

Introduction

Cooperative Stand Assessment (CSA)

Cooperative Stand Assessment (CSA) is the vegetative inventory system used on DNR-administered lands owned by the State of Minnesota. CSA is a stand-based inventory. There are over 200,000 stands in CSA at this time. There are approximately 5.3 million acres of state-owned land in the CSA database. This system was developed in 1976. It is designed primarily to be a timber management inventory. CSA was originally referred to as Phase II. Phase II is no longer correct terminology.

The “cooperative” part of CSA refers to the county lands that were originally part of CSA. The majority of counties in the forested areas of

Minnesota once cooperated with the state in the collection and maintenance of CSA inventory data. The state CSA system no longer supports county land. Inventory data on county land may still appear on CSA township maps. This data has not been maintained for many years and should be considered inaccurate.

The basic premise of the CSA inventory system is to collect and record data that will describe the composition and condition of the stand **at the time it is observed**. Whenever models are used to update CSA data, that data will be identified as modeled data rather than field collected data.

This manual explains how to:

- Collect CSA data in the field
- Summarize the data
- Fill out the data sheet
- Enter the data into your area computer
- Find and correct errors in the data
- Make changes to your data

If you have questions or comments regarding this manual, call Resource Assessment at (218) 327-4449.

Stand Definition

What is a Stand?

For CSA purposes a stand is any homogeneous area, one or more acres in size, that can be distinguished from adjoining areas on an aerial photo or on the ground. Stands may consist of trees, shrubs, ground plants, water, rock, bare ground, or any combination of these elements.

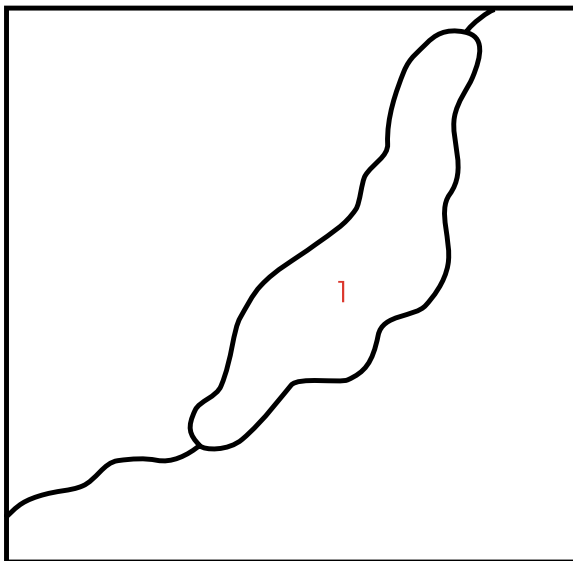
A forested stand is a contiguous group of trees sufficiently uniform in species composition, arrangement of age classes, and condition to be a homogeneous and distinguishable unit.

The stand is the smallest management unit in the CSA system. Management practice may also define the stand. What appears to be one stand based upon photo interpretation or field examination may be divided into two or more stands based on management.

Inclusions are being eliminated. **Do not create any new inclusions when delineating stands.** Minimum stand size is one acre. Existing inclusions will be maintained and may be

altered until a conversion process is developed.

Cruise stands based on how they occur on the ground. Stands will be divided and renumbered based upon ownership, section lines, acquisition, and administration when stand data is entered into the area computer. See below.



25-66-21

Cruise the stand this way

This is one stand on the ground.



25-66-21

Enter stand data this way

It becomes three stands when it is entered into the area CSA database.

When Should a Stand be Inventoried?

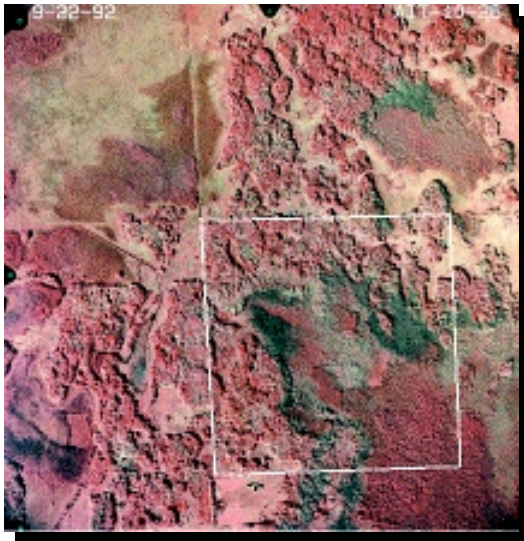
There are three times during the life of a stand that it should be inventoried:

1. Following disturbance (management, fire, blow down, etc.). This will establish the composition and condition of the new stand.
2. When the main species in the stand reaches merchantable size class (5" DBH). The composition of the stand should be well established at this time.
3. Prior to management activity. When the inventory data is found to be accurate, the prescription can be completed. When the inventory data is found to be inaccurate, the stand data will be updated with the new data.

A regeneration model will predict when the main species in the stand reaches 5" DBH. A growth model will be used between steps 2 and 3 above to update stand data. When growth models are used to update stand data, data from the last field visit will be preserved.

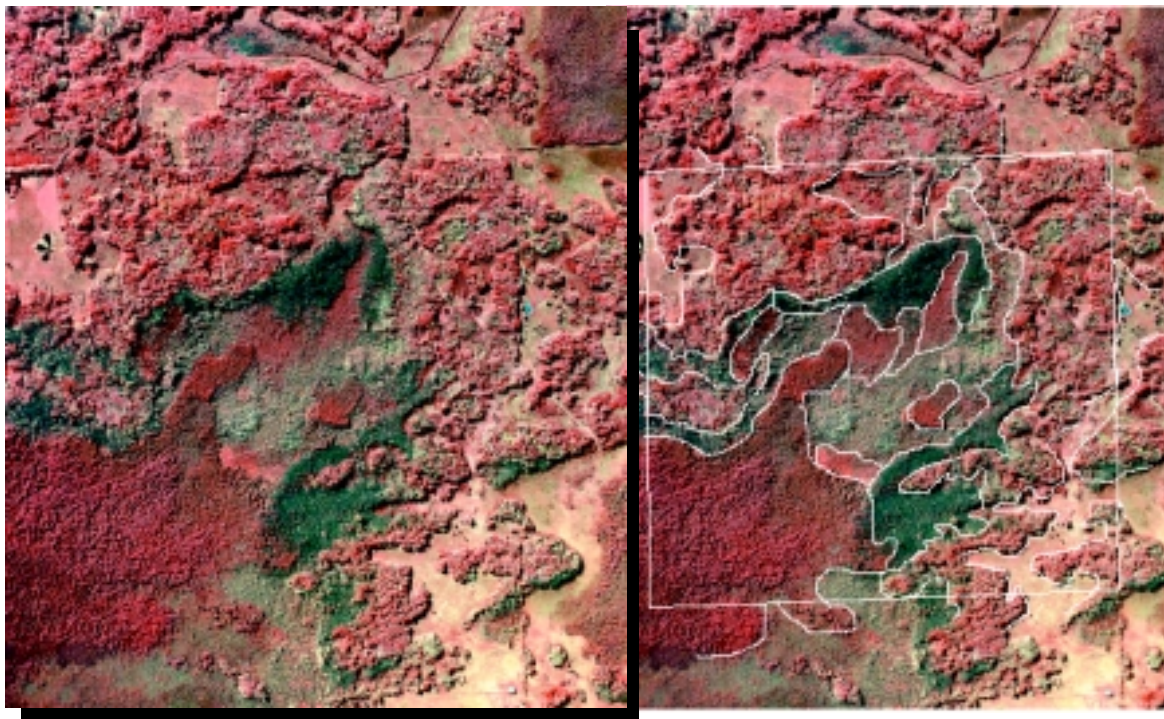
Photo Interpretation

CSA Photo Interpretation



Cooperative Stand Assessment (CSA) begins with vegetation polygons delineated stereoscopically on 1:15,840 scale DNR color infrared aerial photographs. The first step is transferring the corners of the section to be delineated from a GIS database to one of the stereophotos, as shown at left. This can be performed accurately if the corner database is overlaid on a digital orthophotoquad (DOQ) in the computer.

With the target section outlined, the photos are placed under the stereoscope for three-dimensional viewing as shown below, and polygon boundaries are drawn around vegetation patches (stands) that are relatively uniform with respect to crown shape, crown size, density, and color. No polygon smaller than one acre should be delineated; this corresponds to a circle approximately 5 mm in diameter at 1:15,840 scale.



Delineations are normally traced on or transferred to translucent mylar (Matex) overlays for subsequent digitization. All four section corners must be accurately located on the overlays, as their placement controls the positioning of the vegetation delineations in the CSA map database.

Color Coding a Mylar

Use these color codes when showing changes on mylar. **Do not** use these color codes when showing changes on the black and white photocopy township map. Make sure you have four section corners and the correct legal description on any mylar you send in.

- Red: all type lines, wildlife openings, white pine clusters.
- Blue: all section lines, administration lines, acquisition lines, ownership lines, and significant conditions.
- Black: all cover type labels, roads, streams, power lines, railroads, etc., (use the correct map symbols or note what the map feature is).

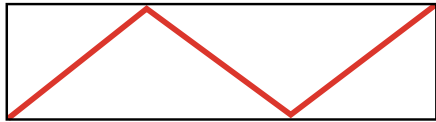
Alterations are normally made in red on the black and white photocopy township map. There are two exceptions to this:

- Mylar may be used when changes are so extensive that it will be clearer to redraw the entire section on mylar.
- Mylar may be used to show new acquisition (new acquisition may also be shown on the black and white photocopy map).

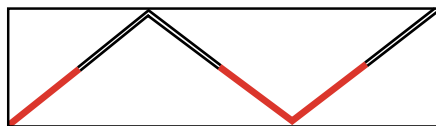
The data on the map will be replaced by what you show on the mylar. Be sure you show everything on the mylar that you want on the map.

Map Symbols

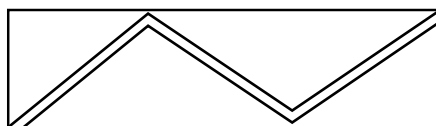
Road Definitions and Symbols



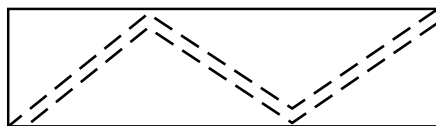
Primary Highway: All paved state and federal highways.



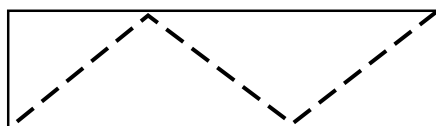
Secondary Highway: All other paved roads and all weather gravel roads.



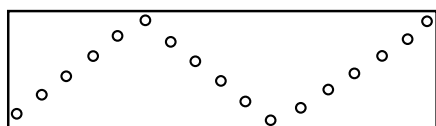
Light Duty Road: Non-paved improved road (has one or more: graveled surface, raised crown, ditches, or culverts).



Unimproved Road: Road without graveled surface, raised crown, ditches, or culverts.



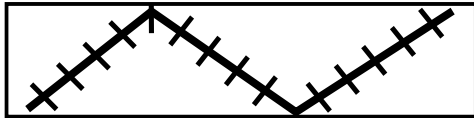
Trail: Suitable for walking, ATV, and snowmobile but not passable for enclosed motor vehicles. Winter roads belong in this category.



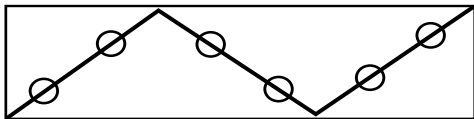
Recreation Trail: Designated, signed, and maintained trail used for cross-country skiing, snowmobiles, hunter walking trail, etc.

The base layer for roads is derived from TIGER data. All road symbols and road locations are alterable. Any township that does not have a townshipwide roads layer, will have this layer installed when the township comes in for alterations. This condition exists only in townships that have not been altered for many years.

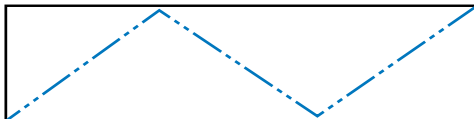
Other Map Symbols



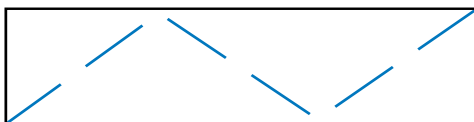
Railroad



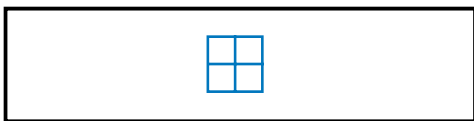
Powerline or Pipeline



River or Stream



Drainage Ditch



Original USGS Section Corner: This symbol will automatically be placed at the location of the original USGS corner whenever you change a corner location through alterations.

Special Management Map Symbols



White Pine Cluster: A white pine cluster is defined as 100+ white pine seedlings (0–9" DBH), 50+ white pine saplings (1–4.9" DBH), or 25+ pole size (5" and larger DBH) white pines occupying one-half acre or less. Map white pine clusters by placing this symbol in the correct location on your CSA township map. Add a significant condition code of 9 to the stand data when a stand contains white pine clusters.



Wildlife Openings: Wildlife openings are maintained openings in forested stands. Map wildlife openings by placing a red star in the correct location on the CSA township map. Red stars may be differentiated from blue stars on the photocopy maps because they are open—blue stars appear solid.



Significant Conditions: A significant condition is a feature in the stand that will substantially affect management of the stand. Map significant conditions by placing a blue star in the correct location on the CSA township map. Add the appropriate significant condition code to the stand data when the stand contains a significant condition. Do not duplicate Rare Natural Features.

See Column 79 (page 80) for a list of significant conditions and examples of them.

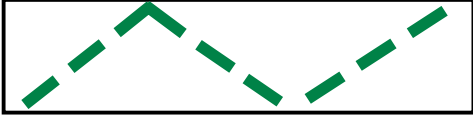


Rare Natural Features: These are locations of endangered, threatened, or special concern species, or animal aggregation sites. Examples of these are colonial waterbird colony, bat hibernaculum, mussel bed, prairie chicken booming ground, or bald eagle winter roost. These features are marked with a blue star and an identification number on the CSA township map. The identification number refers to the Natural Heritage list that resides in each area office. This data is not alterable.

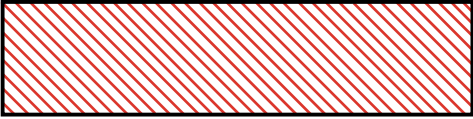


Significant Natural Community: These are locations of native plant communities that are significant based on a combination of statewide rarity and site condition. These areas are shaded and labeled with an identification number on the CSA township map. This identification number refers to the Natural Heritage list that resides in each area office. This data is not alterable.

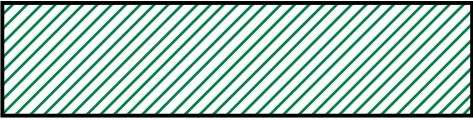
If you have questions about Rare Natural Features or Significant Natural Communities, contact the Nongame Wildlife specialist in your region.



Scientific and Natural Area: These are areas of natural features and rare resources that have been determined to have exceptional scientific and educational value. This data is not alterable.



Old Growth: These are stands that have met the requirements for old growth. A timber status of 5 will cause this stand to be shaded and buffered.



Potential/Future Old Growth: These are stands that may be or may become old-growth stands. A timber status of 7 will cause this stand to be shaded and buffered.



In Transition: These are stands that are changing due to management. They may be planned but not sold, sold but not cut, or under development of some kind. A timber status of 9 causes these stands to be shaded on the CSA township map.

Field Procedures

Fieldwork Procedures

Number of Plots Per Stand

The minimum number of plots required to inventory the stand is determined by stand size. Use this schedule to determine how many field plots will be taken in a stand:

Acres	Number of Plots
1–10	3
11–20	4
21–40	5
41–80	6
81–120	7
121–160	8
161–200	9
201–240	10
241+	Put in one plot for every additional 40-acre increase in stand size.

Additional plots may be added in stands with high variability. Nonproductive stands (stagnant spruce, stagnant tamarack, stagnant cedar, off-site aspen, and off-site oak) require only two plots to be taken, regardless of acres.

Plot Distribution

Distribute your plots randomly over the entire area of the stand. Be sure that the entire stand is represented by your plot locations.

Cruising the Stand

Beginning with a known point, determine the distance and direction to the first plot on your cruise line. Use your pace to determine distance traveled. Use your compass to determine direction traveled. Remember to set the correct declination on your compass. Use your aerial photo to verify where you are on the ground and to make any corrections to your cruise line that may be required. Continue with this procedure until all the plots on your cruise line have been completed. Whenever possible, lay out your cruise line so that the last plot of the day is as near as possible to where you started.

Data Collection on the Plot

The data for each stand will be recorded on a green field sheet. Number the green sheet with the correct stand number and legal description. Record the date, the cruiser, and the tally person.

The prism is the plot center, not you or your eye. Keep the prism directly above the same spot on the ground as you collect prism data. The 10 BAF (basal area factor) plot center will also be the plot center for your 1/100-acre regeneration plot. Record all plot data with a symbol unique to that plot. Once you arrive at the plot center, collect CSA plot data using these methods:

10 BAF (basal area factor) prism plot for commercial tree species 1" and larger, see page 18 for explanation of prism use.

1" to 4.9" DBH tally as non-merchantable, regardless of quality.

5" to 14.9" DBH tally number of 8-foot sticks to a 4" top.

15" and larger DBH... tally number of 16-foot saw logs and half logs to a 6" top (aspen and conifers) or 8" top (hardwoods), use DBH only to determine when to tally logs, not species or quality.

cull tally as culls any trees 5" DBH and larger that are such poor quality they would be left in the woods if the stand was harvested.

dead do not tally any dead trees that are in the plot.

Border line trees may be measured for diameter and distance from plot center to determine if they should be tallied or not. Use the chart on page 19 to determine maximum horizontal distance between tree and plot center. A faster method for dealing with border line trees is to tally every other border line tree in the stand.

1/100-acre fixed radius plot (11.8-foot radius) for commercial tree species less than 5" DBH, use the same plot center as the 10 BAF plot.

Count all trees less than 5" DBH which are commercial species and record them by species and size class. Size classes are:

DBH	Class
0" to .9"	1
1" to 2.9"	2
3" to 4.9"	3

Observed data

Average DBH: Estimate average DBH in whole inches for each species 5" and larger (do not include cull trees) on the plot. Estimate an average DBH for cord wood and an average DBH for saw timber for a species that occurs on the plot as both cordwood and saw timber.

Topography: Observe and record the code that best represents the topography of the land at the plot.

Physiographic Class: Observe and record the code that best represents the soil moisture and drainage characteristics of the stand.

Damage: Observe and record by species any damage seen on the plot. When you record damage you must also record a percent affected by that damage.

- **Percent Affected by Damage:** Estimate and record by species the percentage of stems affected.
- **Percent of Mortality:** Estimate and record by species and type of damage the percentage of stems at least 4½ feet tall and standing that have died within the past two years.

Shrub Species Composition: Observe and record the code that best describes the shrub composition on the plot.

- **Distribution of Shrub Species:** Observe and record the code that best describes how shrubs are distributed on the plot. This code describes coverage rather than number of stems.
- **Density of Shrub Species:** Observe and record the code that best describes how thick the shrubs are.
- **Browse Availability:** Observe and record the code that best describes the amount of shrubs available to deer. All shrubs are considered potential deer browse for this code. Record this code under "HT." on the field side of the green sheet.

Ground Cover: Observe and record the code that best describes ground cover on the plot.

Reconnaissance Level: Record the code that best describes the type of stand examination. Observe and record snow depths when applicable.

Stand Origin: Observe and record the code that best describes the origin of the stand.

Significant Conditions: Observe and record the code that best describes any significant conditions in the stand. Remarks may be used to further identify significant conditions.

Remarks: Observe and record any additional information about the stand you think would affect management of the stand. Do not duplicate data already recorded. Twenty-two spaces are available. Examples of possible remarks are: veneer quality black ash, old logging camp, lady-slippers present, or heron rookery.

White Pine Clusters: White pine clusters are defined as 100+ white pine seedlings (0–.9" DBH), 50+ white pine saplings (1–4.9" DBH), or 25+ pole

size (5" and larger DBH) white pines occupying one-half acre or less. Place a white pine cluster symbol on the map and code a significant condition of 9 when a white pine cluster is observed in a stand.

Measured data

Main Species in Type: You must determine main species in type before you take age and height measurements. Main species will be the species with the most total (cords and board feet) volume when that species is 40 percent or more of total stand volume. Some stands will not have any one species with 40 percent or more of the total volume. When this occurs, group species using the key on page 20, and select the species with the most volume from the group with the most volume.

Tree Selection for Site Index Measurements: Select a tree of the main species that is representative of the stand in diameter, height, and form when measuring age and height. Select a dominant or codominant tree. Do not select diseased, damaged, suppressed, or super dominant trees. Do not select a tree that is leaning. When possible, take site index measurements on the first plot in a stand. This will give a tree height that will help you to estimate sticks and logs accurately. You may not be able to determine the main species in the stand until a number of plots have been taken. **Be certain that the species you are measuring for site index is the main species in the type.** A minimum of two trees from each stand will be measured to determine site index. Do not select two trees from the same plot when measuring site index trees. The site indexes from the two selected trees must be within 10 of each other. If not, additional trees will be measured (height and age) for site index calculation.

Trees from adjacent stands may be used for site index measurements when no suitable tree exists within the stand. An example of this would be in a regeneration stand with no large trees. When trees from an adjacent stand are measured for site index, be sure to also measure the height and age of trees within the stand to determine stand height and stand age.

Age of Main Species in Stand: Measure and record the age of the main species in the stand by boring a representative tree at 4½ feet above ground level and counting the growth rings. Add the appropriate number of years to the growth rings to account for years of growth required to reach 4½ feet (see page 58, Columns 44–46 when adding years to ring count). The age of regeneration may be measured by boring a representative tree at its base and counting the rings, or by cutting off a representative tree at its base and counting the rings. When site index is calculated from trees in an adjacent stand, be sure to also measure the age of two representative trees within the stand.

Height of Main Species in Stand: Measure and record the distance from ground to the very top of a representative tree. When site index is calculated from trees in an adjacent stand, be sure to also measure the height of two representative trees within the stand.

Height to a 4" Top: Use this rule of thumb to check your estimate of 8 foot sticks per tree after you have measured total height of a representative tree.

