. Cut or Leave

Point action is used to guide the stand treatment classification. However, once a stand treatment is determined, the action at some of the points may be changed. More or fewer trees may be cut than shown by point action. Hence, it is desirable to tally each tree "cut or leave" after stand treatment is classified as 2, 3, or 4. This provides the basis for computing desirable cut.

28. Timber Quality

Merchantable hardwood sawtimber trees will be graded by log lengths using standard grades for factory and tie and timber logs. Aspen, the southern pines and white pine will also be log graded. The proportion of net volume in each log grade in each sawlog tree on the three-corner subplot will be recorded. Loss of scale in ten board foot units will be estimated for each log based upon judgment as to extent of cull, a table (Tatum Guide No. 8) which gives gross volume in bolts of different sizes and the instruction sheet, "Determining Proportion of Cull." Standard grading rules will be used.

Hardwood Log Grades for Standard Lumber

Grade factors	Log grade 1		Log	Log
	Butts only	Butts and uppers	grade 2 Butts and uppers	grade 3 Butts and uppers
Diameter (min.)	13-15"	16-19":20"+	11"	8"+
Length (min.)	10'+	10'+	8-11' : 12'+	8'+
Clear cuttings (on the 3 best faces):				
Length (min.)	7'	5' : 3'	3'	2'
Number on face (max.)	2	2	2 : 3	Unlimited
Yield in face length (min.)	5/6	5/6	4/6	3/6
Sweep and crook deduction (max.)	15%	15%	30%	50%
Cull deduction, including including sweep (max.)	40%	40%	50%	50%
Sound end defects, area (max.)	See instructions			

Exceptions.--In ash and basswood 12" d.i.b. for grade 1 butts.

Grade 2 10" d.i.b. must be grade 1 surface quality.

Grade 2 11" d.i.b. limited to two cuttings.

Grade 2 8' and 9' lengths limited to 12" d.i.b.;
3/4 yield in not more than 2 3'+ cuttings.

Sweep and crook allowance reduced 1/3 in logs
with more than 1/4 diameter in sound end defects.

Sixty percent cull deduction permitted in grade 2,
if otherwise of grade 1 quality.

Sixty percent cull deduction permitted in grade 3,
if otherwise of grade 2 quality.

From Hardwood Log Grades for Standard Lumber,
Forest Products Laboratory, 1953.

Specifications for Tie and Timber Logs

Position in tree	: : Butt and upper :
D.I.B., small end, inches	8"+
Length without trim, feet	8'+
Clear cuttings	No requirements. Not graded on cutting basis.
Sweep allowance, maximum	1/4 d.i.b. of small end for half logs and 1/2 d.i.b. for log 16' long.
Sound surface defects permitted:	
Single knots	Any number, if none has an average collar diameter in excess of 1/3 of log diameter at point of occurrence. ^{1/}
Whorled knots	Any number provided the sum of the collar diameters does not exceed 1/3 the log diameter at point of occurrence.
Holes	Any number not exceeding knot specifications if they do not extend over 3 inches into the contained tie or timber.
Unsound defects permitted:	
Surface	Any number and size if they do not extend into contained tie or timber. If they extend into contained tie and timber they shall not exceed size, number, and depth of limits of sound knots.
Interior	None permitted except one shake not more than 1/3 the width of contained tie or timber and one split not over 5 inches long.

^{1/} Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

Local use logs that do not meet the minimum specifications of the above grades will not be considered merchantable for survey purposes.

Specifications for Logs of Southern Pines

Grade	D. I. B.	Length	Surface requirements
1	10" - 16"	8' plus	Surface clear (not considering adventitious knots and branches).
	16" plus	8' plus	Not more than three 2- to 4-inch knots and any number of smaller knots.
2	8" - 9"	8' plus	Surface clear.
	10" - 13"	8" plus	Any number of small knots (Less than 2 inches in diameter).
	14" plus	8' plus	Not more than six 2- to 4-inch knots and any number of smaller knots.
3	6" - 7"	8' plus	Any number of small knots not exceeding 1 inch in diameter.
	8" - 13"	8' plus	With not more than six 2- to 4-inch knots.
	14" plus	8' plus	More than six 2- to 4-inch knots. Any log with one or more knots 5 inches and larger.