- Aspen: 20 feet from top of tree to a 4" top
- Spruce: 15 feet from top of tree to a 4" top
- Pine: 12 feet from top of tree to a 4" top

Subtract this distance from total tree height to get height to a 4" top. Compare this height to your estimate of sticks per tree. This height should be close to your estimate of sticks (average sticks per tree times 8 feet). If you're off by 8 or more feet, you may want to adjust your estimate of sticks per tree. Remember, this is only a rule of thumb.

DBH of Site Index Trees: Measure and record to one-tenth of an inch, the diameter of site index trees. The diameter of site index trees should be close to the average diameter of main species trees on your plots.

Calculated data

Site Index: Site index for the stand is determined by averaging the site indexes from two or more site index trees. Calculate the site index for each tree using its age, height, and the curves in this manual. Site index height and site index age may be different than stand height and stand age. Site index curves are found on page 83.

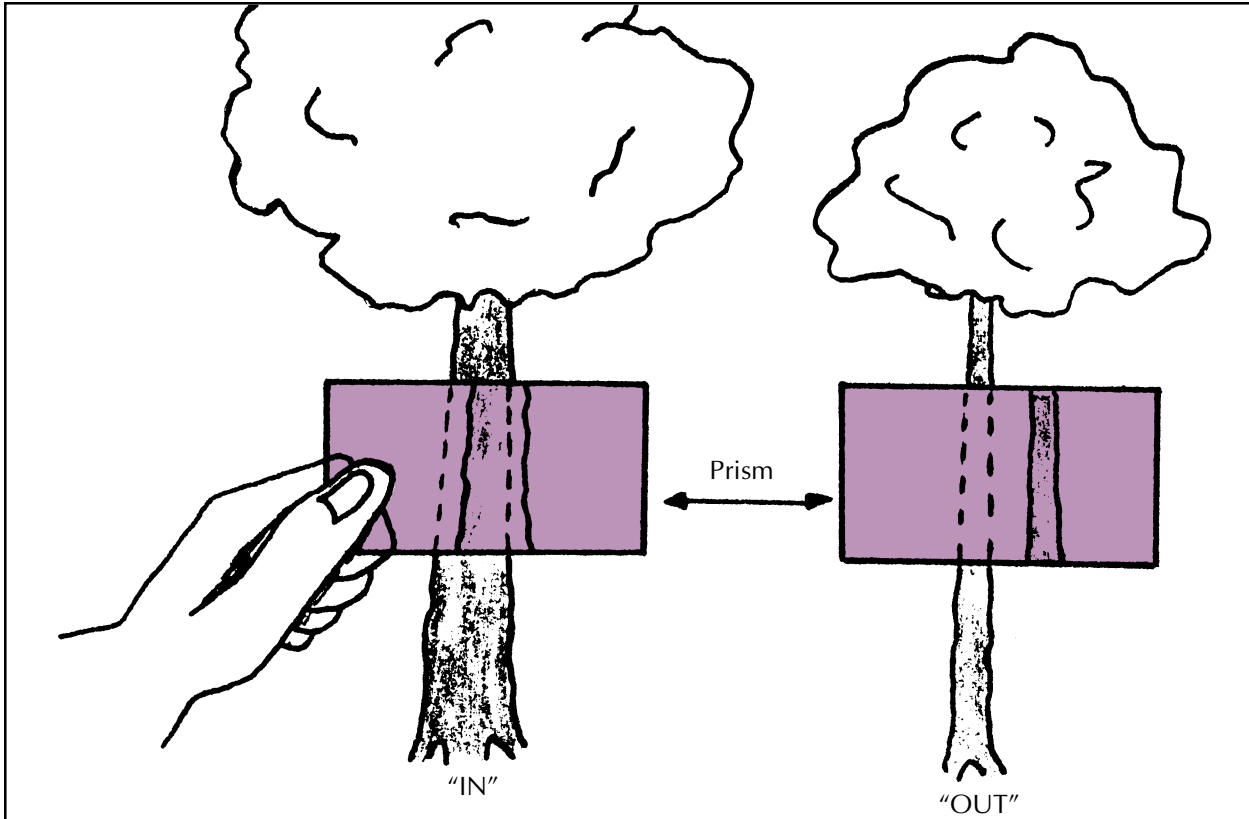
As you inventory the stand, keep in mind that the concept here is to collect data that represents the stand. Ask yourself, "Does the data I'm collecting represent this stand?" An old division forester put it this way: "Don't cruise with blinders on." Keep your eyes open as you inventory the stand, and make the data you collect represent the stand as accurately as possible.

Here is an example of what a field sheet might look like after the stand has been inventoried.



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

AVE. DBH	SPEC.	CULL TREES	NON-MERT PRISM COUNT	VOL. IN CDS. - MERCHANTABLE STEMS OVER 5" D.B.H. TO 4" TOP								TOTAL + NO. OF SAMPLES - DEFECT DEDUCTION = NET CDS/ACRE
				NO. OF 8' STICKS PER TREE								
				1	2	3	4	5	6	7	8	
8'9"9x 90	ASP			1 2 2 1 3 4 6 7 2 4 6 8 10 12 17 20 22 25 27 30 32 35 37 40 42 45 47 50 52 55 57 60 62 64 67 69 72 74 77 79 82 84 87 89 91 94 96 99 102	1 3 4 6 7 2 4 6 8 10 12 17 20 22 25 27 30 32 35 37 40 42 45 47 50 52 55 57 60 62 64 67 69 72 74 77 79 82 84 87 89 91 94 96 99 102	2 4 6 8 10 12 17 20 22 25 27 30 32 35 37 40 42 45 47 50 52 55 57 60 62 64 67 69 72 74 77 79 82 84 87 89 91 94 96 99 102	3 5 7 9 11 13 15 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150 152 154 156 158 160 162 164 166 168 170 172 174 176 178 180 182 184 186 188 190 192 194 196 198 200 202 204 206 208 210 212 214 216 218 220 222 224 226 228 230 232 234 236 238 240 242 244 246 248 250 252 254 256 258 260 262 264 266 268 270 272 274 276 278 280 282 284 286 288 290 292 294 296 298 300 302 304 306 308 310 312 314 316 318 320 322 324 326 328 330 332 334 336 338 340 342 344 346 348 350 352 354 356 358 360 362 364 366 368 370 372 374 376 378 380 382 384 386 388 390 392 394 396 398 400 402 404 406 408 410 412 414 416 418 420 422 424 426 428 430 432 434 436 438 440 442 444 446 448 450 452 454 456 458 460 462 464 466 468 470 472 474 476 478 480 482 484 486 488 490 492 494 496 498 500 502 504 506 508 510 512 514 516 518 520 522 524 526 528 530 532 534 536 538 540 542 544 546 548 550 552 554 556 558 560 562 564 566 568 570 572 574 576 578 580 582 584 586 588 590 592 594 596 598 600 602 604 606 608 610 612 614 616 618 620 622 624 626 628 630 632 634 636 638 640 642 644 646 648 650 652 654 656 658 660 662 664 666 668 670 672 674 676 678 680 682 684 686 688 690 692 694 696 698 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760 762 764 766 768 770 772 774 776 778 780 782 784 786 788 790 792 794 796 798 800 802 804 806 808 810 812 814 816 818 820 822 824 826 828 830 832 834 836 838 840 842 844 846 848 850 852 854 856 858 860 862 864 866 868 870 872 874 876 878 880 882 884 886 888 890 892 894 896 898 900 902 904 906 908 910 912 914 916 918 920 922 924 926 928 930 932 934 936 938 940 942 944 946 948 950 952 954 956 958 960 962 964 966 968 970 972 974 976 978 980 982 984 986 988 990 992 994 996 998 1000 1002 1004 1006 1008 1010 1012 1014 1016 1018 1020 1022 1024 1026 1028 1030 1032 1034 1036 1038 1040 1042 1044 1046 1048 1050 1052 1054 1056 1058 1060 1062 1064 1066 1068 1070 1072 1074 1076 1078 1080 1082 1084 1086 1088 1090 1092 1094 1096 1098 1100 1102 1104 1106 1108 1110 1112 1114 1116 1118 1120 1122 1124 1126 1128 1130 1132 1134 1136 1138 1140 1142 1144 1146 1148 1150 1152 1154 1156 1158 1160 1162 1164 1166 1168 1170 1172 1174 1176 1178 1180 1182 1184 1186 1188 1190 1192 1194 1196 1198 1200 1202 1204 1206 1208 1210 1212 1214 1216 1218 1220 1222 1224 1226 1228 1230 1232 1234 1236 1238 1240 1242 1244 1246 1248 1250 1252 1254 1256 1258 1260 1262 1264 1266 1268 1270 1272 1274 1276 1278 1280 1282 1284 1286 1288 1290 1292 1294 1296 1298 1300 1302 1304 1306 1308 1310 1312 1314 1316 1318 1320 1322 1324 1326 1328 1330 1332 1334 1336 1338 1340 1342 1344 1346 1348 1350 1352 1354 1356 1358 1360 1362 1364 1366 1368 1370 1372 1374 1376 1378 1380 1382 1384 1386 1388 1390 1392 1394 1396 1398 1400 1402 1404 1406 1408 1410 1412 1414 1416 1418 1420 1422 1424 1426 1428 1430 1432 1434 1436 1438 1440 1442 1444 1446 1448 1450 1452 1454 1456 1458 1460 1462 1464 1466 1468 1470 1472 1474 1476 1478 1480 1482 1484 1486 1488 1490 1492 1494 1496 1498 1500 1502 1504 1506 1508 1510 1512 1514 1516 1518 1520 1522 1524 1526 1528 1530 1532 1534 1536 1538 1540 1542 1544 1546 1548 1550 1552 1554 1556 1558 1560 1562 1564 1566 1568 1570 1572 1574 1576 1578 1580 1582 1584 1586 1588 1590 1592 1594 1596 1598 1600 1602 1604 1606 1608 1610 1612 1614 1616 1618 1620 1622 1624 1626 1628 1630 1632 1634 1636 1638 1640 1642 1644 1646 1648 1650 1652 1654 1656 1658 1660 1662 1664 1666 1668 1670 1672 1674 1676 1678 1680 1682 1684 1686 1688 1690 1692 1694 1696 1698 1700 1702 1704 1706 1708 1710 1712 1714 1716 1718 1720 1722 1724 1726 1728 1730 1732 1734 1736 1738 1740 1742 1744 1746 1748 1750 1752 1754 1756 1758 1760 1762 1764 1766 1768 1770 1772 1774 1776 1778 1780 1782 1784 1786 1788 1790 1792 1794 1796 1798 1800 1802 1804 1806 1808 1810 1812 1814 1816 1818 1820 1822 1824 1826 1828 1830 1832 1834 1836 1838 1840 1842 1844 1846 1848 1850 1852 1854 1856 1858 1860 1862 1864 1866 1868 1870 1872 1874 1876 1878 1880 1882 1884 1886 1888 1890 1892 1894 1896 1898 1900 1902 1904 1906 1908 1910 1912 1914 1916 1918 1920 1922 1924 1926 1928 1930 1932 1934 1936 1938 1940 1942 1944 1946 1948 1950 1952 1954 1956 1958 1960 1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026 2028 2030 2032 2034 2036 2038 2040 2042 2044 2046 2048 2050 2052 2054 2056 2058 2060 2062 2064 2066 2068 2070 2072 2074 2076 2078 2080 2082 2084 2086 2088 2090 2092 2094 2096 2098 2100 2102 2104 2106 2108 2110 2112 2114 2116 2118 2120 2122 2124 2126 2128 2130 2132 2134 2136 2138 2140 2142 2144 2146 2148 2150 2152 2154 2156 2158 2160 2162 2164 2166 2168 2170 2172 2174 2176 2178 2180 2182 2184 2186 2188 2190 2192 2194 2196 2198 2200 2202 2204 2206 2208 2210 2212 2214 2216 2218 2220 2222 2224 2226 2228 2230 2232 2234 2236 2238 2240 2242 2244 2246 2248 2250 2252 2254 2256 2258 2260 2262 2264 2266 2268 2270 2272 2274 2276 2278 2280 2282 2284 2286 2288 2290 2292 2294 2296 2298 2300 2302 2304 2306 2308 2310 2312 2314 2316 2318 2320 2322 2324 2326 2328 2330 2332 2334 2336 2338 2340 2342 2344 2346 2348 2350 2352 2354 2356 2358 2360 2362 2364 2366 2368 2370 2372 2374 2376 2378 2380 2382 2384 2386 2388 2390 2392 2394 2396 2398 2400 2402 2404 2406 2408 2410 2412 2414 2416 2418 2420 2422 2424 2426 2428 2430 2432 2434 2436 2438 2440 2442 2444 2446 2448 2450 2452 2454 2456 2458 2460 2462 2464 2466 2468 2470 2472 2474 2476 2478 2480 2482 2484 2486 2488 2490 2492 2494 2496 2498 2500 2502 2504 2506 2508 2510 2512 2514 2516 2518 2520 2522 2524 2526 2528 2530 2532 2534 2536 2538 2540 2542 2544 2546 2548 2550 2552 2554 2556 2558 2560 2562 2564 2566 2568 2570 2572 2574 2576 2578 2580 2582 2584 2586 2588 2590 2592 2594 2596 2598 2600 2602 2604 2606 2608 2610 2612 2614 2616 2618 2620 2622 2624 2626 2628 2630 2632 2634 2636 2638 2640 2642 2644 2646 2648 2650 2652 2654 2656 2658 2660 2662 2664 2666 2668 2670 2672 2674 2676 2678 2680 2682 2684 2686 2688 2690 2692 2694 2696 2698 2700 2702 2704 2706 2708 2710 2712 2714 2716 2718 2720 2722 2724 2726 2728 2730 2732 2734 2736 2738 2740 2742 2744 2746 2748 2750 2752 2754 2756 2758 2760 2762 2764 2766 2768 2770 2772 2774 2776 2778 2780 2782 2784 2786 2788 2790 2792 2794 2796 2798 2800 2802 2804 2806 2808 2810 2812 2814 2816 2818 2820 2822 2824 2826 2828 2830 2832 2834 2836 2838 2840 2842 2844 2846 2848 2850 2852 2854 2856 2858 2860 2862 2864 2866 2868 2870 2872 2874 2876 2878 2880 2882 2884 2886 2888 2890 2892 2894 2896 2898 2900 2902 2904 2906 2908 2910 2912 2914 2916 2918 2920 2922 2924 2926 2928 2930 2932 2934 2936 2938 2940 2942 2944 2946 2948 2950 2952 2954 2956 2958 2960 2962 2964 2966 2968 2970 2972 2974 2976 2978 2980 2982 2984 2986 2988 2990 2992 2994 2996 2998 3000 3002 3004 3006 3008 3010 3012 3014 3016 3018 3020 3022 3024 3026 3028 3030 3032 3034 3036 3038 3040 3042 3044 3046 3048 3050 3052 3054 3056 3058 3060 3062 3064 3066 3068 3070 3072 3074 3076 3078 3080 3082 3084 3086 3088 3090 3092 3094 3096 3098 3100 3102 3104 3106 3108 3110 3112 3114 3116 3118 3120 3122 3124 3126 3128 3130 3132 3134 3136 3138 3140 3142 3144 3146 3148 3150 3152 3154 3156 3158 3160 3162 3164 3166 3168 3170 3172 3174 3176 3178 3180 3182 3184 3186 3188 3190 3192 3194 3196 3198 3200 3202 3204 3206 3208 3210 3212 3214 3216 3218 3220 3222 3224 3226 3228 3230 3232 3234 3236 3238 3240 3242 3244 3246 3248 3250 3252 3254 3256 3258 3260 3262 3264 3266 3268 3270 3272 3274 3276 3278 3280 3282 3284 3286 3288 3290 3292 3294 3296 3298 3300 3302 3304 3306 3308 3310 3312 3314 3316 3318 3320 3322 3324 3326 3328 3330 3332 3334 3336 3338 3340 3342 3344 3346 3348 3350 3352 3354 3356 3358 3360 3362 3364 3366 3368 3370 3372 3374 3376 3378 3380 3382 3384 3386 3388 3390 3392 3394 3396 3398 3400 3402 3404 3406 3408 3410 3412 3414 3416 3418 3420 3422 3424 3426 3428 3430 3432 3434 3436 3438 3440 3442 3444 3446 3448 3450 3452 3454 3456 3458 3460 3462 3464 3466 3468 3470 3472 3474 3476 3478 3480 3482 3484 3486 3488 3490 3492 3494 3496 3498 3500 3502 3504 3506 3508 3510 3512 3514 3516 3518 3520 3522 3524 3526 3528 3530 3532 3534 3536 3538 3540 3542 3544 3546 3548 3550 3552 3554 3556 3558 3560 3562 3564 3566 3568 3570 3572 3574 3576 3578 3580 3582 3584 3586 3588 3590 3592 3594 3596 3598 3600 3602 3604 3606 3608 3610 3612 3614 3616 3618 3620 3622 3624 3626 3628 3630 3632 3634 3636 3638 3640 3642 3644 3646 3648 3650 3652 3654 3656 3658 3660 3662 3664 3666 3668 3670 3672 3674 3676 3678 3680 3682 3684 3686 3688 3690 3692 3694 3696 3698 3700 3702 3704 3706 3708 3710 3712 3714 3716 3718 3720 3722 3724 3726 3728 3730 3732 3734 3736 3738 3740 3742 3744 3746 3748 3750 3752 3754 3756 3758 3760 3762 3764 3766 3768 3770 3772 3774 3776 3778 3780 3782 3784 3786 3788 3790 3792 3794 3796 3798 3800 3802 3804 3806 3808 3810 3812 3814 3816 3818 3820 3822 3824 3826 3828 3830 3832 3834 3836 3838 3840 3842 3844 3846 3848 3850 3852 3854 3856 3858 3860 3862 3864 3866 3868 3870 3872 3874 3876 3878 3880 3882 3884 3886 3888 3890 3892 3894 3896 3898 3900 3902 3904 3906 3908 3910 3912 3914 3916 3918 3920 3922 3924 3926 3928 3930 3932 3934 3936 3938 3940 3942 3944 3946 3948 3950 3952 3954 3956 3958 3960 3962 3964 3966 3968 3970 3972 3974 3976 3978 3980 3982 3984 3986 3988 3990 3992 3994 3996 3998 4000 4002 4004 4006 4008 4010 4012 4014 4016 4018 4020 4022 4024 4026 4028 4030 4032 4034 4036 4038 4040 4042 4044 4046 4048 4050 4052 4054 4056 4058 4060 4062 4064 4066 4068 4070 4072 4074 4076 4078 4080 4082 4084 4086 4088 4090 4092 4094 4096 4098 4100 4102 4104 4106 4108 4110 4112 4114 4116 4118 4120 4122 4124 4126 4128 4130 4132 4134 4136 4138 4140 4142 4144 4146 4148 4150 4152 4154 4156 4158 4160 4162 4164 4166 4168 4170 4172 4174 4176 4178 4180 4182 4184 4186 4188 4190 4192 4194 4196 4198 4200 4202 4204 4206 4208 4210 4212 4214 4216 4218 4220 4222 4224 4226 4228 4230 4232 4234 4236 4238 4240 4242 4244 4246 4248 4250 4252 4254 4256 4258 4260 4262 4264 4266 4268 4270 4272 4274 4276 4278 4280 4282 4284 4286 4288 4290 4292 4294 4296 4298 4300 4302 4304 4306 4308 4310 4312 4314 4316 4318 4320 4322 4324 4326 4328 4330 4332 4334 4336 4338 4340 4342 4344 4346 4348 4350 4352 4354 4356 4358 4360 4362 4364 4366 4368 4370 4372 4374 4376 4378 4380 4382 4384 4386 4388 4390 4392 4394 4396 4398 4400 4402 4404 4406 4408 4410 4412 4414 4416 4418 4420 4422 4424 4426 4428 4430 4432 4434 4436 4438 4440 4442 4444 4446 4448 4450 4452 4454 4456 4458 4460 4462 4464 4466 4468 4470 4472 4474 4476 4478 4480 4482 4484 4486 4488 4490 4492 4494 4496 4498 4500 4502 4504 4506 4508 4510 4512 4514 4516 4518 4520 4522 4524 4526 4528 4530 4532 4534 4536 4538 4540 4542 4544 4546 4548 4550 4552 4554 4556 4558 4560 4562 4564 4566 4568 4570 4572 4574 4576 4578 4580 4582 4584 4586 4588 4590 4592 4594 4596 4598 4600 4602 4604 4606 4608 4610 4612 4614 4616 4618 4620 4622 4624 4626 4628 4630 4632 4634 4636 4638 4640 4642 4644 4646 4648 4650 4652 4654 4656 4658 4660 4662 4664 4666 4668 4670 4672 4674 4676 4678 4680 4682 4684 4686 4688 4690 4692 4694 4696 4698 4700 4702 4704 4706 4708 4710 4712 4714 4716 4718 4720 4722 4724 4726 4728 4730 4732 4734 4736 4738 4740 4742 4744 4746 4748 4750 4752 4754 4756 4758 4760 4762 4764 4766 4768 4770 4772 4774 4776 4778 4780 4782 4784 4786 4788 4790 4792 4794 4796 4798 4800 4802 4804 4806 4808 4810 4812 4814 4816 4818 4820 4822 4824 4826 4828 4830 4832 4834 4836 4838 4840 4842 4844 4846 4848 4850 4852 4854 4856 4858 4860 4862 4864 4866 4868					



To determine if a tree should be tallied, view that tree through the prism at a point about breast height on the tree's main stem. If an "in" tree forks below 4½ feet, it is tallied as two trees. If an "in" tree forks above 4½ feet, it is tallied as one tree, counting sticks only on the main stem.

NOTE: When using the prism:

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

Rotate around the prism.