Knotty or crooked merchantable logs 8-inch d.i.b. or over that do not fall in either No. 1 or No. 2 grade: length 10 feet or over.

29. Radial Growth

An increment boring will be taken about 2 inches below dbh on each growing stock tree over 3" dbh tallied at the 3 corner points of each sample acre. The radial growth for the last 10 and the last 20 years will be measured and recorded to the closest .05 inch.

30. Height change in 10 years

Growth in merchantable tree height will be estimated on each growing stock tree. The increase in cubic foot and board foot merchantable heights during the 10 years following inventory will be estimated and recorded to the closest foot on the survey plot sheet.

31. Mortality class

The primary (major lethal agent) and the main contributing causes (Tatum Guide No. 7) of the death of each tree which has died within 3 years will be estimated and recorded in that order on the survey plot sheet.

32. Volume classification

Growing stock volume on commercial forest land: Volume of sound wood in the bole of live sawtimber and poletimber trees from stump to a minimum top diameter of 4.0 inches outside bark, may be expressed in cubic feet of solid wood or cords of unpeeled wood. Include central stem only to the point where it breaks into limbs or is 4.0 inches in diameter outside bark, whichever comes first.

Sawtimber volume on commercial forest land: Net volume in board-feet, International 1/4-inch Log Rule, of live sawtimber trees. Net volume is defined as gross board foot volume less deductions for rot, sweep, or other defects affecting use of a tree for lumber.

Volume computations will be made by a data processing machine using (a) formulae based on the Lake States Composite Table and (b) species correction factors developed from Central States form class and bark thickness measurements. However, the field man should be able to determine volume and stand operability on the ground. Tatum Guide No. 8 presents two tables entitled, "Multiple Volume Tables for Factor 37½ Angle-Gauge Plot" which will assist him in determining gross volume in cords per acre and in M feet, board measure per acre.

33. Desirable Cut

Desirable cut is the amount of merchantable timber that may be cut annually during the next decade while (a) progressively effecting a reasonably even distribution of age classes during the rotation selected for each type, and (b) progressively building up to a satisfactory level of good growing stock. The cut should be at a level which can be sustained or raised in quantity and quality during subsequent decades.

Desirable cut will be computed by two methods (a) field recommendations and (b) formula. These will be compared with each other and with growth and growing stock volumes in search of the most advantageous cutting level. The Lake States Survey Handbook provides a general guide for this activity.

All forest land in this State is considered accessible. However, a minimum cut of 3 cords or 500 board feet will be required for an operable commercial cut. This minimum volume must be available within 5 years following the date of the inventory (middle of the desirable cut period).

V ADDITIONAL SURVEY PHASES

A. Ownership Studies

After plot locations have been selected, ownership data may be collected along two courses of action. If convenient, a contact may be made with the owner at or near the plot. In this case, the owner will be questioned and Budget Bureau form No. 40-6013.1 will be filled out. If the owner is not contacted in the field the cruiser will make contacts in the county offices to determine who the owner is, where he lives, and what his occupation is. The questionnaire will then be sent to him. If no reply is received after several attempts by mail, the cruiser will phone or make a personal contact with the owner to obtain the information desired.

B. Locating Superior Stands and Trees

Forest Survey personnel will watch for any stands or individual trees which appear to have superior characteristics. Regardless of their location on or off plots, these stands or trees will be reported on a card entitled, "Report of promising or unusual stands or trees." The cards will be sent to the Central States Forest Experiment Station at Columbus.

C. Generalized Forest Type Mapping

The best available generalized forest cover type map will be reproduced on an official State Highway map in color. The map will then be cut into districts and each one mounted inside a manila folder. These will be checked by the field crews and corrected insofar as needed. If many changes are necessary it will be advisable to show new cover types on a second map.

Any area of at least 100 square miles having 10 percent or more of forest land will be shown. Stringers of forest land over 3/4-mile wide, as along river bottoms, will be shown diagrammatically.

The following cover types and colors will be used:

As part of the nationwide Forest Survey, the Lake States Forest Experiment Station of the U.S. Forest Service is compiling information on ownership of forest lands.

Records of _____ County, _____, show that you own forest land. This is one of several hundred tracts being covered by the present study. It would be most helpful if you would fill in the answers to the following 10 questions, giving your best estimates where exact figures are not known.

Questions 1, 2, and 3 relate to total land owned.

	In above state (acres)	In other states (acres)
1. How much land do you own individually? (Include land owned in common with spouse.)		
2. How much land do you own jointly?		
3. What is your proportional interest in jointly held land reported in item 2? (1/2, 1/4, 1/10, etc.)		

Questions 4, 5, 6 and 7 below relate only to forest land. Include as forest land all land that is growing trees, including all cut-over woodland and brush land.

In questions 5 and 7 do not include land in Soil Bank programs.

	In above state	In other states
4. How many acres of <u>forest land</u> do you own individually?		
5. How many acres of the individually owned <u>forest land</u> are leased to others?		
6. How many acres of <u>forest land</u> do you own jointly?		
7. How many acres of the jointly owned <u>forest land</u> are leased to others?		
8. Do you operate a sawmill or other wood-using plant?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
9. Do you operate a farm?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
10. What is your principal occupation? _____		

All information will be held confidential and used only in statistical summaries.

A return envelope is enclosed for your convenience; no stamp is required. An early reply would be most helpful, and your cooperation will be sincerely appreciated.

Very truly yours,
M. B. DICKERMAN, Director

By: *James T. Morgan*
James T. Morgan

<u>Type Group</u>	<u>Color</u>	<u>Crayon</u>
White-red-jack pine	Brown	343
Loblolly-shortleaf pine	Lemon yellow	353½
Oak-Pine	Orange	324
Oak-Hickory (also include Central mixed hardwoods and white oak)	Green	354
Oak-Gum-Cypress (include Pin oak)	Olive green	325
Elm-Ash-Cottonwood (include pure Cottonwood and Willow)	Sky blue	320
Maple-Beech-Birch	Pink	322
Aspen-Birch	Purple	323½
Unproductive forest land	Grey	352½

Forest land reserved for nontimber purposes is to be indicated by black hatching (NW to SE) over type colors.

D. Training and Supervision

At the beginning of the Second Illinois Forest Survey each crew member will be given at least 4 days of training by personnel from the Lake and Central States Forest Experiment Stations. This is designed to provide orientation to Illinois conditions and a background in the latest forest practices in addition to covering survey techniques.

Followup training will be given by the Survey party leader until all questionable points are resolved. Men reporting after the survey is underway will be trained on the job by the party leader and the crew chief. A check list will be maintained for each new man to record training which is required and accomplished.

The inventory chief and the party leader must provide sufficient inspection to insure that each crew member knows the job and is obtaining a high standard of accuracy. Check cruising of each crew will be carried out on a schedule of one plot checked every two weeks for new crews. After crews are experienced one plot should be checked per crew every six weeks, unless presence of errors make more frequent checking necessary. Equipment and tools must be kept clean and in good working order. These will be checked during regular check cruising. Safe operations will be stressed. Recorded field data must be neat, numbers well-formed with all required items completely filled out.