Artwork by Bud Kincaid

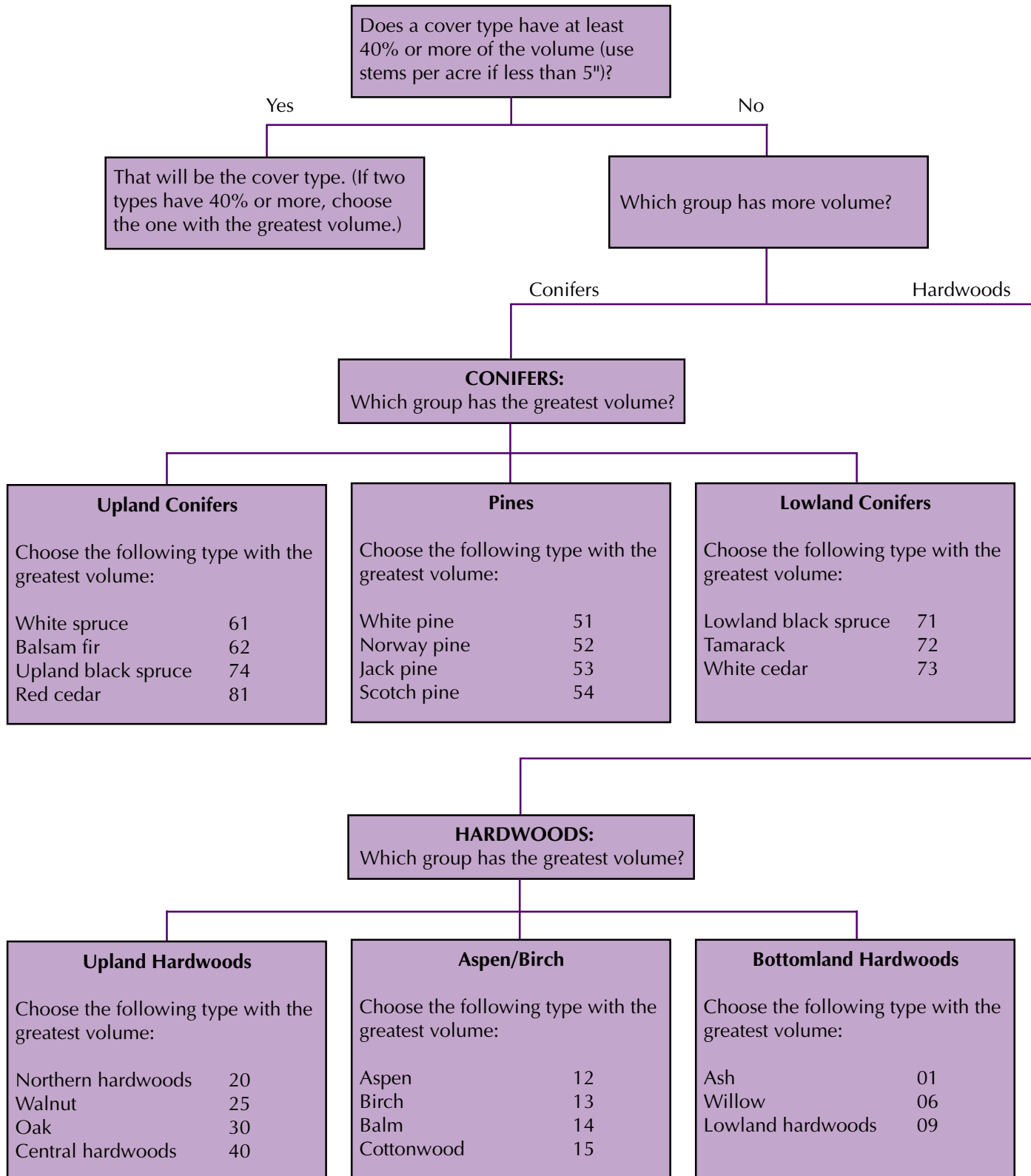
Maximum Horizontal Distance for an “In” Tree for a Prism BAF = 10

DBH	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
5	13.75	14.02	14.30	14.57	14.85	15.12	15.40	15.67	15.95	16.22
6	16.50	16.77	17.05	17.32	17.60	17.87	18.15	18.42	18.70	18.97
7	19.25	19.52	19.80	20.07	20.35	20.62	20.90	21.17	21.45	21.72
8	22.00	22.27	22.55	22.82	23.10	23.37	23.64	23.91	24.20	24.47
9	24.75	25.02	25.30	25.57	25.85	26.12	26.40	26.67	26.95	27.22
10	27.50	27.77	28.05	28.32	28.60	28.87	29.15	29.42	29.70	29.97
11	30.25	30.52	30.80	31.07	31.35	31.62	31.90	32.17	32.45	32.72
12	33.00	33.27	33.55	33.82	34.10	34.37	34.64	34.92	35.19	35.47
13	35.74	36.02	36.29	36.57	36.84	37.11	37.39	37.67	37.94	38.22
14	38.49	38.77	39.04	39.32	39.59	39.87	40.14	40.42	40.69	40.97
15	41.24	41.52	41.79	42.07	42.34	42.62	42.89	43.17	43.44	43.72
16	43.99	44.27	44.54	44.82	45.09	45.37	45.64	45.92	46.19	46.47
17	46.74	47.02	47.29	47.57	47.84	48.12	48.39	48.67	48.94	49.22
18	49.49	49.77	50.04	50.32	50.59	50.87	51.14	51.42	51.69	51.97
19	52.24	52.52	52.79	53.07	53.34	53.62	53.89	54.17	54.42	54.72
20	54.99	55.27	55.54	55.82	56.09	56.37	56.64	56.92	57.19	57.47
21	57.74	58.02	58.29	58.57	58.84	59.12	59.39	59.67	59.94	60.22
22	60.49	60.77	60.94	61.32	61.59	61.87	62.14	62.42	62.69	62.97
23	63.24	63.52	63.79	64.07	64.34	64.62	64.89	65.17	65.44	65.72
24	65.99	66.27	66.52	66.82	67.09	67.37	67.64	67.92	68.18	68.47
25	68.74	69.01	69.29	69.56	69.84	70.11	70.39	70.66	70.94	71.21
26	71.49	71.76	72.04	72.31	72.59	72.86	73.14	73.41	73.69	73.96
27	74.24	74.51	74.79	75.06	75.34	75.61	75.89	76.16	76.44	76.71
28	76.99	77.26	77.54	77.81	78.09	78.36	78.64	78.91	79.19	79.46
29	79.74	80.01	80.29	80.56	80.84	81.11	81.39	81.66	81.94	82.21
30	82.49	82.76	83.04	83.31	83.59	83.86	84.14	84.41	84.69	84.96
31	85.24	85.51	85.79	86.06	86.34	86.61	86.89	87.16	87.44	87.71
32	87.99	88.26	88.54	88.81	89.09	89.36	89.64	89.91	90.19	90.46
33	90.74	91.01	91.29	91.56	91.84	92.11	92.39	92.66	92.94	93.21
34	93.49	93.76	94.04	94.31	94.59	95.86	95.14	95.41	95.69	95.96
35	96.24	96.51	96.79	97.06	97.34	97.61	97.89	98.16	98.44	98.71
36	98.99	99.26	99.54	99.81	100.09					
37	101.74	102.01	102.29	102.56	102.84	103.11	103.38	103.66	103.93	104.21
38	104.48	104.76	105.03	105.31	105.58	105.86	106.13	106.41	106.68	106.96
39	107.23	107.51	107.78	108.06	108.33	108.61	108.88	109.16	109.43	109.71
40	109.98	110.26	110.53	110.81	111.08	111.36	111.63	111.91	112.18	112.46

$$\text{Distance} = \text{DBH} \times \left(\sqrt{\frac{43,560 - \text{BAF}}{4 \times \text{BAF}}} \right) \times 12 \quad \div \quad \text{Example: DBH} = 8.4 \text{ inches}$$

Distance to tree = 23.10 feet

Key for Main Cover Type Determination



Some of the types may switch between groups depending on the physiographic class.

Summarizing

Summarizing the Data Collected in the Field

CSA data is summarized before it is entered into the area computer. Saving the field sheets is the best way to save raw data at this time. Summarize CSA data and fill out the green sheet this way:

Basal Area

Add up all the tally marks (merchantable, non-merchantable, and culls) for the stand, multiply by 10, and divide by the number of plots. Record this number.

Cords per Acre

For each species in the 5" to 14.9" DBH size class, add up the last numbers tallied in each box and divide by the number plots to get cords per acre. Divide by the total number of plots taken in the stand even if the species was not present on all plots. Show this calculation in the NET CDS/ACRE box for each species.

Board Feet per Acre

For each species in the 15" and larger DBH size class, add up the last numbers tallied in each box, multiply by

100, and divide by the number of plots to get board feet per acre. Divide by the total number of plots taken in the stand even if the species was not present on all plots. Show this calculation in the NET BD FT/ACRE box for each species.

Miscellaneous Cords

CSA allows volume data to be entered for a maximum of five species. Total any remaining cords per acre and enter them under miscellaneous cords. This data is accurate to one-tenth of a cord per acre and is recorded in Columns 75, 76, and 77 on the data sheet. **Do not enter a decimal point.** Any number entered in Column 77 will automatically be read as tenths of a cord.

Miscellaneous Board Feet

CSA allows volume data to be entered for a maximum of five species. Total all remaining board feet per acre and enter them under miscellaneous board feet. This data is accurate to 100 board feet per acre and is recorded in Columns 78, 79, and 80 on the data sheet. **Do not enter a decimal point.** Any data entered in Column 80 will automatically be read as hundreds of board feet.

Do not use miscellaneous cords or miscellaneous board feet until you have entered data for species 2 through 5 on Card 2. You will get an FDM error message if you do.

See example on page 29. The headings Misc. Cords and Misc. MBF will not appear on the green data sheet.

Main Cover Type

The species or combination of species with the most volume determines the main cover type. A stand must have at least 3 cords per acre or 1,251 board feet per acre or 251 stems per acre to be a forested cover type. When a stand does not have 3 cords per acre or 1,251 board feet per acre, the understory will become the main cover type. When the understory becomes the main cover type, there will be no understory type. If the understory does not have 251 or more stems per acre, ground cover will determine the main cover type. Refer to the key on page 20 for further explanation on main cover type determination.

Main Cover Size

Average the observed diameters of the main species. Round down to the nearest whole inch. Determine the main cover size class code using this diameter. Record this code.

Main Cover Density

Add the volume of all cords per acre and all board feet per acre. Convert board feet into cords using **500 board feet = 1 cord** as the conversion factor. Determine the main cover density code using this total cords per acre volume. A density code of zero is not valid.

Regeneration

Add up the number of stems by size class for each species recorded on the 1/100-acre plot. Multiply each of these numbers by 100 and divide by the number of plots. Divide by the total number of plots taken in the stand even if the species or size class was not present on all plots. Do this for all regeneration species. Show the stems per acre in each size class for each species in the appropriate column.

Total the number of all stems in all three size classes for each species.

Total the number of all stems in all three size classes for all species.

Understory Type

Understory type will be determined by the species or combination of species with the most volume. You must have 251 or more total stems per acre to have a forested understory type. Use one of the deforested cover types if you do not have 251 stems per acre of regeneration in the stand. You may still enter regeneration data on Card 3 using zero as the density code when you have a deforested understory type. Refer to the key on page 20 if no species has 40 percent or more of the stems per acre.

Understory Size Class

Determine which species from the understory type (they are not always the same) has the most stems per acre. The size class of this species with the most volume will determine the understory size class.

Understory Density

The total number of stems per acre (all species, all size classes) will determine the understory density.

Percent Affected by Damage and Percent of Mortality

Only the main species in type receives a percentage for affected and for mortality. Average the percent affected and percent mortality by agent. Enter the damage code for the agent with the highest percent affected. All other species should be coded for any damage observed, but without percentages for affected or mortality.

White Pine

Whenever white pine data is recorded on the 10 BAF prism plot or on the 1/100-acre fixed radius plot, it should be recorded on the summarized data side of the data sheet and entered into the area CSA database. Enter this white pine data regardless of volume or number of stems per acre. Enter this white pine data even if it means omitting other species with more volume. Use a density code of zero when white pine regeneration is 250 stems per acre or less.

Here is an example of what a field sheet might look like after the stand data has been summarized.



The summarized data is shown in red.

Data Sheet Codes

Coding the Field Sheet

After you have collected and summarized the field data, it's time to code the data entry side of the field sheet. Follow the example on the next page when coding the field sheet. Code definitions and explanations are given on the pages following the filled out example field sheet.



COVER TYPE EXAMINATION DATA

COVER TYPE DATA

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

Site Index	Phys. Class	Stand Age	Basal Area	Cords per Acre	M.B.F. per Acre	Cond. Class	Tbr. Status	Main Specie in Type							Shrubs					Recon. Level	Stand Origin	Dist. to Road	Sign. Cond.	# of Cards 1																
								Spec.	D.B.H.	HT.	V/Ac	Damg.	% Alf.	% Mort	Spec. Comp.	Distr.	Den.	Browse	Cord Cover																					
6	7	3	0	4	8	1	1	2	2	8	0	0	8	2	1	1	2	0	8	6	5	2	2	0	2	7	2	1	1	1	1	1	2	4	8	3	1			3
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	

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

Card #	Record I.D.																									Second Specie					Har									
	Same as Card # 1																									Spec.	D.B.H.	Dst	V/Ac	Damg.										
2																										6	2	0	8	1	0	3	0							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41

Third Specie			Fourth Specie			Fifth Specie			Misc. Cords	Misc. MBF																												
Spec.	D.B.H.	Dst	V/Ac	Damg.	Har	Spec.	D.B.H.	Dst			V/Ac	Damg.	Har																									
1	3	1	0	1	0	2	0			6	1	0	9	1	0	1	2			6	1	1	7	1	0	0	5			0	0	2	0	0	3			
42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

STAND COMPOSITION - Trees Less Than 4.9" D.B.H.

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

Specie Data			Specie Data			Specie Data			Remarks																																	
Spec.	Sz	Den	Dst	Damg.	Spec.	Sz	Den	Dst	Damg.	Spec.	Sz	Den	Dst	Damg.																												
6	1	1	0	1		5	1	1	0	2																																
38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Cruiser Mike Brown	Date 2-14-00	Project Leader Edit
Tallyman Bob Jensen	Date 2-14-00	Forester Edit

Column 1: CARD NUMBER

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

Columns 2 and 3: COVER TYPE SEQUENCE NUMBER

Number the stands 1 through 89. Make sure the number on the data sheet matches up with the right stand number on the map. Numbers may only be used once. Gaps in number sequence are not a problem.

Columns 4 and 5: ALTERATION NUMBER

This code is obsolete. Do not enter anything in these columns.

Columns 6 and 7: SECTION NUMBER

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

Columns 8, 9, and 10: TOWNSHIP NUMBER

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

Columns 11 and 12: RANGE NUMBER

Record the number of the range in which the stand is located. Example: range 7 = 07.

Column 13: EAST/WEST

This column is to differentiate between the east and west ranges. Code 8 = east and Code 9 = west. This code number has already been entered. You do nothing with this column. Only the eastern part of Cook County is affected by the east ranges.

Columns 14 and 15: COUNTY

Record the two-digit code number of the county in which the stand is located.

County	Code	County	Code	County	Code
Aitkin	01	Isanti	30	Pipestone	59
Anoka	02	Itasca	31	Polk	60
Becker	03	Jackson	32	Pope	61
Beltrami	04	Kanabec	33	Ramsey	62
Benton	05	Kandiyohi	34	Red Lake	63
Big Stone	06	Kittson	35	Redwood	64
Blue Earth	07	Koochiching	36	Renville	65
Brown	08	Lac Qui Parle	37	Rice	66
Carlton	09	Lake	38	Rock	67
Carver	10	Lake of the Woods	39	Roseau	68
Cass	11	LeSueur	40	St. Louis	69
Chippewa	12	Lincoln	41	Scott	70
Chisago	13	Lyon	42	Sherburne	71
Clay	14	McLeod	43	Sibley	72
Clearwater	15	Mahnomen	44	Stearns	73
Cook	16	Marshall	45	Steele	74
Cottonwood	17	Martin	46	Stevens	75
Crow Wing	18	Meeker	47	Swift	76
Dakota	19	Mille Lacs	48	Todd	77
Dodge	20	Morrison	49	Traverse	78
Douglas	21	Mower	50	Wabasha	79
Faribault	22	Murray	51	Wadena	80
Fillmore	23	Nicollet	52	Waseca	81
Freeborn	24	Nobels	53	Washington	82
Goodhue	25	Norman	54	Watonwan	83
Grant	26	Olmstead	55	Wilkin	84
Hennepin	27	Ottertail	56	Winona	85
Houston	28	Pennington	57	Wright	86
Hubbard	29	Pine	58	Yellow Medicine	87

Columns 16, 17, and 18: REGION AREA NUMBER

Record the code number of the Division of Forestry Region Area Number (RAN) in which the stand is located, regardless of who is the administrator of the land.

Forestry Area	Code	Forestry Area	Code
Bemidji Region		Brainerd Region	
Bemidji	111	Brainerd	311
Bagley	116	Little Falls	312
Blackduck	117	Backus	321
Warroad	121	Pequot Lakes	323
Wannaska	123	Hill City	331
Baudette	131	Aitkin	334
Park Rapids	161	Moose Lake	342
Alexandria	162	Hinckley	344
Detroit Lakes	163	Cambridge	351
Grand Rapids Region		St. Cloud	353
Deer River	221	Rochester Region	
Effie	222	Mankato	442
Hibbing	234	New Ulm	443
Orr	241	Willmar	444
Tower	245	Lewiston	531
Cloquet	251	Caledonia	532
Two Harbors	253	Preston	533
Grand Marais	255	Lake City	534
Littlefork	261	Rochester	541
		Faribault	545
		Metro Region	
		North Metro	611
		East Metro	612
		West Metro	613

Columns 19 and 20: STATE FOREST

Record the code number of the state forest in which the stand is located, regardless of who is the administrator of the land.

State Forest	Code	State Forest	Code
Outside state forest	00	Lake Jeanette	30
Admin. site/misc. state forest	01	Land O' Lakes	31
Badoura	02	Lyons	32
Battleground	03	Memorial Hardwood	33
Bear Island	04	Mississippi Headwaters	34
Beltrami Island	05	Nemadji	35
Big Fork	06	Northwest Angle	36
Birch Lakes	07	Pat Bayle	37
Blackduck	08	Paul Bunyan	38
Bowstring	09	Pillsbury	39
Buena Vista	10	Pine Island	40
Burntside	11	Red Lake	41
Chengwatana	12	Remer	42
Cloquet Valley	13	Rum River	43
Crow Wing	14	St. Croix	44
D.A.R.	15	Sand Dunes	45
Emily	16	Savanna	46
Finland	17	Smokey Bear	47
Fond Du Lac	18	Smoky Hills	48
Foot Hills	19	Solana	49
General C.C. Andrews	20	Sturgeon River	50
George Washington	21	Two Inlets	51
Golden Anniversary	22	Wealthwood	52
Grand Portage	23	Welsh Lake	53
Hill River	24	White Earth	54
Huntersville	25	Whiteface River	55
Insula Lake	26	Snake River	56
Kabetogama	27	Lost River	57
Koochiching	28	Lake of the Woods	58
Lake Isabella	29	Waukenabo	59

Columns 21, 22, and 23: OTHER MANAGEMENT UNITS

Record the code number of any management unit, other than a state forest, in which the stand is located. This includes any unit which requires a separation of data for management, such as a state park, game management area, school forest, or municipal forest. State parks have a code sequence established.

Management units that do not have an identifying code number must have a code number assigned before the field work begins.

There is no field for this data in FDM.

State Parks	Code	State Parks	Code	State Parks	Code
Administration	001	Glacial Lakes	088	Nerstrand Big Woods	035
Acton Monument	072	Glendalough	050	Great River Bluffs	094
Afton	089	Gooseberry Falls	017	Old Crossing Treaty	036
Banning	086	Grand Portage	084	Old Mill	037
Baptism River	053	Hayes Lake	099	Ray Berglund	055
Bear Head Lake	069	Helmer Myre	004	Rice Lake	095
Beaver Creek Valley	003	Hill Annex Mine	102	St. Croix	041
Big Stone Lake	066	Hinckley Monument	057	St. Croix Islands	085
Birch Coulee	005	Inspiration Peak	019	St. Croix Wild River	024
Blue Mounds	034	Interstate	020	Sam Brown Mon.	081
Brook Park Monument	006	Itasca	021	Sakatah Lake	096
Buffalo River	007	Jay Cooke	022	Savanna Portage	068
Camden	008	John Latsch	023	Scenic	042
Camp Release	009	Joseph R. Brown	056	Schoolcraft	067
Caribou Falls	073	Judge Magney	071	Schwandt Mon.	082
Carley	078	Kilen Woods	025	Sibley	043
Cascade River	061	Kodonce River	079	Soundan Mine	097
Charles A. Lindbergh	010	Lac qui Parle	026	Split Rock Creek	045
Chipp. Lac qui Parle	038	Lake Bemidji	027	Split Rock Lighthouse	083
Count Beltrami	011	Lake Bronson	028	Temperance River	059
Cross River	074	Lake Carlson	029	Tettegouche	101
Cuyuna Country	012	Lake Louise	090	Traverse Des Sioux	047
Crow Wing	065	Lake Maria	091	Up. Sioux Agency	098
Devil's Track	075	Lake Shetek	030	Whitewater	048
Father Hennepin	013	Little Elbow Lake	092	Wild River	100
Flandrau	014	McCarthy Beach	031	William O'Brien	049
Flood Bay	076	Maplewood	093	Wood Lake Mon.	058
Forestville/Mystery Cave	087	Milford Monument	080	Zipple Bay	063
Fort Ridgely	015	Mille Lacs Kathio	060	NW Region	052
Fort Snelling	077	MN Valley Rec. Area	016	NE Region	046
Franz Jevne	002	Minneopa	032	Central Region	070
Frontenac	062	Monson Lake	033	SW Region	051
Garden Island	039	Moose Lake	054	SE Region	044
Geo. Crosby Manitou	064	Moose Lake Rec. Area	018	Metro Region	040

Column 24: MANAGEMENT CODE

These codes are optional and intended for area use only.

Code	Description
1	Manage for understory. Stand has three or more cords per acre but is being managed for the understory type.
2	Manage for species #2. Stand is being managed for species listed as #2 rather than the main species in type.
3	Manage for a species with less than 250 stems per acre. Stand has a non-forest main cover type or non-forest understory type, but regeneration sufficient for management is present. Management species data must be listed in "trees less than 5" DBH."
4	White pine seed trees present. White pine seed trees are present in sufficient numbers to expect adequate white pine regeneration to occur.
5	Overstory is merchantable but not currently marketable. Stand has three or more cords per acre but is not currently marketable due to poor access or low volumes.
6	Riparian. Stands within riparian zones as defined by <i>FRC Guidelines</i> of December 1998.
7	Special management consideration. Identify the special consideration in remarks (boughs, bolts, Christmas trees, or other special products).
8	Genetically improved species planted. Stand has been planted with genetically improved stock.
9	Area defined. Stand is being managed for area-specific objectives. Identify objectives in remarks.