E. Cost and Accuracy Studies

In order to improve accuracy of survey planning, accomplishments will be maintained, a brief time study will be made and accuracy of photo classifications will be studied. Each week the field party leader will prepare an analysis of time spent and the resulting accomplishments. This keeps

supervisory personnel posted on progress and provides basic data for calculating the cost of the survey. A two-week study of time spent on the various phases of the job will be made after the crews are well trained. Detailed instructions will be provided. Toward the end of the survey an analysis will be made of the accuracy of classifications and the co-efficients of variation.

F. The Computing Plan

To be added later.

G. Computation of Statistical Accuracy

To be added later.

FOREST SURVEY TATUM GUIDE NO. 7
September 1961

LAND CLASSIFICATION

- Photo
1 Forest
3 Water
5 Other nonforest
Ground
3 Water
4 Wooded pasture
5 Other nonforest
6 Commercial forest
7 Unproductive forest
8 Reserve forest

PLOT SIZE

- Seedling & brush-fixed r = 5.26'
2" class trees-fixed r = 5.89'
4" class trees-fixed r = 6.80'
5+ trees-angle gauge DBH factor 37½
(1.42 feet radius per inch DBH)
Fixed plot for cut and mortality
4" trees-1/100 acre-r = 11.8'
Poles -1/50 acre-r = 16.6'
Sawtimber-1/15 acre-r = 30.4'

COVER TYPE

- Photo
1 Softwood
4 Upland hardwood
8 Lowland hardwood
Ground
0 Shortleaf-loblolly pine
1 Redcedar-hardwoods
2 Oak-pine
3 White oak
4 Oak-hickory
5 Central mixed hardwoods
6 Maple-beech
7 Pin oak (Dist. 1 & 2)
Aspen-birch (Dist. 3 & 4)
8 Oak-gum-cypress (Dist. 1 & 2)
Northern pine (Dist. 3 & 4)
9 Elm-ash-cottonwood
Always show ground cover type for land classes 6, 7, & 8.

SIZE STOCKING

- Photo
1 Nonstocked,
S & S - poor & medium
3 Saplings & seedlings-good
4 Poletimber-poor & medium
6 Poletimber-good
7 Sawtimber-poor & medium
8 Sawtimber-good
Ground
0 Nonstocked
1 Sapling & seedlings-poor
2 Sapling & seedling-medium
3 Sapling & seedling-good
4 Poletimber-poor
5 Poletimber-medium
6 Poletimber-good
7 Sawtimber-poor
8 Sawtimber-medium
9 Sawtimber-good

AREA CONDITION

- 1 70 percent or more stocked with desirable trees.
2 40 to 70 percent stocked with desirable trees, and with 30 percent or less of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.
3 40 to 70 percent stocked with desirable trees and with more than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface condition that will prevent occupancy by desirable trees.
4 Less than 40 percent stocked with desirable trees, adequate seed source, and seedbed favorable to natural restocking.
5 Less than 40 percent stocked with desirable trees, inadequate seed source and/or seedbed unfavorable to natural regeneration.

SITE

- Photo
1 ~~Maturity height 100+~~
2 Maturity height 80-90' *Good Site*
3 Maturity height 60-79' *Medium Site*
4 Maturity height 40-59' *Poor Site*
5 Maturity height below 40' *Unproductive*
Ground
Determine site index at 50 years for shortleaf pine, white pine, aspen, black, white, or post oak, hard maple, elm, cottonwood, or black gum.

USE TREND (Since previous survey)

- 1 Continuing nonforest use-grazing
2 Continuing other nonforest uses
3 Changed from forest to grazing
4 Changed from forest to cultivation
5 Changed from forest to urban
6 Changed from forest to mining
7 Changed from forest to other nonforest
8 Continuing forest
9 Changed from nonforest to forest

OWNERSHIP

- 0 National Forest
1 Bureau of Indian Affairs
2 Other Federal
3 State
4 Other public
5 Forest Industry-Pulp
6 Forest Industry-Lumber
7 Forest Industry-Other
8 Farmer-owned
9 Miscellaneous private

SIZE OF OWNERSHIP

- (Commercial forest in U.S.A.)
1 0 - 24 acres
2 25 - 49 acres
3 50 - 99 acres
4 100 - 499 acres
5 500 - 2,499 acres
6 2,500 - 4,999 acres
7 5,000 - 49,999 acres
8 50,000+ acres

STAND TREATMENT

- 1 No treatment
2 Harvest cut
3 Commercial stand improvement
4 Noncommercial stand improvement
5 Site preparation only
6 Site preparation and reforest
7 Reforest only

SPECIAL PROTECTION

- 1 No special protection
2 Disease
3 Insects
4 Domestic animals
5 Game animals
6 Porcupines
7 Drainage

SIZE OF STAND AREA

- 1 1 acre
2 2 acres
3 3 - 4.9 acres
4 5 - 9.9 acres
5 10 - 39.9 acres
6 40+ acres

SPECIES

- | | | |
|--------------------------------|-------------------------|--|
| Softwoods | 31 White birch | Soft Hardwoods |
| 01 Shortleaf pine | 32 Black birch | 60 Silver maple |
| 02 White pine | 33 Sugar maple | 61 Red maple |
| 07 Bald cypress | 34 Beech | 62 Boxelder |
| 08 Eastern redcedar | 35 Rock elm | 63 Black cherry |
| 09 Other softwoods | 36 White ash | 64 Hackberry & sugarberry |
| | 37 Red ash | 65 American elm |
| | 38 Green ash | 66 Slippery elm |
| Hard Hardwoods | 39 Blue ash | 67 Winged elm |
| 10 White oak | 40 Shagbark hickory | 68 Chinese elm |
| 11 Swamp chestnut oak | 41 Mockernut hickory | 69 Black ash |
| 12 Swamp white oak | 42 Shellbark hickory | 70 Cottonwood |
| 13 Bur oak | 43 Pignut hickory | 71 Aspen |
| 14 Post oak | 44 Water hickory | 72 Willow |
| 15 Overcut oak | 45 Pecan | 73 Basswood |
| 16 Chinquapin oak | 46 Bitternut hickory | 74 Butternut <i>Asiafrass</i> |
| 17 Nuttall oak | 47 False pignut-hickory | 80 Sycamore |
| 20 Northern red oak | 48 Southern red oak | 82 Kentucky coffee tree |
| 21 Swamp red (cherry bark) oak | 49 Black hickory | 83 Catalpa |
| 22 Black oak | 50 Black walnut | 84 Yellow poplar |
| 23 Scarlet oak | 51 Honey locust | 85 Sweet gum |
| 24 Black jack oak | 52 Black locust | 86 Black gum |
| 25 Pin oak | 53 Red mulberry | 87 Buckeye |
| 26 Willow oak | 54 Persimmon | 88 Magnolia |
| 27 Water oak | 55 Osage orange | 89 Other soft hardwoods |
| 28 Shingle oak | 56 Dogwood | |
| 29 Shumard oak | 57 Yellowwood | Noncommercial |
| 30 River birch | 58 Pumpkin ash | 90 Noncommercial species |
| | 59 Other hard hardwoods | |

STOCKING (AND TREE) CLASS

- 11 Desirable dominant
12 Desirable codominant
13 ~~21 Acceptable dominant~~
22 Acceptable codominant
23 Acceptable suppressed
34 Sound cull
35 Rotten cull
40 Inhibiting vegetation or slash
50 Nonstocked (bare)
60 Nonstockable
07 Stump (cut by man)
08 Dead tree-salvable
09 Dead tree-not salvable

TREE NUMBER

- 1st digit indicates point number.
2nd digit indicates sector of point.
3rd digit indicates 5 foot circle from center.