Column 25: ACQUISITION STATUS

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

Code	Description
0	None
1	Trust Fund (School or Swamp)
2	Acquired Land
3	Consolidated Conservation
4	L.U.P. (Leased)
5	50-50 Lands
6	University
7	Volstead
8	Salt Spring
9	Tax Forfeited

See "History of Lands" on page 189 for more information on acquisition of state-owned land in Minnesota.

Column 26: ADMINISTRATOR

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

Code	Description
0	None of the Below
1	State Forestry
2	State Fish & Wildlife
3	State Parks & Recreation
4	Other State Agencies
5	County
6	Private
7	Municipal Forest, School Forest

Columns 27 and 28: COVER TYPES

A high degree of accuracy is required in cover type determination. Many stands can be classified to type by observation, but it usually will be determined by a measurement of the volume of wood in trees over 5" DBH or a count of stems for trees less than 5" DBH.

A stand of trees with a volume of wood less than three cords per acre (10 percent) or 1,251 board feet per acre **cannot** be shown as the main cover type. In this case the understory or ground cover will be recorded as the main cover type.

When there is a volume of merchantable size timber in a nonmerchantable type, the merchantable volume will be recorded by species on Card 2.

The volume of wood in trees larger than 5" DBH will be recorded by species on Card 2: Stand Composition.

The number of stems in trees less than 5" DBH will be recorded by species on Card 3: Stand Composition.

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

If, within a stand, the following conditions exist:

- size class differs by one or more codes,
- density class differs by two or more codes,
- site index differs by 10 or more, or
- management prescriptions differ,

the stand will be separated into two or more stands.

COMMERCIAL FOREST TYPES

Code	Type	Symbol	Description
01	Ash	Ash	A bottomland type composed of ash.
06	Willow	Wil	A bottomland type which attains merchantable size in the southern portion of the state.
09	Lowland hardwoods	LH	Bottomland hardwoods (ash, elm, Balm of Gilead, silver maple, etc.).
12	Aspen	A	Trembling or large tooth aspen or paper birch; aspen predominating.
13	Birch	Bi	Paper birch usually with aspen. Paper birch predominating.
14	Balm of Gilead	Bg	A type composed almost entirely of Balm of Gilead, or of Balm of Gilead and aspen with Balm of Gilead predominating.
15	Cottonwood	Cot	Cottonwood; usually in southern portion of state.
17	Hybrid poplar	HP	A plantation, made up entirely of hybrid poplar.
20	Northern hardwoods	NH	Northern or upland hardwood species.
25	Walnut	WAL	Walnut predominating.
30	Oak	O	Oak species predominating.
40	Central hardwoods	CH	Dense hardwoods with oak, hickory, cherry, butternut.
51	White pine	WP	Pine, with white pine outweighing Norway and jack pine.
52	Norway pine	NP	Pine, with Norway pine outweighing white and jack pine.
53	Jack pine	JP	Pine, with jack pine outweighing white and Norway pine.
54	Scotch pine	SCP	A type, usually a plantation, entirely Scotch pine.
55	Ponderosa pine	PP	A type, usually a plantation, entirely ponderosa pine.
61	White spruce	WS	A type with white spruce predominating.
62	Balsam fir	BF	A type with balsam fir predominating.
64	Norway spruce	NS	A type, usually a plantation, entirely Norway spruce.
70	Upland larch	UL	Upland type with larch predominating.
71	Black spruce, lowland	BSL	Swamp conifers with black spruce outweighing other species.
72	Tamarack	T	Swamp conifers with tamarack outweighing other species.
73	Northern white cedar	C	Swamp conifers with white cedar outweighing other species.
74	Black spruce, upland	BSU	A type usually on high rocky ridges, often in mixture with Jack pine.
81	Red cedar	RC	A type usually found on dry sites in the south half of the state; seldom attains a large size.

NON-STOCKED COMMERCIAL FOREST TYPES (Nonproductive)

Code	Type	Symbol	Description
75	Stagnant spruce	SX	A spruce, tamarack, or cedar type below site index 23.
76	Stagnant tamarack	TX	
77	Stagnant cedar	CX	
78	Offsite aspen	AX	An aspen type below site index 35.
79	Offsite oak	OX	Scrubby oak type below site index 40.

The volume of wood in trees larger than 5" DBH must be recorded on Card 2: Stand Composition, by species.

The number of stems in trees less than 5" DBH must be recorded on Card 3: Stand Composition, by species.

NON-STOCKED COMMERCIAL FOREST TYPES (Deforested)

Code	Type	Symbol	Description
82	Cutover area	COA	Cutover within the last three years since the close of the timber sale with no representative timber present or visible—usually in the process of regeneration.
83	Lowland grass	LG	A lowland grass area capable of supporting a commercial forest.
84	Upland grass	UG	An upland grass or weed area less than 10 percent stocked with a commercial tree species.
85	Lowland brush	LB	A lowland brush area on potential commercial land, less than 10 percent stocked with a commercial tree species.
86	Upland brush	UB	Upland brush such as hazel, willow, pin cherry, raspberry, etc., less than 10 percent stocked with a commercial tree species.
87	Duff	D	Low herbaceous cover only or litter and herbaceous cover (ferns or annuals). Generally only used as an understory designation.
88	Moss	M	Sphagnum or feather. Generally only used as an understory designation.
91	Agricultural	Agr	Land being actively used for agricultural purposes—cropland, orchard, pasture, etc.
92	Industrial & urban development	IDev	Areas used for industry or residences—leased land, gravel pits, power lines, pipelines, etc.
93	Recreation development	Rec	Recreational areas less than 10 percent stocked with a commercial tree species including forest lands where timber is reserved from cutting.
94	Roads	Rd	Roads, railroads, cut out road right-of-way.
95	Rock outcrop	RO	Rock ridges or knobs either bare or only sparsely covered with vegetation.
96	Permanent water	L	Non-meandered lakes (bodies of water that do not have permanent traverse lines marking the high water mark of that permanent body of water), ponds and ditches which are managed for the primary purpose of containing water perpetually (during drought periods may be dry).
97	Non-permanent water	LF	Temporary areas of water such as beaver flowage, etc.
98	Marsh	Mh	Marsh land incapable of supporting a commercial forest. Includes wild grass, cattails, cane, some willow or other scattered lowland brush.
99	Muskeg	Ms	Peat land with a vegetation consisting of mosses and low shrubs such as leatherleaf, laurel, Labrador tea, cranberries, bog birch, etc., but not tall willows, alder, dogwood, etc. Often characterized by scattered, severely stunted black spruce and tamarack of less than site index 23 with a stocking below 10 percent.

Column 29: MAIN COVER TYPE SIZE CLASS (DIAMETER)

Average the observed diameters of the main species. Round down to the nearest whole inch. Determine the main cover size class code using this diameter. Record this code.

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

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

Codes 4 through 8 are based on volume per acre. In determining the size class, the larger size class always takes precedence except where the cordwood volume (codes 4 and 5) exceeds the sawtimber volume by two or more density classes.

Examples:

- Code 4 contains 15 cords per acre. In the density table, this volume is Code 3.
- Code 6 contains 3,000 board feet per acre. In the density table, this volume is Code 1.
- Applying the above rule, the size class will be Code 4 because the volume in that size class is two densities greater than the volume in Code 6.
- If the cover type is a deforested type, size class will be entered as 0, not applicable.

Column 30: MAIN COVER TYPE DENSITY

Merchantable types (5"+ DBH) will be classified according to volume per acre. Seedlings and saplings (less than 5" DBH) will be classified according to the number of stems per acre. Count the stems in a 1/100-acre plot which has a plot radius of 11.8 feet to arrive at the number of stems per acre. Record the code which best represents the density of the stand from the table below:

Code	Seedlings/Saplings 0"-4.9" Stems/Acre	Cordwood 5"-14.9" Cords/Acre	Sawtimber 15" and Larger Bd Ft/Acre
0	0-250	0.0-2.9	0 (625)-1,250
1	251 (500)-750	3.0 (5)-7.5	1,251 (2,500)-3,750
2	751 (1,000)-1,250	7.6 (10)-12.5	3,751 (5,000)-6,250
3	1,251 (1,500)-1,750	12.6 (15)-17.5	6,251 (7,500)-8,750
4	1,751 (2,000)-2,250	17.6 (20)-22.5	8,751 (10,000)-11,250
5	2,251 (2,500)-2,750	22.6 (25)-27.5	11,251 (12,500)-13,750
6	2,751 (3,000)-3,250	27.6 (30)-32.5	13,751 (15,000)-16,250
7	3,251 (3,500)-3,750	32.6 (35)-37.5	16,251 (17,500)-18,750
8	3,751 (4,000)-4,250	37.6 (40)-42.5	18,751 (20,000)-21,250
9	4,251 and up	42.6 (45) and up	21,251 (22,500) and up

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

Likewise, when the size class is determined to be a sawtimber size class (Code 6, 7, or 8), the volume in cords will be converted to board feet (1 cd = 500 bf or 1,000 bf = 2 cds). The sum of the two will then determine the density class.

The only time you convert cords to board feet or board feet to cords is to determine Main Cover Type Density. Do not record the volume figure that results from this conversion process.

In aspen regeneration, you may have up to 7.5 cords per acre and still code the main cover type as regeneration.

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

Columns 31 and 32: UNDERSTORY TYPE

Determine the understory by adding up the number of stems by size class for each species recorded on the 1/100-acre plot. Multiply each of these numbers by 100 and divide by the number of plots. Divide by the total number of plots taken in the stand even if the species or size class was not present on all plots. Do this for all regeneration species. Show the stems per acre in each size class for each species in the appropriate column of the 1/100-acre plot information.

Total the number of all stems in all three size classes for each species.

Total the number of all stems in all three size classes for all species.

Understory Type: The species with the most total stems, or the combination of species with the most total stems when no one species has 40 percent or more of the total volume, will determine the understory type.

Column 33: UNDERSTORY SIZE CLASS

Understory Size Class: The size class with the most stems per acre of the understory type species will determine understory size class.

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

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

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

Column 34: UNDERSTORY DENSITY

Understory Density: The total of all stems per acre for all species in the understory will determine the understory density class.

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

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

Columns 35, 36, and 37: ACRES

Record your best estimate for the stand acres whenever you add a new stand or change the type lines of an existing stand. Use whole numbers. Do not leave blank. Do not record the stand acres as zero. Fill in to the left with zeros:

Correct: 0 1 7 Incorrect: 1 7

Stand acres will be computer calculated based on how the stand boundaries are drawn on your alteration map or mylar. This computer-generated acre figure will override your acre estimate if the two acre figures are different. These computer-generated acre figures come to you on diskette following alteration processing. Your acre figures will be automatically updated when you load this diskette.

Columns 38 and 39: YEAR

Record the last two digits of the year in which the survey is being done.

Column 40: TOPOGRAPHY

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

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

Columns 41 and 42: SITE INDEX

Record the actual site index number as obtained from the enclosed Site Index Curves on page 83.

To evaluate site index, a minimum of two sample trees (main species in type) in a stand will be measured for age and total height.

Measure only dominant or codominant trees.

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

By referring these measurements to the site curves, the capacity of the site to grow a specific tree species is measured and recorded.

For pine stands composed of trees less than 25 feet in height, use the five-year intercept method below to determine site. For dense hardwoods use the red oak curves on page 99. For balm of Gilead use the aspen curves on page 96.

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

Five-Year Intercept Method, Red and White Pine*

Intercept (in feet)	Site Index
Less than 3.2	30
3.3–4.4	40
4.5–5.7	50
5.8–7.3	60
7.4–10.8	70
10.9+	80

1. Select a dominant or codominant tree.
2. Measure the distance between the first and sixth whorl of branches above 6'.
3. Read site index directly from chart.
4. Stand site index should be based on measurements of at least three trees.

*For use on pine less than 25 feet tall. For pine over 25 feet tall, use standard (height over age) site index curves.

Column 43: PHYSIOGRAPHIC CLASS

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

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

Columns 44, 45, and 46: STAND AGE

Pertains to the main cover type and reflects the main size class of the species to be managed. Average stand age is determined by boring at least two dominant or codominant trees at breast height and adding the number of years from the chart below required to reach the point of measurement. Small trees may be cut off at ground level or bored at ground level to get a ring count (age) without adding years to reach breast height. Sample tree ages are averaged to obtain stand age.

Average Number of Years to Reach Breast Height		
Species	Better Site	Medium & Poor Site
Aspen	1	2
White pine	8	12
Norway pine	6	10
Jack pine	5	8
Black spruce	10	20
Tamarack	5	10
Balsam fir	10	20
White spruce	10	15
Northern white cedar	10	20
Sugar maple	8	15
Silver & red maple	2	4
Ash	8	15
Elm	4	8
Basswood	2	4
Balm of Gilead	1	2
Oak	3	6
Paper birch	2	4
Yellow birch	8	15

Site Index		
Species	Better Site	Medium & Poor Site
Aspen	59+	58 or less
Jack pine	46+	45 or less
Balsam fir	42+	41 or less
Black spruce	31+	30 or less
White spruce	47+	46 or less
White pine	55+	54 or less
Norway pine	46+	45 or less
Northern white cedar	31+	30 or less
Tamarack	41+	40 or less
Red oak	51+	50 or less
Paper birch	43+	42 or less

Columns 47, 48, and 49: BASAL AREA/ACRE

Add up all the tally marks (merchantable, nonmerchantable, and culls) for the stand, multiply by 10 and divide by the number of plots. Record this number. Round down. Use whole numbers. There is no decimal point.

Columns 50 and 51: CORDS/ACRE

Record the actual cord volume per acre for all trees that are from 5" to 14.9" diameter at breast height to a 4" top diameter, as obtained from the cumulative angle gauge tally sheet, include all species. Round off to the nearest cord.

Columns 52, 53, and 54: THOUSANDS OF BOARD FEET/ACRE

Record the actual board feet volume per acre for all trees that are 15" or larger diameter at breast height to a 6" or an 8" top diameter, as obtained from the cumulative angle gauge tally sheet, all species. Example: 12,000 board feet is recorded as 12.0; 1,200 board feet is recorded as 1.2; 200 board feet is recorded as 00.2. The decimal point is automatic. There is no need to enter a decimal point.

Column 55: CONDITION CLASS

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

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

When using the high risk code, you must also show damage codes, percentage affected, and percentage mortality sufficient to justify a high risk condition class.

Column 56: TIMBER STATUS

Record the code number which best represents conditions affecting the status of timber management for the stand. Cover types 82 through 88 should be give a timber status of 1–9 even though no trees may be present.

Before field work is started, the region and area shall prepare a map that outlines the boundaries of tracts which have restrictions that will affect the management of the stand. An example is: The BWCA interior, which would be coded as 3, “No timber harvesting allowed.”

Code	Condition	Description
0	Not applicable	Non-forest types. Cover Types 91–99.
1	Normal timber harvesting allowed	No restrictions to management.
2	Restricted timber harvesting allowed	Parks, etc., where aesthetics or some other priority limits normal timber harvesting.
3	No timber harvesting allowed	Determined by law or policy.
4	Extended rotation forest	Stand will be held beyond normal rotation age.
5	Designated old-growth stand	No timber harvest allowed.
6	Obsolete code	This code is no longer valid.
7	Potential or future old-growth stand	No timber harvest.
8	Obsolete code	This code is no longer valid.
9	Under development	These are stands that are under active management, planned but not sold, sold but not cut.

Columns 57 and 58: MAIN SPECIES IN TYPE

From the species list below, record the species code number for the most important species in the cover type. For cover types that have been classified as containing trees 5" DBH or larger, the main cover type species with the highest volume of wood will be entered. For cover types that have been classified as containing trees less than 5" DBH, the species with the greatest number of stems will be entered.

Code	Name	Code	Name
00	None	41	Bitternut hickory
01	Black ash	42	Shagbark hickory
02	American elm	43	Hackberry
03	Silver maple	45	Boxelder
04	Red elm	51	White pine
05	Rock elm	52	Norway pine
06	Willow	53	Jack pine
12	Trembling aspen	54	Scotch pine
13	Paper birch	55	Ponderosa pine
14	Balm of Gilead	56	Austrian pine
15	Cottonwood	61	White spruce
16	Largetooth aspen	62	Balsam fir
17	Hybrid poplar	63	Colorado spruce
21	Red maple	64	Norway spruce
22	Sugar maple	65	Black Hills spruce
23	Basswood	71	Black spruce
24	Yellow birch	72	Tamarack
25	Walnut	73	Northern white cedar
26	Butternut	81	Eastern red cedar
27	Cherry	82	Hemlock
28	Buckeye	83	Douglas fir
31	Red oak	84	European larch
32	Black oak	85	Japanese larch
33	Northern pin oak	86	Siberian larch
34	White oak	91	Locust
35	Burr oak	92	Ironwood
36	Scarlet oak	93	River birch
38	White ash	94	Blue beech
39	Green ash	99	Miscellaneous

Columns 59 and 60: DIAMETER AT BREAST HEIGHT

Enter, in whole inches, the average diameter of the tree species being recorded as the main species. Trees less than 1.0" DBH are recorded as zero. Trees shorter than 4½ feet are recorded as zero.

Columns 61 and 62: HEIGHT

This is the average height of the main species in the stand from the very top of the tree to ground level.

Average the height of the two index trees when they are representative of the stand. Estimate the height of the main species in the stand when the trees used for site index are not representative of the stand.

Enter the height in whole numbers.

Columns 63, 64, and 65: VOLUME PER ACRE

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

Trees with a size class of 15" and greater will be recorded as thousand board feet per acre.

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

Example:

- 20 cords = 20.0
- 2,100 board feet = 02.1
- 1,100 stems = 01.1

Columns 66 and 67: INSECTS, DISEASES, AND OTHER STAND DAMAGE

The damage categories pertain to **main species** only. Damage noted on species other than the main species should not be recorded here. For cover types with trees 5" DBH and larger, the damage will be recorded for the species with the greatest volume in the stand. For cover types with trees less than 5" DBH, the damage will be recorded for the species with the largest number of stems.

When more than one damage occurs to the main species in the stand, record the most significant damage. Priority for determining significance should be given to damage that will lead to death, then to damage that will lead to volume loss, and finally to damage that will lead to growth loss. Example: Hypoxylon canker on aspen would be recorded before aspen decay, and aspen decay would be recorded before any aspen defoliation.

Record the damage on each plot that reflects your observation of the condition of the main species on the plot. The stand damage should be the damage that is most significant and/or common on all the plots, and is supported by what you see off-plot as you walk through the stand.

HOWEVER, if you observe a more significant damage off-plot than you have recorded on the plots, use your off-plot observation as the stand damage.

Refer to the Insect & Disease Supplement (page 177) for further explanation of the damage categories.

Code	Damage	Code	Damage
00	Healthy - no visible damage	30	Birch decline
INSECTS		31	Hardwood cankers
		32	Needle rusts
01	Defoliators	33	Armillaria root rot
02	Bark beetles	40	Other diseases
03	Wood borers	ANIMALS	
04	Saratoga spittlebug		
05	White pine weevil	41	Beaver
06	Spruce budworm	42	Porcupine
07	Jack pine budworm	43	Rabbit or mice (regen)
08	Shoot insects (regen)	44	Deer or moose (regen)
09	Stem borers	45	Sapsucker
10	Root collar insects (regen)	46	Other animals
15	Other insects	ENVIRONMENTAL DAMAGE	
DISEASES			
		51	Windthrow
16	White pine blister rust (WPBR)	52	Drought
17	WPBR & WP weevil	53	Stem breakage
18	Sweet fern rust	54	Fire
19	Scleroderris canker	55	Flooding
20	Sirococcus shoot blight	56	Hail
21	Butternut canker	57	Open crack
22	Oak mortality	60	Other environmental damage
23	Dwarf mistletoe	HUMAN CAUSED	
24	Diplodia tip blight		
25	Hypoxyylon canker	61	Mechanical damage
26	Aspen decay (Phellinus)	62	Chemical damage
27	Hypoxyylon & decay	UNKNOWN OR NOT IN CODE LIST	
28	Decay		
29	Dutch elm disease	99	Unknown

Column 68: PERCENT AFFECTED BY DAMAGE

Pertains to the **main species** in the stand.

On each plot in the stand, estimate the percentage of trees that are affected by the damage. Determine the percent affected of the entire stand by adding the percentage on each plot and dividing by the total number of plots.

HOWEVER, If your observations or impressions of the stand are different than what the plot average shows, use your off-plot observations to help determine the overall stand percentage.

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

Column 69: PERCENT MORTALITY

Pertains to the **main species** in the stand.

On each plot in the stand, estimate the percentage of trees on the plot that are dead. See below for a discussion of "dead." Determine the percent mortality of the entire stand by adding the percentage on each plot and dividing by the total number of plots.

HOWEVER, if your observations or impressions of the stand are different than what the plot average shows, use your off-plot observations to help determine the overall stand percentage.

To record dead trees, the trees must be standing and be taller than 4½ feet. Count only those trees that you are reasonably sure have died within the past two years. These trees will still have bark, have sound wood, and the main branches and some of the fine branches will be remaining.

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

Columns 70 and 71: SHRUB SPECIES COMPOSITION

Code	Description
00	No shrub species present
01	Unknown, below snow
02	Predominantly Labrador tea, leatherleaf
03	Predominantly lowland alder
04	Predominantly lowland willow
05	Predominantly prickly ash
06	Predominantly raspberry or other rubus species
07	Alder and/or willow with other good browse species present
08	Combination of upland blueberry and other low shrubs
09	Predominantly sumac
10	Predominantly hazel
11	Combination of hazel and/or honeysuckle, mt. maple, dogwood, juneberry, or upland willow
12	Predominantly dogwood
13	Predominantly mt. maple
14	Predominantly buckthorn
15	Predominantly elderberry
16	Predominantly gooseberry or other ribes
17	Predominantly nannyberry
18	Predominantly chokeberry
19	Predominantly wild plum
20	Predominantly honeysuckle

Column 72: DISTRIBUTION OF SHRUB SPECIES WITHIN STAND

Describes "coverage," not density of stems.

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

Column 73: DENSITY OF SHRUBS WITHIN STAND

Code	Description
0	No shrub species present
1	Low density (walk directly through with little shrub contact)
2	Moderate density (almost constant contact)
3	Heavy density (walk through requires pushing, ducking)

Column 74: AMOUNT OF SHRUB BROWSE AVAILABLE TO DEER

Record the code number for twigs $\frac{1}{4}$ " and less in diameter below seven feet, regardless of shrub species.

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

Column 75: GROUND COVER

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

Column 76: RECONNAISSANCE LEVEL

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

Column 77: STAND ORIGIN

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

For cover types that have no trees on them, code as zero.

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

Artificial regeneration is planting or seeding done by a person.

Column 78: DISTANCE TO A ROAD

This data is obsolete. Do not enter anything here.

Column 79: SIGNIFICANT CONDITIONS

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

Code	Condition
0	None
1	Unusual botanical feature. Examples: seepage swamps and fens, orchid bogs, goat prairie, and sand prairie.
2	Unusual geological feature. Examples: cliffs and talus slopes, springs, worm infestations.
3	Unusual historical feature. Examples: old logging camps, burial mounds, cellar depressions, old foundations.
4	Unusual scenic or recreational potential.
5	Eagle or osprey nesting site.
6	Active deer yarding area.
7	Other wildlife features. Examples: sharp-tailed grouse dancing ground, goshawk nest, colonial waterbird rookery (heron, egret), turtle nesting location.
8	Other features. Examples: ephemeral streams, vernal ponds.
9	White pine cluster(s) present.

Column 80: NUMBER OF CARDS USED

This data is obsolete. Do not enter anything here.

Site Index Curves

Site Index Curves

Species	Page
American Basswood.....	100
American Beech.....	90
American Elm	101
Balsam Fir	102
Black Ash	92
Black Cherry	97
Black Spruce	106
Black Walnut Plantations	94
Cottonwood	95
Eastern White Pine	109
European Larch Plantations	103
Green Ash	93
Hickories	89
Jack Pine	107
Northern Red Oak.....	99
Northern White Cedar.....	110
Paper Birch	88
Quaking Aspen	96
Red Maple	84
Red Pine	108
Silver Maple	86
Sugar Maple	85
Tamarack	104
White Ash	91
White Oak	98
White Spruce	105
Yellow Birch	87

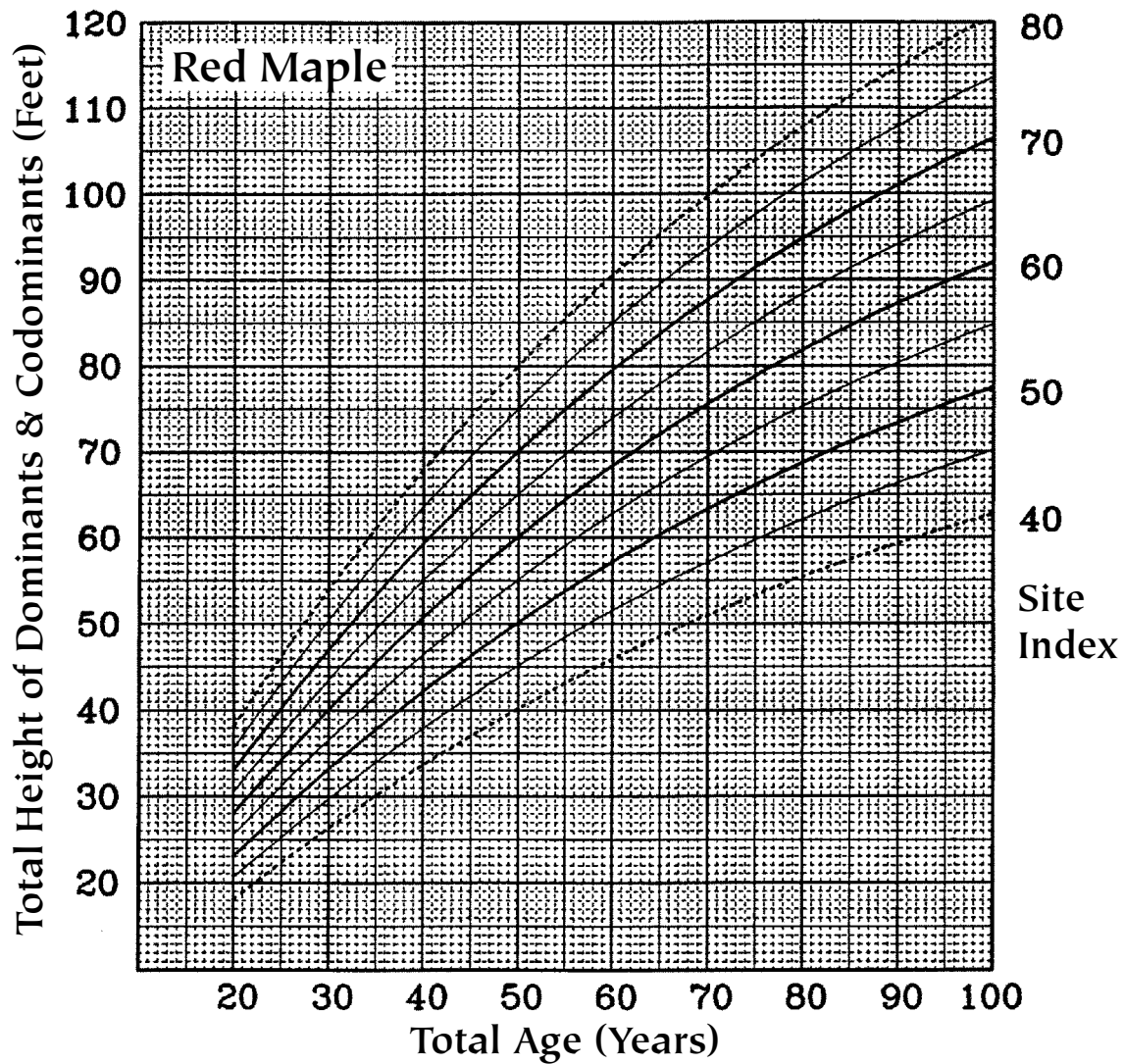


Figure 1.—Red maple (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 114 plots having 438 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	2.9435	0.9132	-0.0141	1.6580	-0.1095	0.99	0.49	2.0
SI	0.3263	1.0634	-0.0106	-1.2573	-0.0646	0.99	0.51	2.2

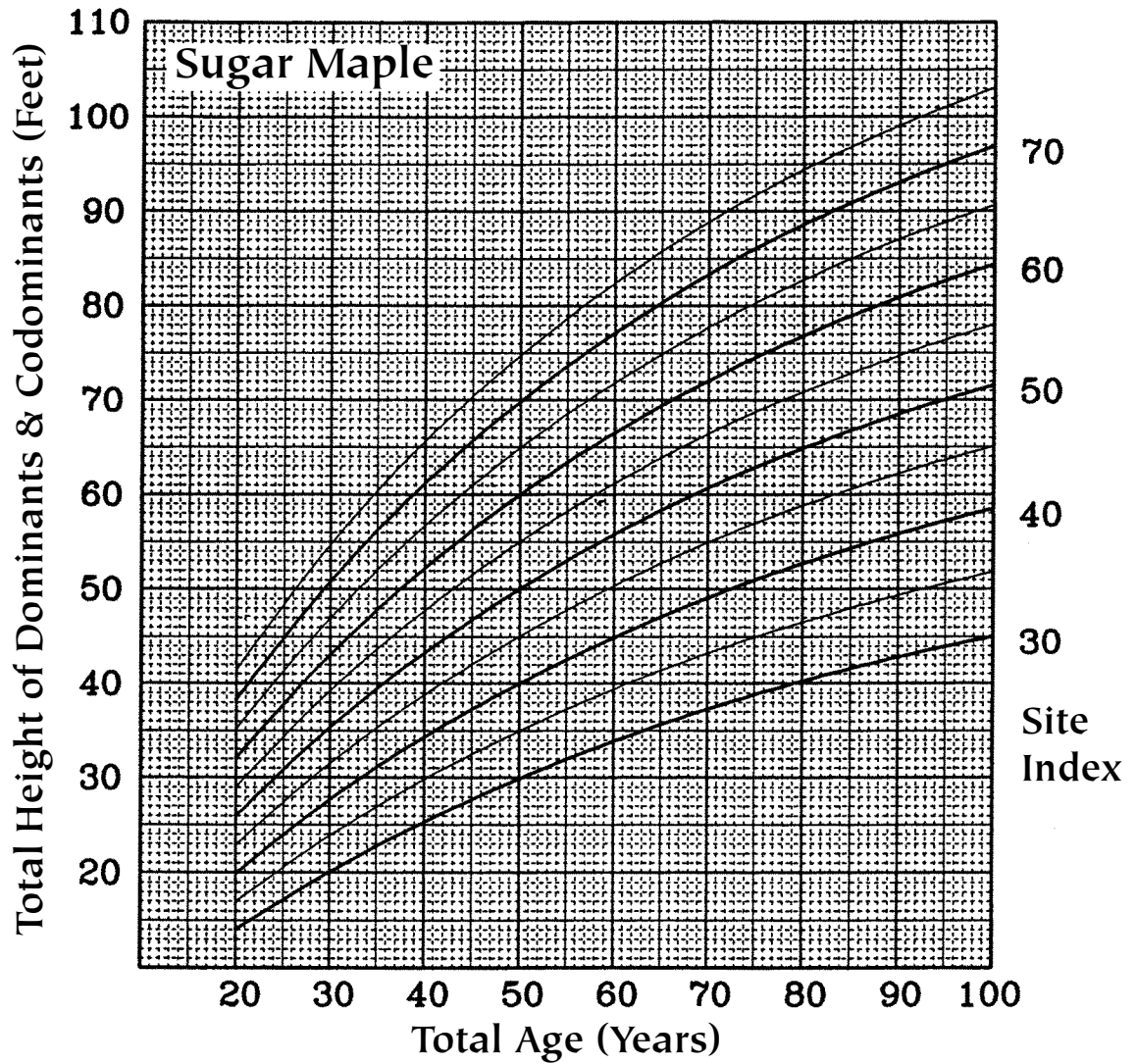


Figure 2.—Sugar maple (Curtis and Post 1962, Solomon 1968)
 Vermont Green Mountains
 67 plots having 136 dominant and codominant trees
 Stem analysis, logarithm equation, anamorphic, original curves
 redrafted from d.b.h. age to total age and from SI age 75 to SI
 age of 50
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	3.3721	0.8407	-0.0150	2.6208	-0.2661	0.99	0.88	0.3
SI	0.1771	1.2075	-0.0066	-1.7003	-0.2189	0.99	0.98	1.9

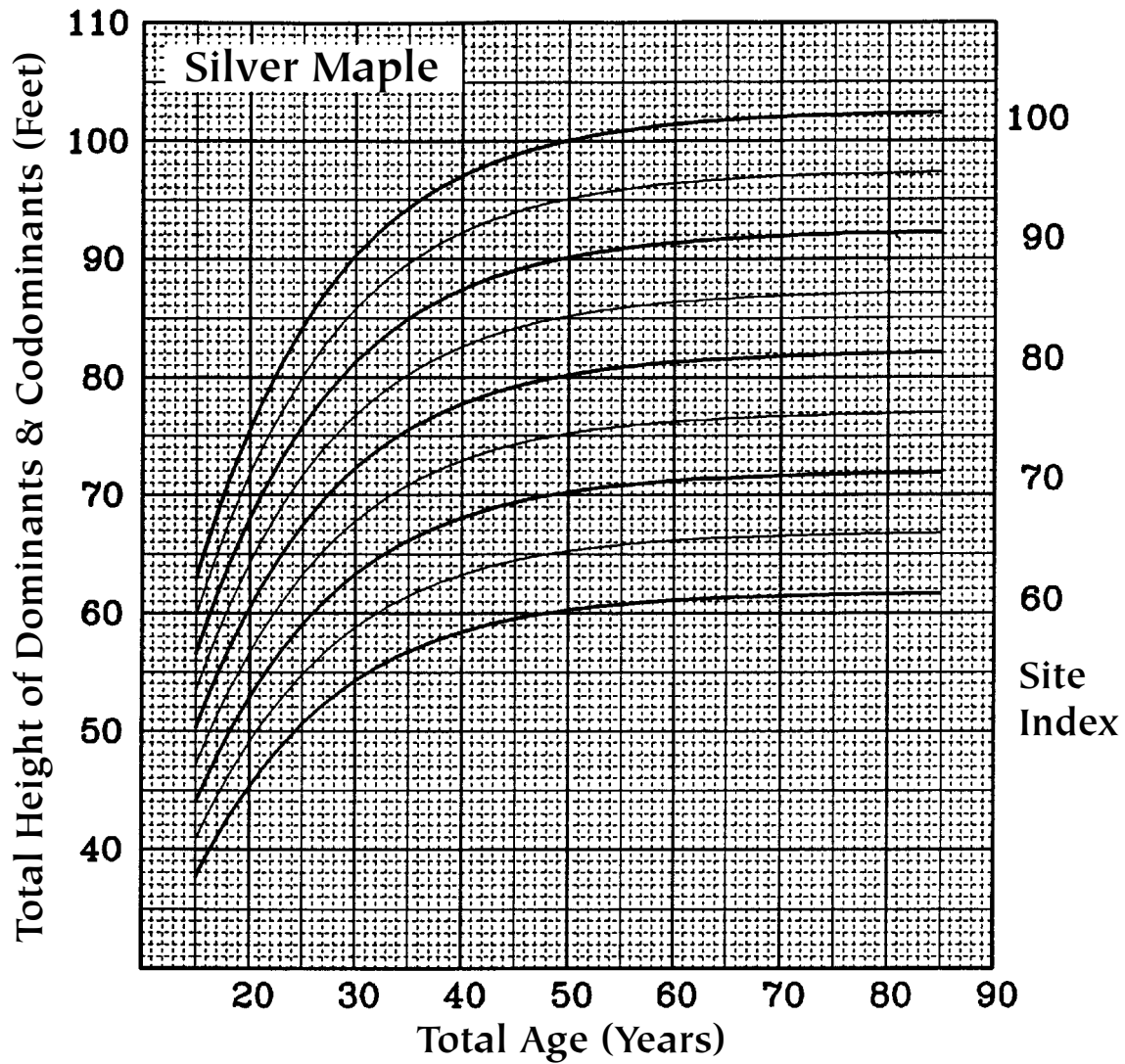


Figure 4.—Silver maple (Brendemuehl, McComb, and Thomson 1961b)
 Southeastern Iowa
 50 plots, number of dominant and codominant trees not given
 Total height and age, anamorphic, equation not given
 Add 3 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.0645	0.9918	-0.0812	1.5754	-0.0272	0.99	1.00	4.2
SI	0.8972	1.0183	-0.0769	-4.8154	-0.3162	0.99	0.95	6.0

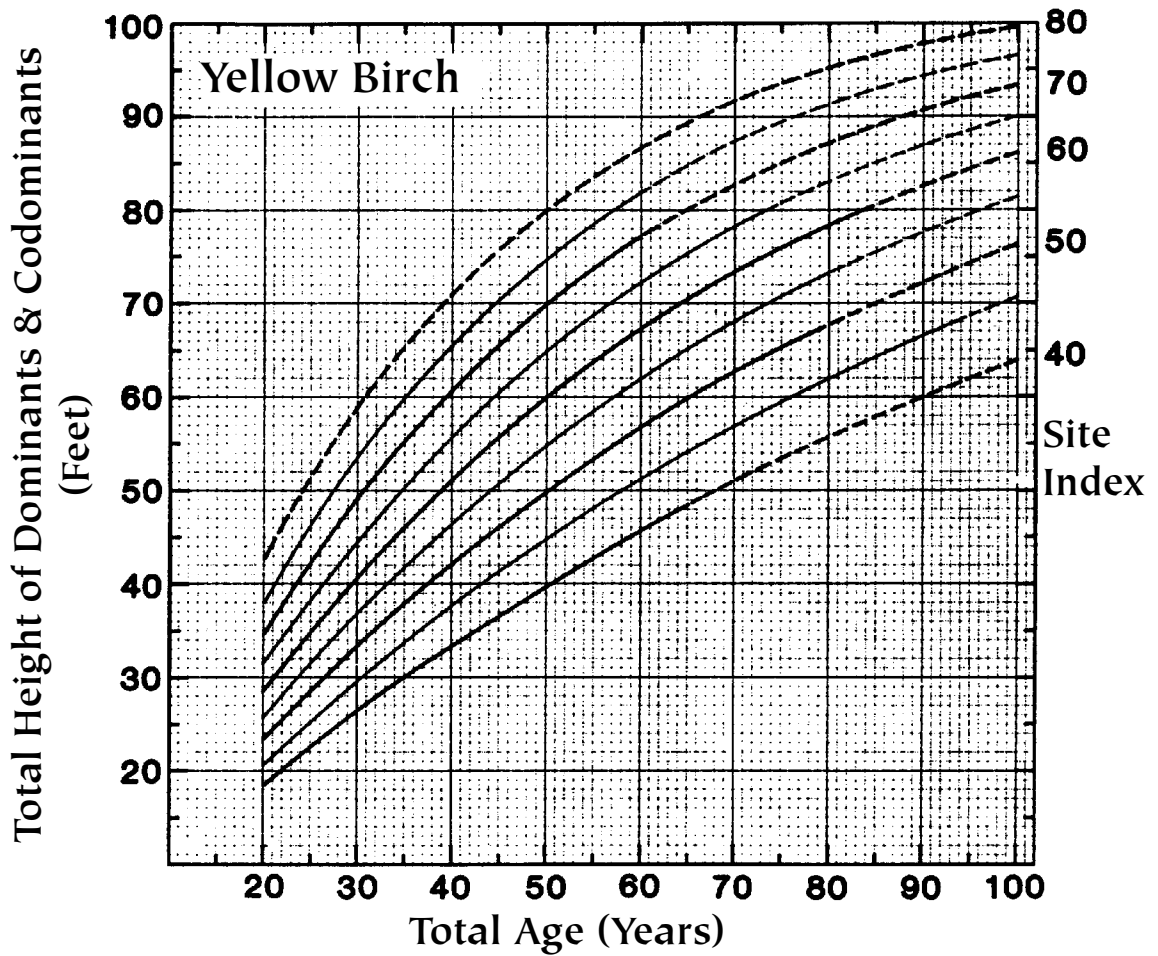


Figure 6.—Yellow birch (Carnean 1978)
 Northern Wisconsin and Upper Michigan
 119 plots having 459 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	6.0522	0.6768	-0.0217	15.4232	-0.6354	0.99	1.29	5.0
SI	0.1817	1.2430	-0.0110	-3.0184	-0.3180	0.98	2.05	7.7

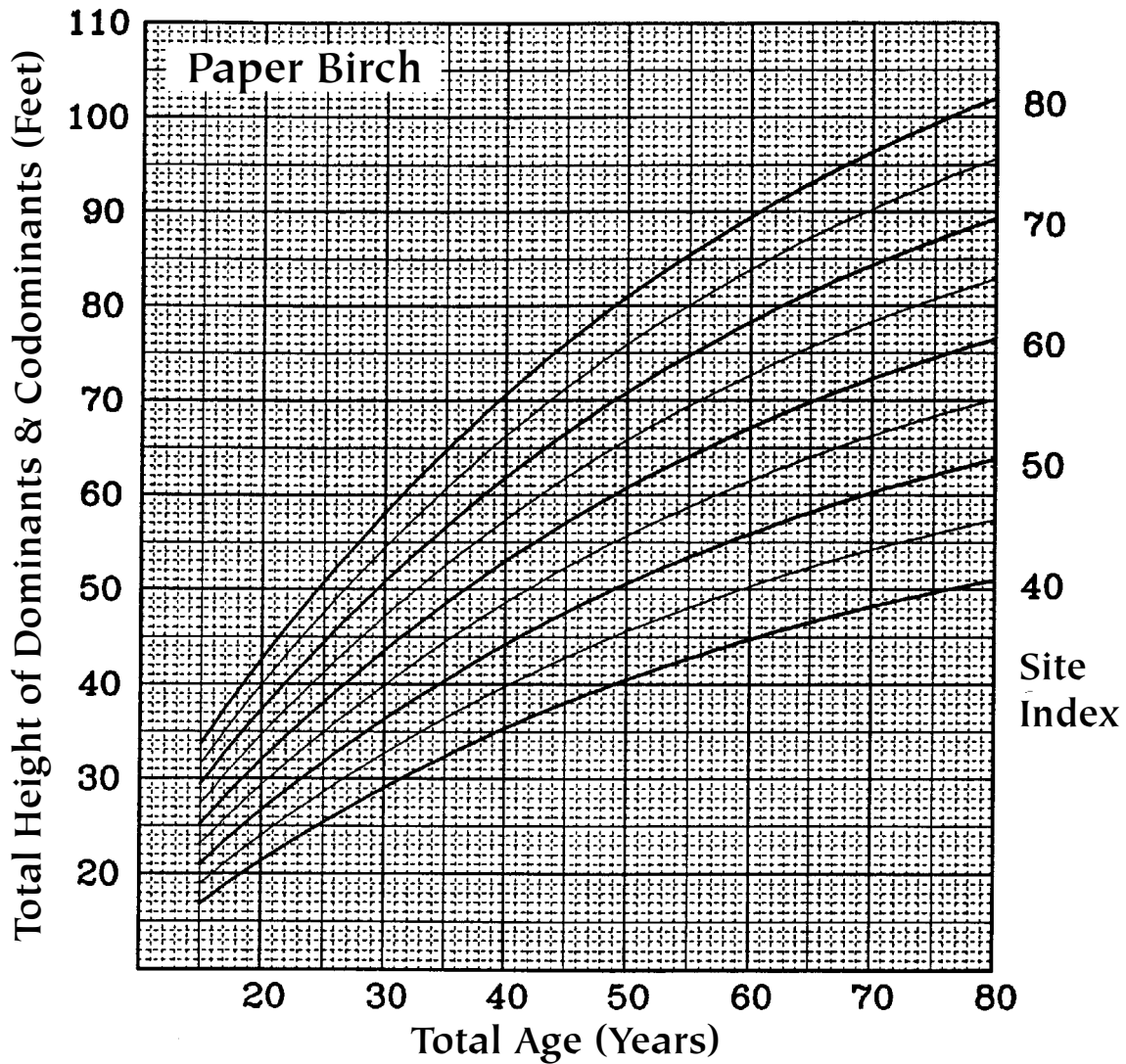


Figure 7.—Paper birch (Cooley 1958, 1962)
 Northern Wisconsin (104 plots); Upper Michigan (4 plots)
 108 plots, number of dominant and codominant trees not given
 Total height and age, anamorphic, equation not given
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.5980	1.0000	-0.0198	0.9824	0.0000	0.99	0.32	0.6
SI	0.6258	1.0000	-0.0198	-0.9824	0.0000	0.99	0.32	0.6