CUT OR LEAVE

- 1 Cut
2 Leave

POINT ACTION

- 0 No action-nonproductive or nonforest
1 No action-stocking satisfactory
2 Cut mature or near mature growing stock tree
3 Cut immature pole or sawtbr. growing stock tree
4 Cut or kill sapling or cull trees
5 Cut or kill unwanted vegetation only
6 Prepare site and reforest
7 Plant or seed only
Overpunch 2, 3, or 4 with X if reforestation also is desirable.
8 Site preparation only

MORTALITY

- 1 Fire
2 Weather
3 Flood
4 Suppression
5 Disease
6 Insects
7 Birds & animals
8 Cut (by man)
9 Logging damage
0 Unknown

FOREST SURVEY TATUM GUIDE NO. 8

September 1961

VARIABLE PLOT RADII BY DBH AND PERCENT SLOPE
 BASAL AREA FACTOR 37.5
 (1.42 feet radius per inch DBH)

DBH Inch	Percent slope						
	0	10	20	30	40	50	60
	Radius in feet						
5	7.1	7.1	7.2	7.4	7.6	7.9	8.3
6	8.5	8.5	8.7	8.9	9.2	9.5	9.9
7	9.9	9.9	10.1	10.3	10.7	11.1	11.5
8	11.4	11.5	11.6	11.9	12.3	12.7	13.3
9	12.8	12.9	13.1	13.4	13.8	14.3	14.9
10	14.2	14.3	14.5	14.8	15.3	15.9	16.5
11	15.6	15.7	15.9	16.3	16.8	17.4	18.2
12	17.1	17.2	17.4	17.9	18.4	19.1	19.9
13	18.5	18.6	18.9	19.3	19.9	20.7	21.5
14	19.9	20.0	20.3	20.8	21.4	22.2	23.2
15	21.3	21.4	21.7	22.2	22.9	23.8	24.8
16	22.7	22.8	23.1	23.7	24.4	25.4	26.4
17	24.2	24.3	24.7	25.3	26.1	27.1	28.2
18	25.6	25.7	26.1	26.7	27.6	28.6	29.8
19	27.0	27.1	27.5	28.2	29.1	30.2	31.4
20	28.4	28.5	29.0	29.7	30.6	31.8	33.1
21	29.8	29.9	30.4	31.1	32.1	33.3	34.7
22	31.3	31.5	31.9	32.7	33.7	35.0	36.4
23	32.7	32.9	33.3	34.1	35.2	36.6	38.1
24	34.1	34.3	34.8	35.6	36.7	38.1	39.7
25	35.5	35.7	36.2	37.1	38.2	39.7	41.3
26	36.9	37.1	37.6	38.5	39.7	41.3	43.0
27	38.4	38.6	39.2	40.1	41.4	42.9	44.7
28	39.8	40.0	40.6	41.6	42.9	44.5	46.3
29	41.2	41.4	42.0	43.0	44.4	46.1	48.0
30	42.6	42.8	43.4	44.5	45.9	47.6	49.6

Additional correction for 1/10" d.b.h. classes

DBH Inch	Percent slope						
	0	10	20	30	40	50	60
	Radius in feet						
0.1	.1	.1	.1	.1	.1	.1	.1
0.2	.3	.3	.3	.3	.3	.3	.3
0.3	.4	.4	.4	.4	.4	.4	.5
0.4	.6	.6	.6	.6	.6	.7	.7
0.5	.7	.7	.7	.7	.8	.8	.8
0.6	.9	.9	.9	.9	1.0	1.0	1.0
0.7	1.0	1.0	1.0	1.0	1.1	1.1	1.2
0.8	1.1	1.1	1.1	1.1	1.2	1.2	1.3
0.9	1.3	1.3	1.3	1.4	1.4	1.5	1.5

These factors are used to correct the plot radii values to the nearest 1/10-inch of diameter. For example: A tree 10.6 inches d.b.h. on a 30 percent slope has a plot radius of 14.8 feet (see upper table) plus 0.9 feet (see lower table) or 15.7 feet.