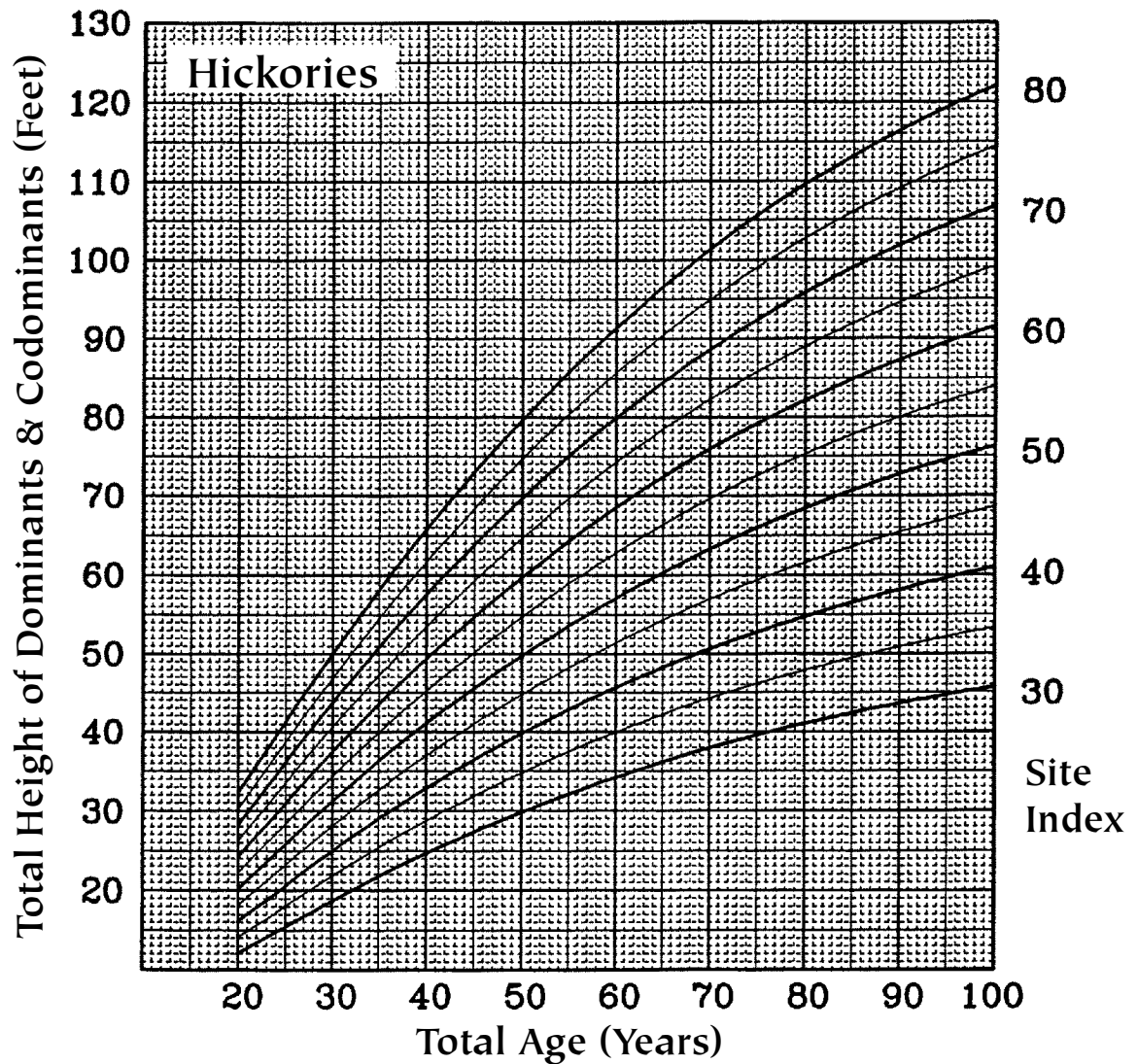


Figure 10.—Hickories (Boisen and Newlin 1910, Hampf 1965)
 Central States, Cumberland Mountains of Kentucky
 30 plots, number of dominant trees not given
 Total height and age, anamorphic, equation not given
 Convert d.b.h. age to total age by adding years according to
 site index (BH = 0.0):
 SI: 30 40 50 60 70 80
 Years: 10 8 7 6 5 4

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.8326	1.0015	-0.0207	1.4080	-0.0005	0.99	0.60	2.1
SI	0.5243	1.0126	-0.0216	-1.5897	-0.0239	0.99	0.62	2.3

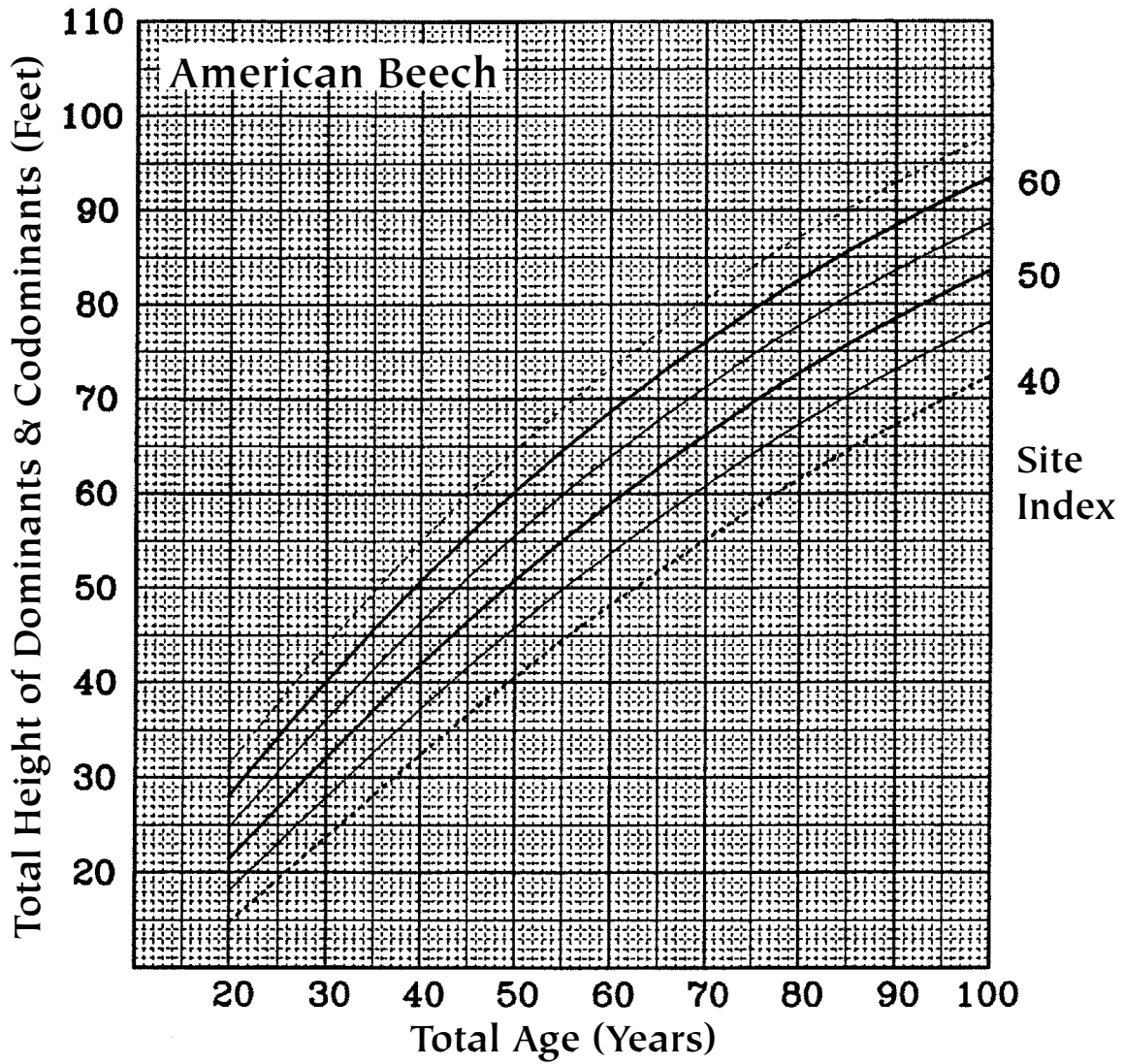


Figure 11.—American beech (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 19 plots having 70 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	29.7300	0.3631	-0.0127	16.7616	-0.6804	0.99	0.44	1.3
SI	0.2376	1.1312	-0.0109	-1.8550	-0.1430	0.96	1.99	6.5

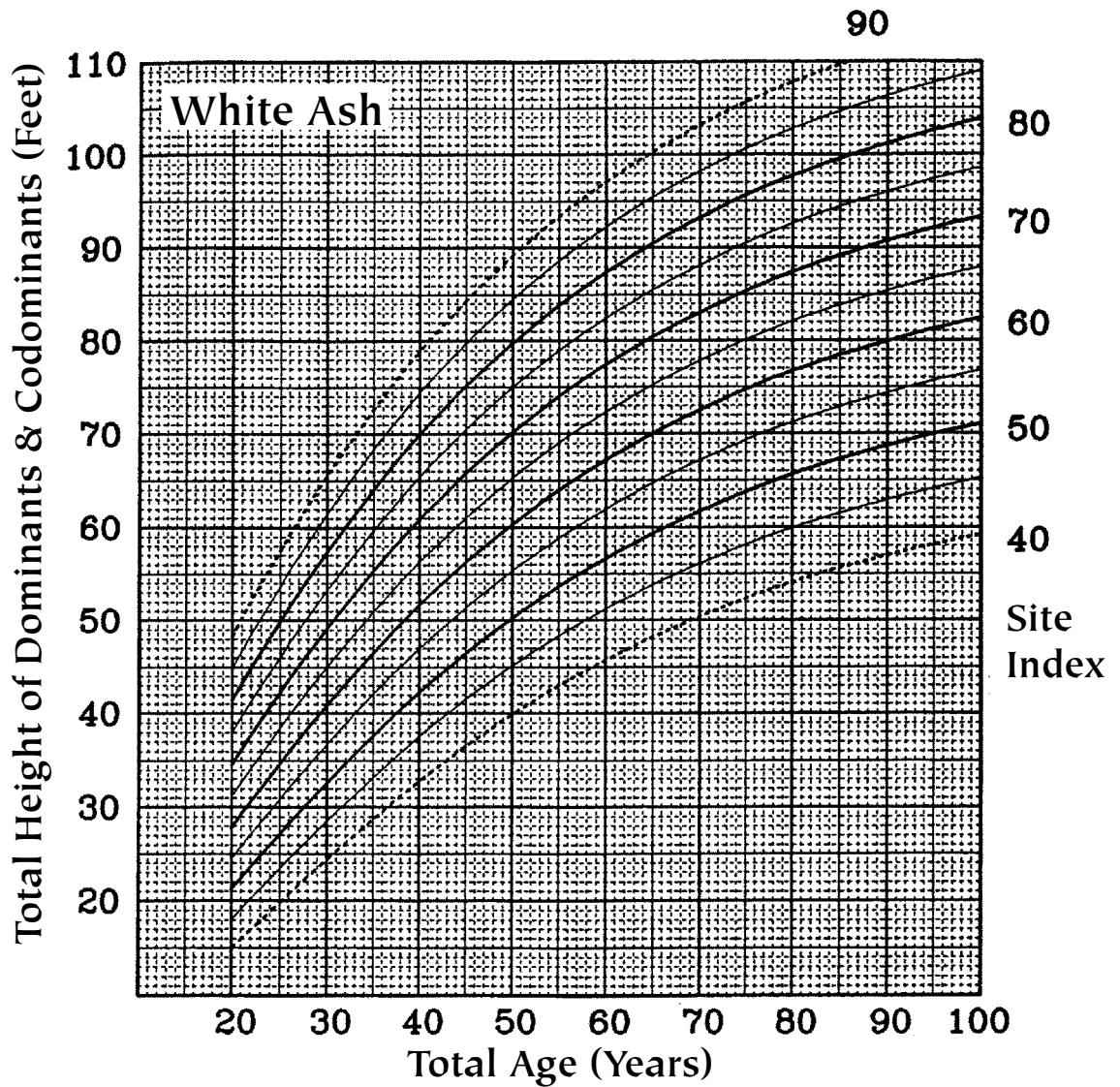


Figure 13.—White ash (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 73 plots having 275 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	4.1492	0.7531	-0.0269	14.5384	-0.5811	0.99	1.37	5.1
SI	0.1728	1.2560	-0.0110	-3.3605	-0.3452	0.99	1.99	9.5

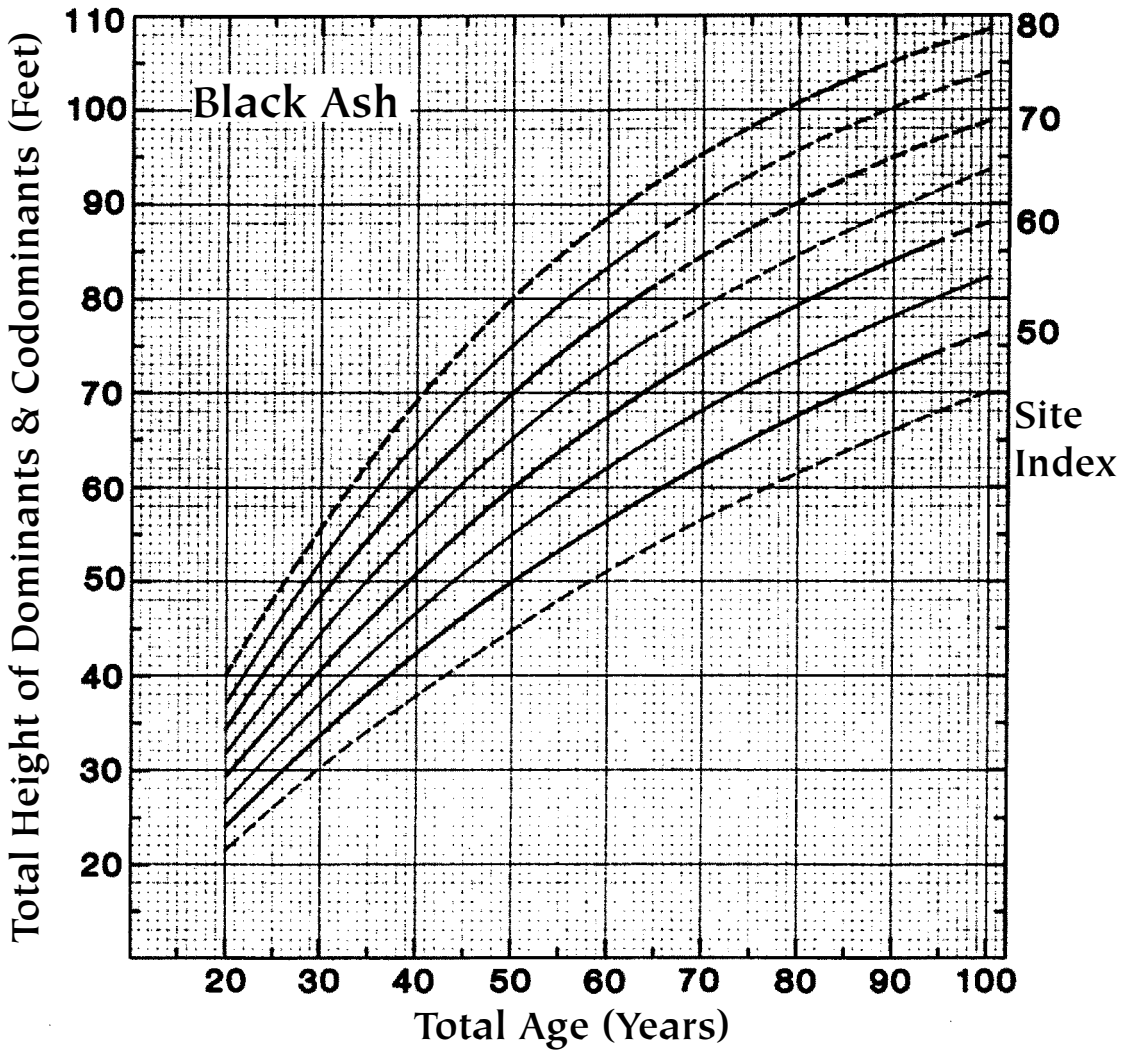


Figure 14.—Black ash (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 39 plots having 143 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	4.2286	0.7857	-0.0178	4.6219	-0.3591	0.99	0.70	2.4
SI	0.2388	1.1583	-0.0102	-1.8455	-0.1883	0.99	0.99	3.4

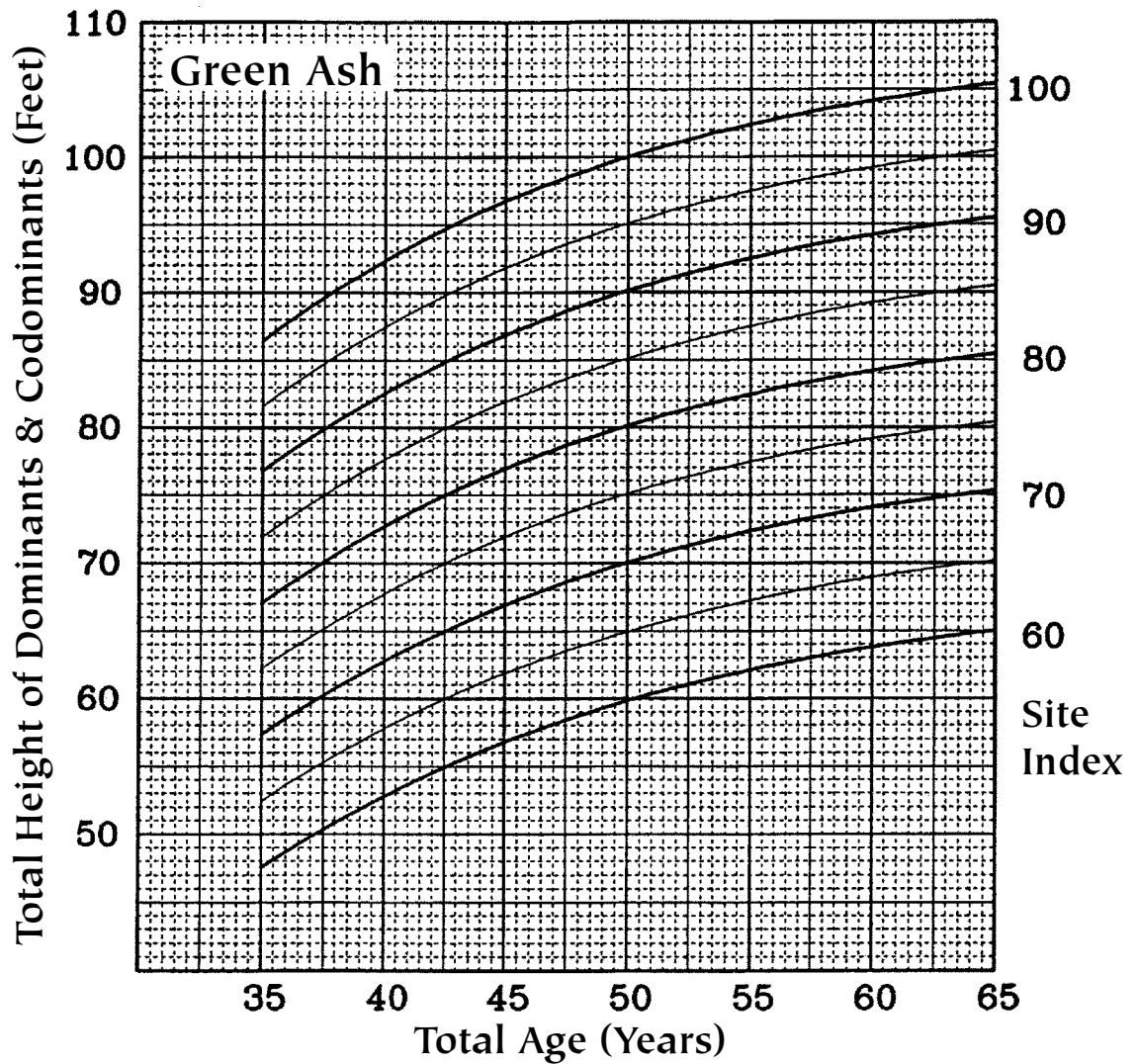


Figure 15.—Green ash (Broadfoot 1969)
 Mississippi Valley alluvium—Louisiana, Mississippi, Arkansas,
 Tennessee
 Number of plots and number of dominant and codominant trees not
 given
 Stem analysis, graphically constructed anamorphic curves
 Add 2 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.6505	0.9096	-0.0644	125.7045	-0.8908	0.99	1.20	0.8
SI	0.5672	1.0990	-0.0482	-38.2659	-0.7549	0.99	1.25	0.8

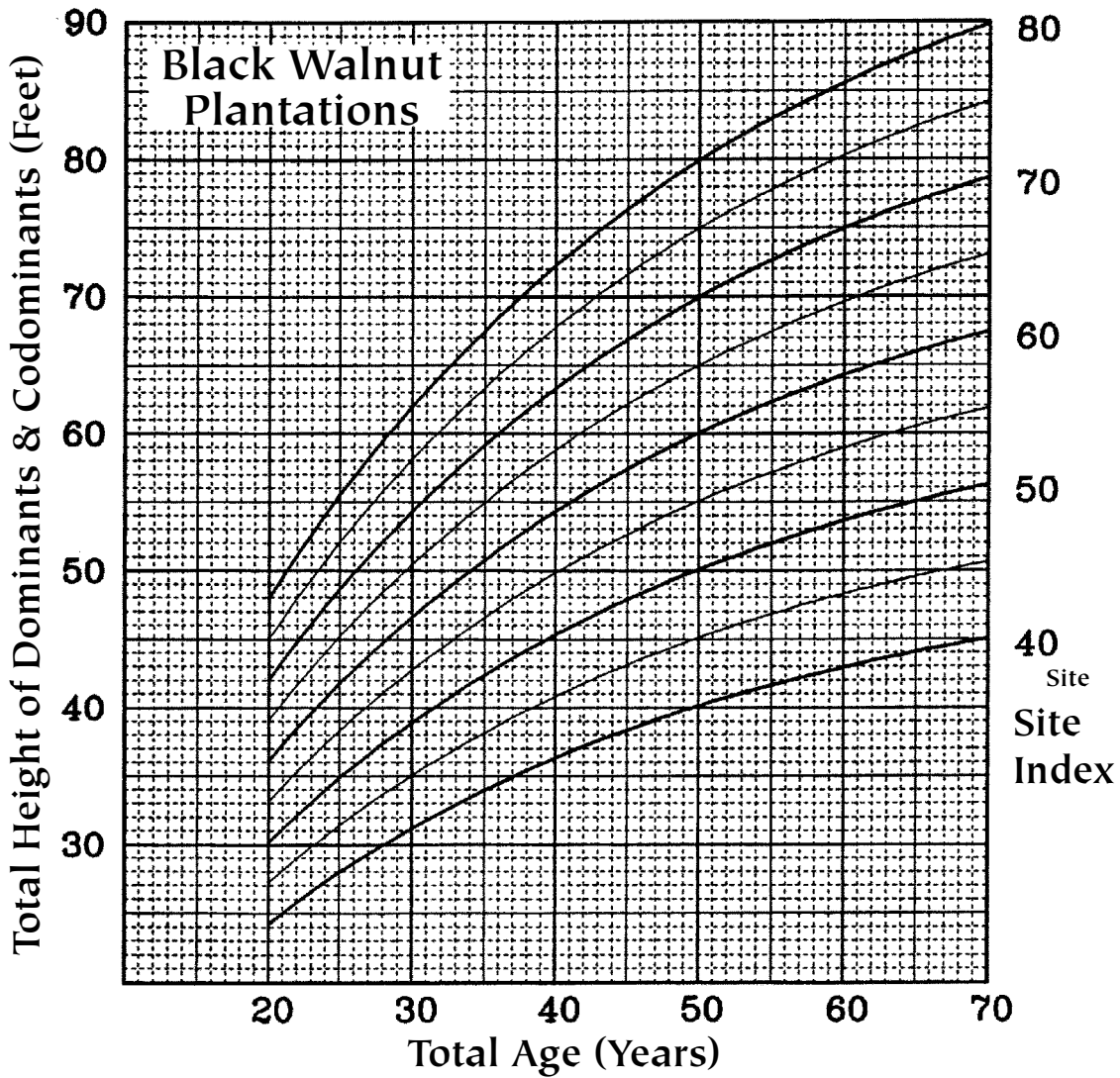


Figure 16.—Black walnut plantations (Kellogg 1939b)
 Central States
 188 plots, number of dominant trees not given
 Total height and total age, anamorphic, equation not given
 Determine total age from stumps or planting records (do not
 damage trees by using an increment borer) (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.2898	0.9982	-0.0289	0.8546	0.0171	0.99	0.44	1.7
SI	0.7875	0.9963	-0.0281	-0.7823	0.0353	0.99	0.49	2.1

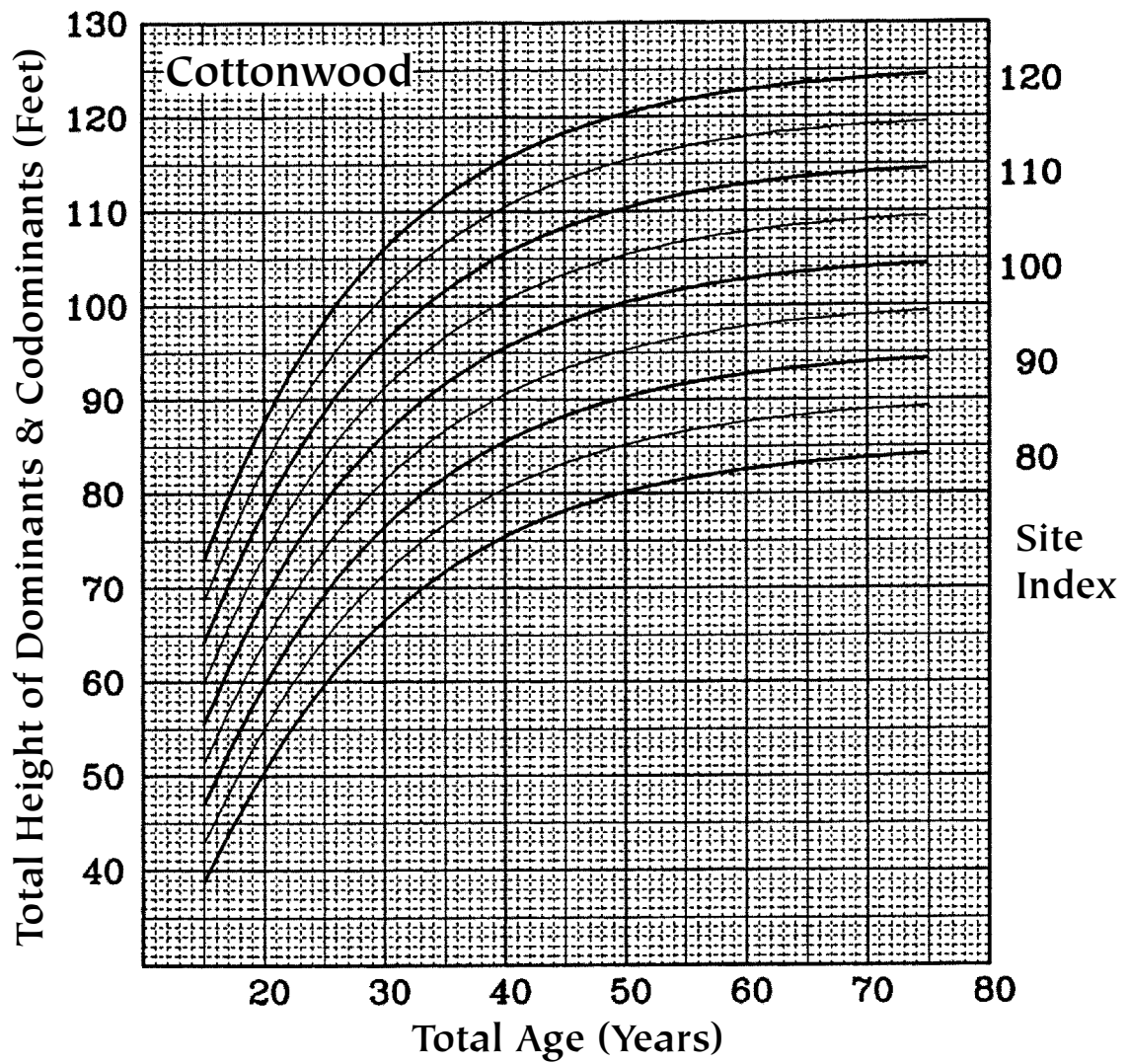


Figure 30.—Cottonwood (Brandemuehl 1965)
 lowa bottomlands
 66 plots, number of dominant and codominant trees not given
 Total height and total age, anamorphic, equation not given
 Add 2 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.2834	0.9571	-0.0680	100.0000	-0.9223	0.99	0.96	3.3
SI	0.7688	1.0412	-0.0462	-14.4222	-0.6595	0.99	1.56	4.4

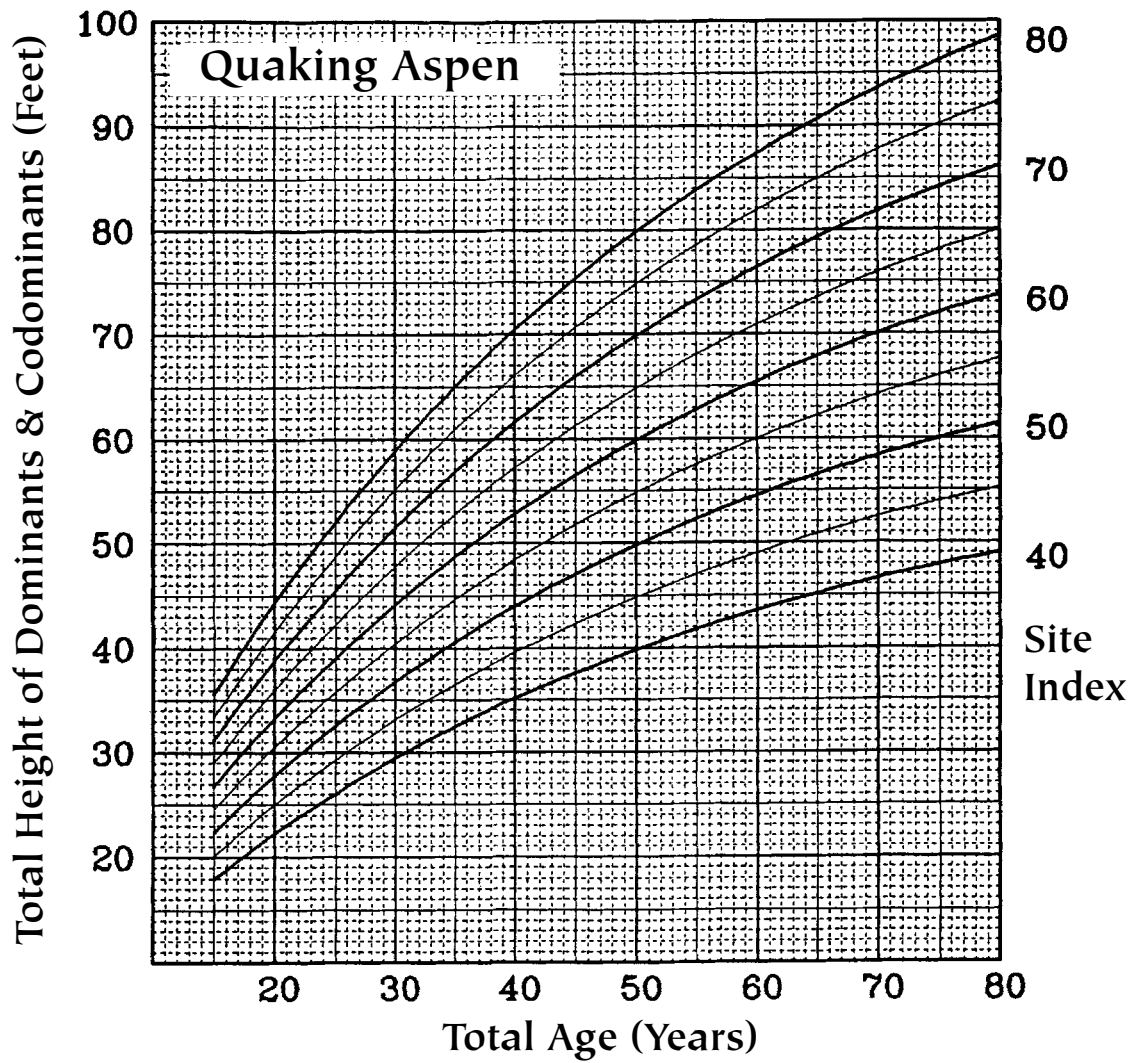


Figure 31.—Quaking aspen (Gevorkiantz 1956a, from Kittredge and Gevorkiantz 1929)
 Number of plots and number of dominant and codominant trees not given
 Total height and total age, anamorphic, equation not given
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.4475	1.0098	-0.0200	0.8489	0.0146	0.99	0.15	0.4
SI	0.6755	1.0000	-0.0213	-0.9367	-0.0002	0.99	0.04	0.1

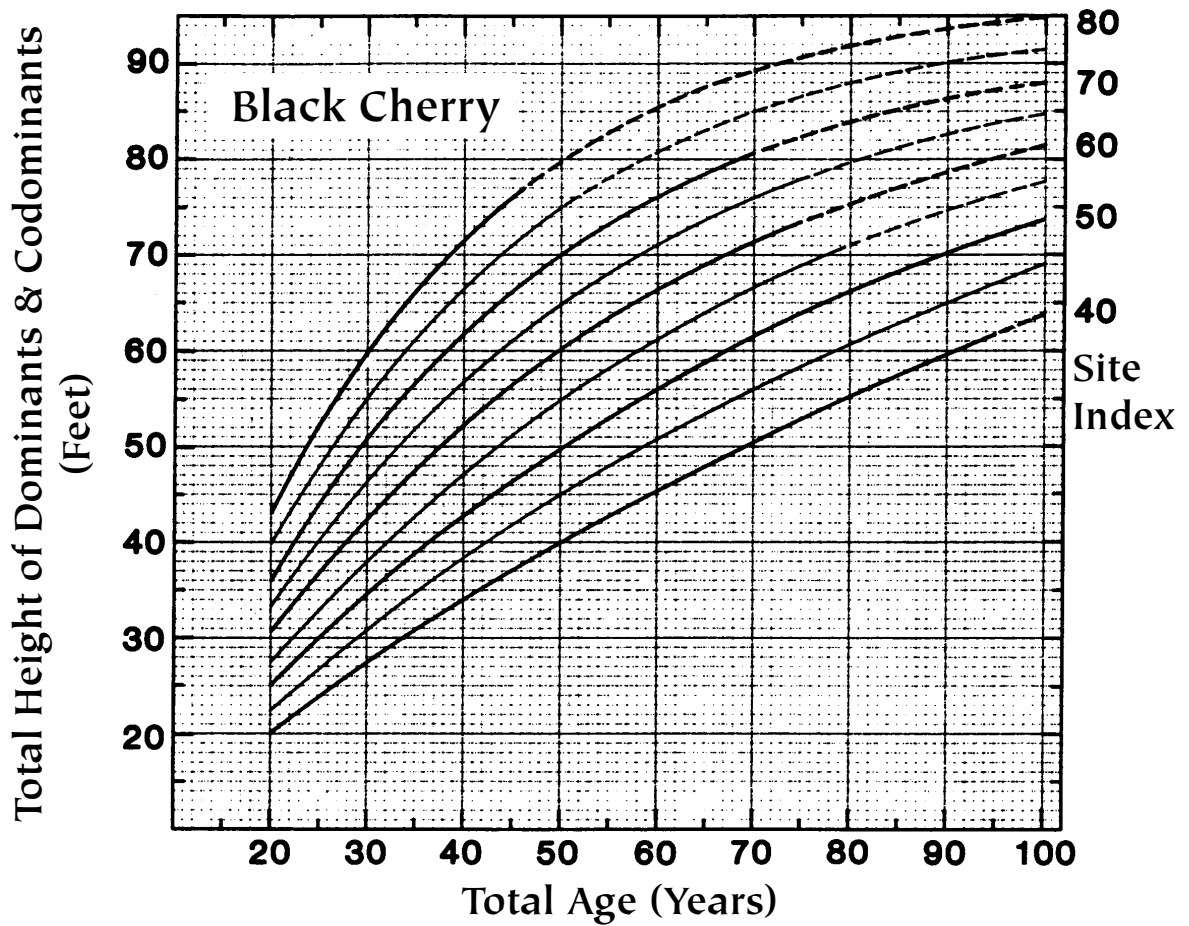


Figure 34.—Black cherry (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 42 plots having 126 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	5.1493	0.6948	-0.0248	20.9210	-0.7143	0.99	1.55	5.4
SI	0.1073	1.3455	-0.0070	-3.3034	-0.3899	0.99	1.77	9.1

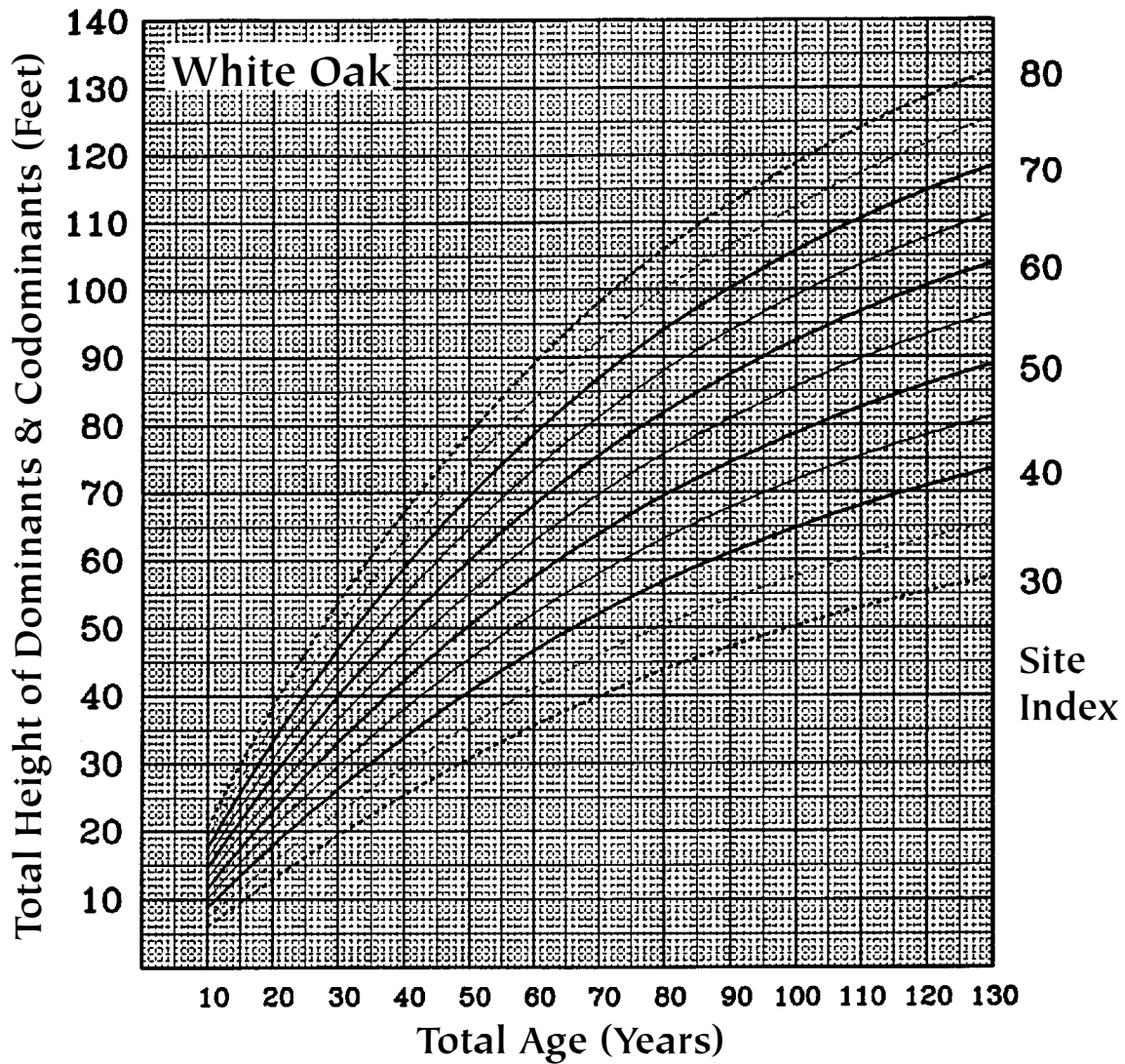


Figure 41.—White oak (Carmean 1971, 1972)
 Unglaciated uplands of southeastern Ohio, eastern Kentucky,
 southern Indiana, southern Illinois, and southern Missouri
 41 plots having 112 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 3 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	4.5598	0.8136	-0.0132	2.2410	-0.1880	0.99	2.69	(1)
SI	0.3387	1.0135	-0.0076	-0.9644	-0.0176	0.99	2.90	(1)

(1) Value not calculated because model was fitted to original data rather than to site index curves.