DISTRIBUTION OF VOLUME IN THE TREE

Tree size Bolts (8')	Logs (16')	Bolt number									
		1	2	3	4	5	6	7	8	9	10
		Percent of tree volume									
2	1	56	44								
3	1½	41	33	26							
4	2	33	28	22	17						
5	2½	27	23	19	17	14					
6	3	24	21	18	15	12	10				
7	3½	22	19	17	14	12	9	7			
-	4	20	18	15	13	11	9	8	6		
-	5	18	15	13	12	10	9	8	6	5	3

GROSS VOLUME IN BOLTS OF DIFFERENT SIZES

Top d.o.b. Inches	Length of bolt - feet				Length of bolt - feet			
	2	4	6	8	2	4	6	8
	Peeled vol. - cu.ft.				Ten bd. ft. Int'l 1/4			
4	.2	.4	.5	.7				
5	.3	.6	.8	1				
6	.4	1	1	2				
7	.6	1	2	2				
8	.7	1	2	3		1	1	1
9	1	2	3	4		1	1	2
10	1	2	3	5		1	1	3
11	1	3	4	6		1	2	4
12	2	3	5	7		1	2	5
13	2	4	6	8		1	3	6
14	2	4	7	9		1	3	6
16	3	6	9	12		2	4	8
18	4	7	11	15		2	5	11
20	4	9	14	18		3	6	10
22	5	11	16	22		4	8	13
24	6	13	19	26		5	10	15
28	9	18	27	35		7	14	21
32	11	23	35	46		9	18	28
36	14	29	43	58		12	24	35

For long lengths scale by sections allowing 1-inch taper per 8 feet. A 20-inch, 16-foot log may be scaled as two 8-foot sections with 20- and 21-inches d.i.b. (15 + 13 = 28 or 280 board feet).

MULTIPLE VOLUME TABLES FOR FACTOR 37½ ANGLE-GAUGE PLOT

Trees on plot Number	Number of 8-foot sticks per tree							
	1	2	3	4	5	6	7	8
	Cords per acre							
1	0.33	0.55	0.75	0.93	1.09	1.25	1.40	1.55
2	.7	1.1	1.5	1.9	2.2	2.5	2.8	3.1
3	1.0	1.6	2.2	2.8	3.3	3.7	4.2	4.6
4	1.3	2.2	3.0	3.7	4.4	5.0	5.6	6.2
5	1.6	2.8	3.7	4.6	5.5	6.2	7.0	7.7
6	2.0	3.3	4.5	5.6	6.5	7.5	8.4	9.3
7	2.3	3.8	5.2	6.5	7.6	8.7	9.8	10.8
8	2.6	4.4	6.0	7.4	8.7	10.0	11.2	12.4
9	3.0	5.0	6.7	8.4	9.8	11.2	12.6	13.9

Trees on plot Number	Number of 16-foot logs per tree							
	½	1	1½	2	2½	3	3½	4
	M feet BM (Int'l. 1/4" rule) per acre							
1	0.15	0.27	0.39	0.49	0.59	0.68	0.76	0.85
2	.3	.5	.8	1.0	1.2	1.4	1.5	1.7
3	.4	.8	1.1	1.5	1.8	2.0	2.3	2.6
4	.6	1.1	1.6	2.0	2.4	2.7	3.0	3.4
5	.7	1.4	2.0	2.4	3.0	3.4	3.8	4.2
6	.9	1.6	2.3	2.9	3.5	4.1	4.6	5.1
7	1.0	1.9	2.7	3.4	4.1	4.8	5.3	6.0
8	1.2	2.2	3.1	3.9	4.7	5.4	6.1	6.8
9	1.3	2.4	3.5	4.4	5.3	6.1	6.8	7.6

Examples of use: Five 2-stick trees equal 2.8 cords per acre.