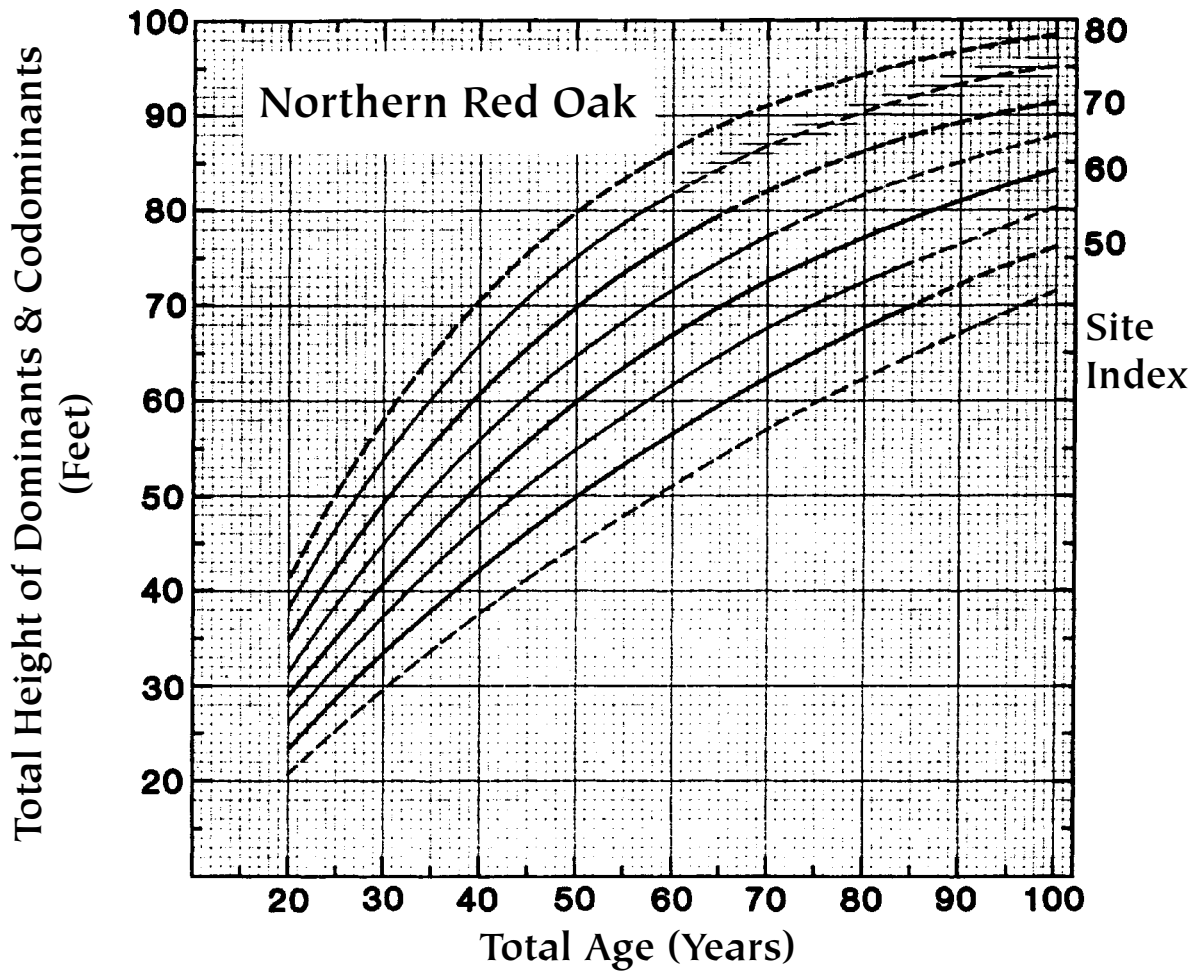


Figure 48.—Northern red oak (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 37 plots having 136 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	6.1785	0.6619	-0.0241	25.0185	-0.7400	0.99	1.32	4.9
SI	0.1692	1.2648	-0.0110	-3.4334	-0.3557	0.97	2.09	7.8

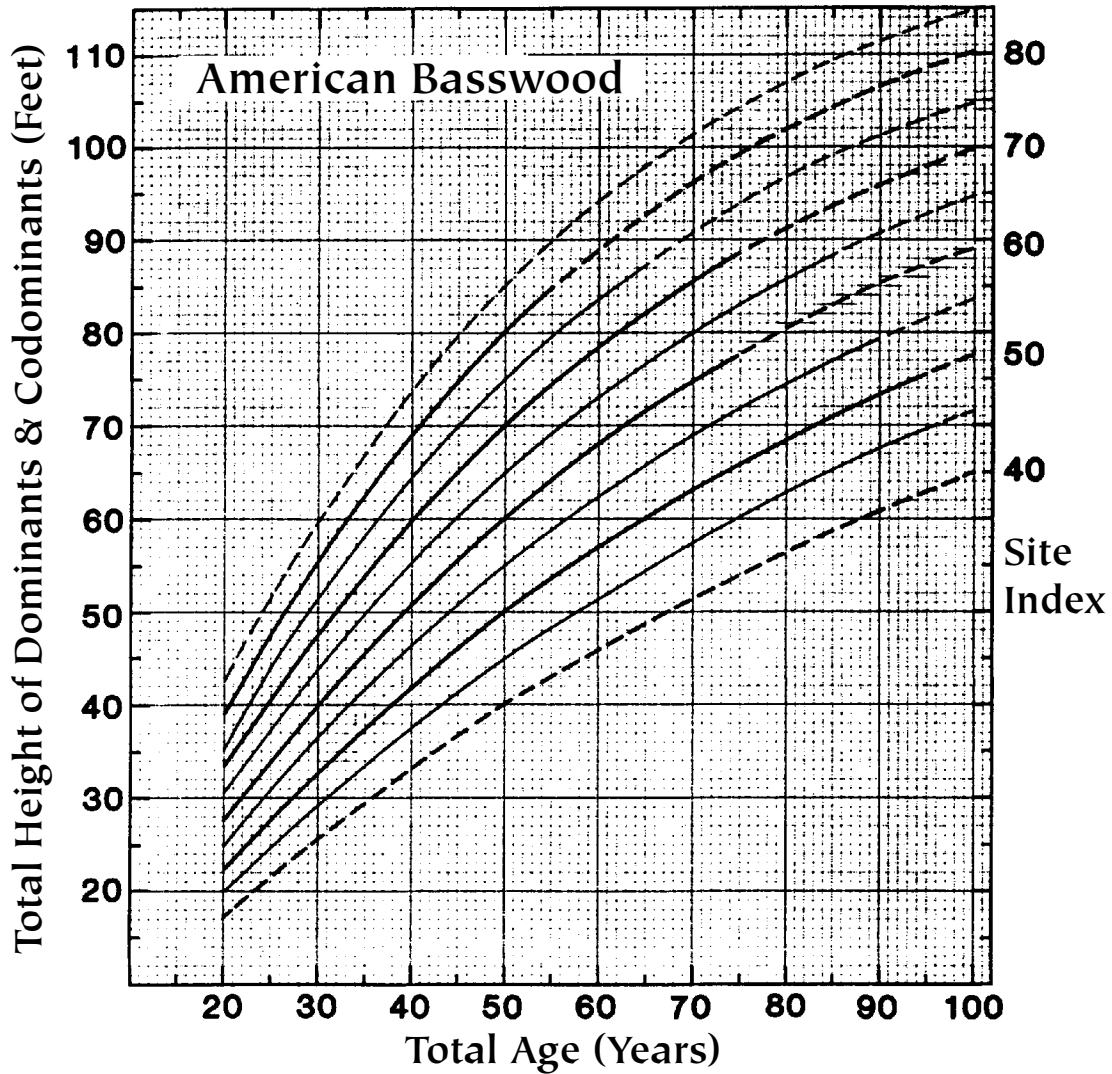


Figure 51.—American basswood (Carnean 1978)
 Northern Wisconsin and Upper Michigan
 122 plots having 483 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	4.7633	0.7576	-0.0194	6.5110	-0.4156	0.99	0.70	2.7
SI	0.1921	1.2010	-0.0100	-2.3009	-0.2331	0.99	1.24	4.5

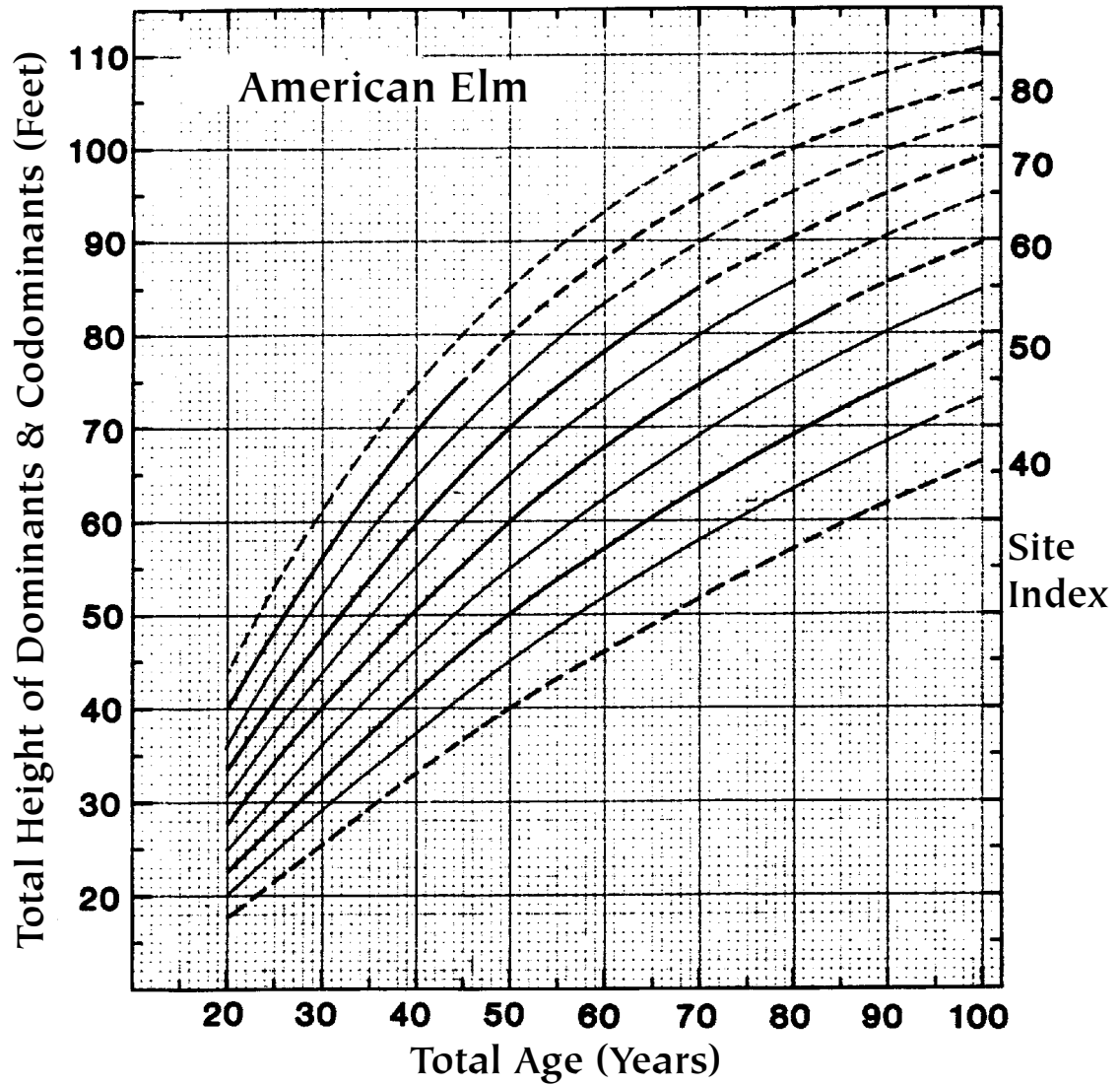


Figure 53.—American elm (Carmean 1978)
 Northern Wisconsin and Upper Michigan
 109 plots having 416 dominant and codominant trees
 Stem analysis, nonlinear regression, polymorphic
 Add 4 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	6.4362	0.6827	-0.0194	10.9767	-0.5477	0.99	1.12	4.4
SI	0.1898	1.2186	-0.0110	-2.6865	-0.2717	0.99	1.99	6.6

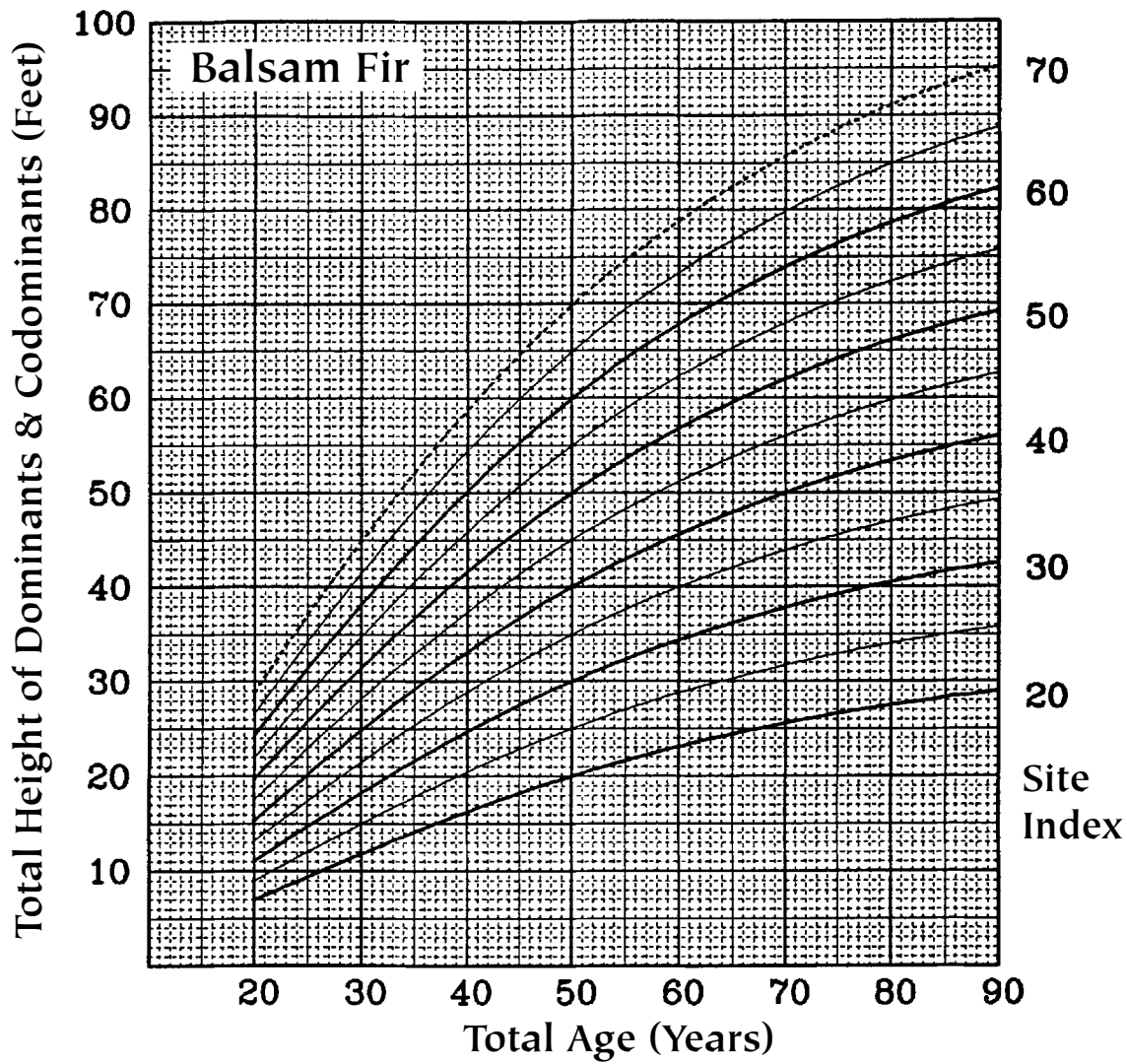


Figure 55.—Balsam fir (Carnean and Hahn 1981, revision of Gevorkiantz 1956b)
 Lake States
 Number of plots and number of dominant and codominant trees not given
 Total height and total age, anamorphic, Gevorkiantz (1956b) equation not given
 Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):
 SI: 20 30 40 50 60 70
 Years: 15 13 11 10 9 8

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	2.0770	0.9303	-0.0285	2.8937	-0.1414	0.97	0.95	1.7
SI	0.4100	1.0799	-0.0205	-2.1577	-0.1295	0.98	1.07	2.5

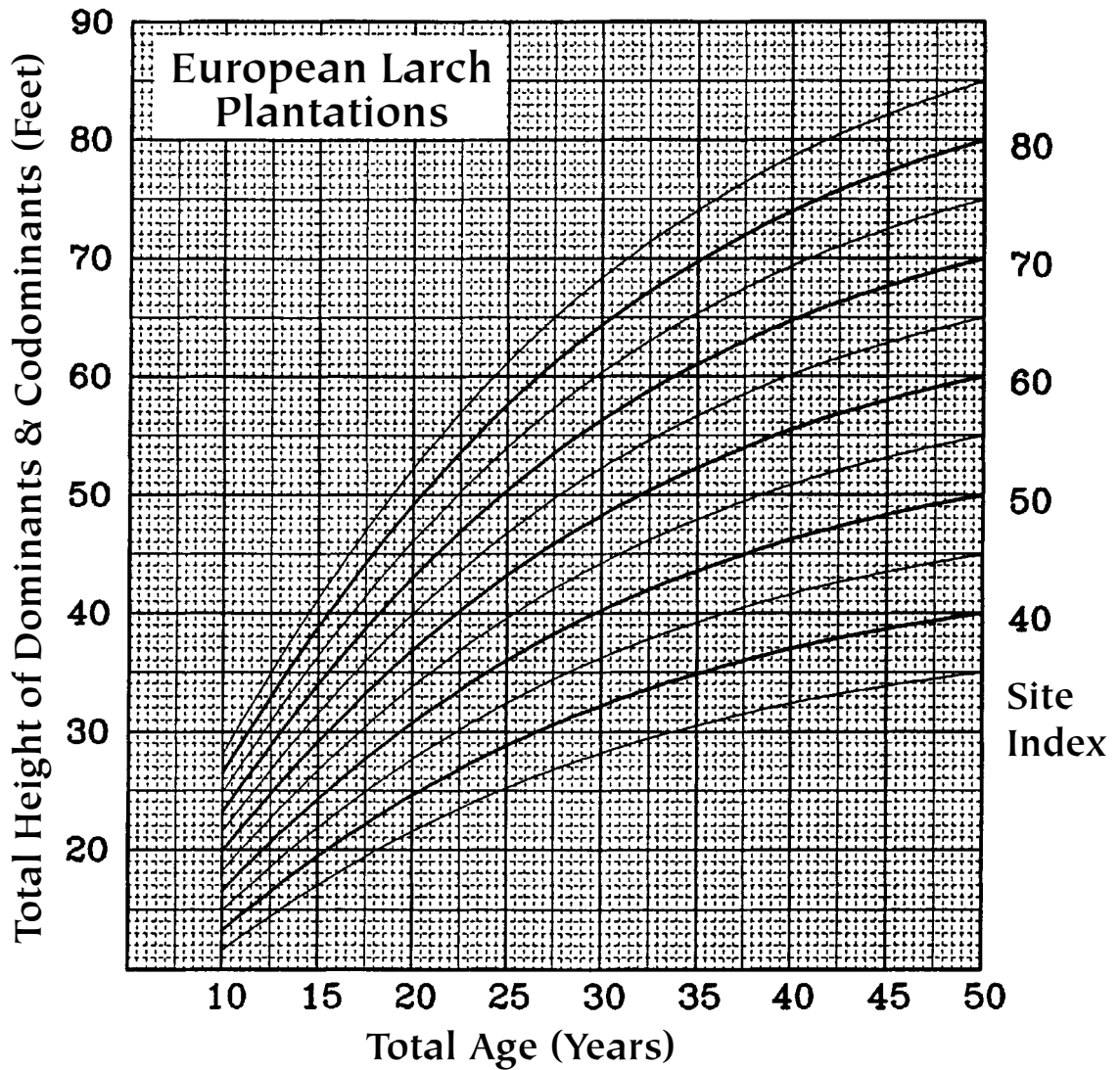


Figure 59.—European larch plantations (Aird and Stone 1955, Stone 1957)
 New York and southern New England
 147 plots, number of dominants and codominants not given
 Total height and total age, anamorphic, logarithm equation
 Add 3 years to d.b.h. age to obtain total age (BH = 0.0)

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.1151	1.0000	-0.0504	1.3076	0.0009	0.98	0.72	4.2
SI	0.8821	1.0047	-0.0511	-1.4863	-0.0271	0.98	0.82	1.4

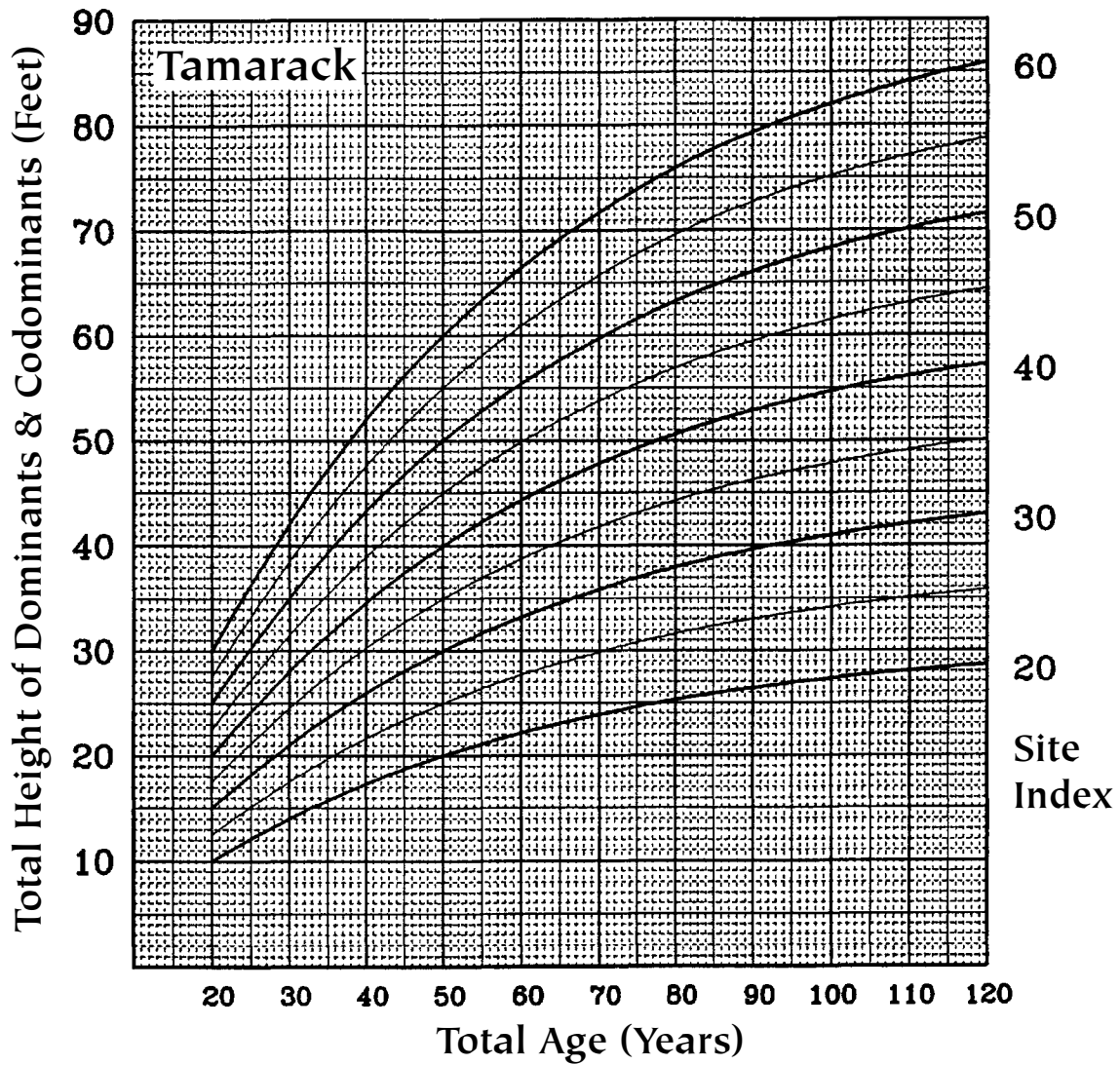


Figure 60.—Tamarack (Gevorkiantz 1957d)
 Minnesota
 Number of plots and number of dominant and codominant trees not given
 Total height and total age, anamorphic, equation not given
 Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):
 SI: 20 30 40 50-90
 Years: 12 10 7 5

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.5470	1.0000	-0.0225	1.1129	0.0000	0.99	0.52	1.4
SI	0.6464	1.0000	-0.0225	-1.1129	0.0000	0.99	0.52	1.4

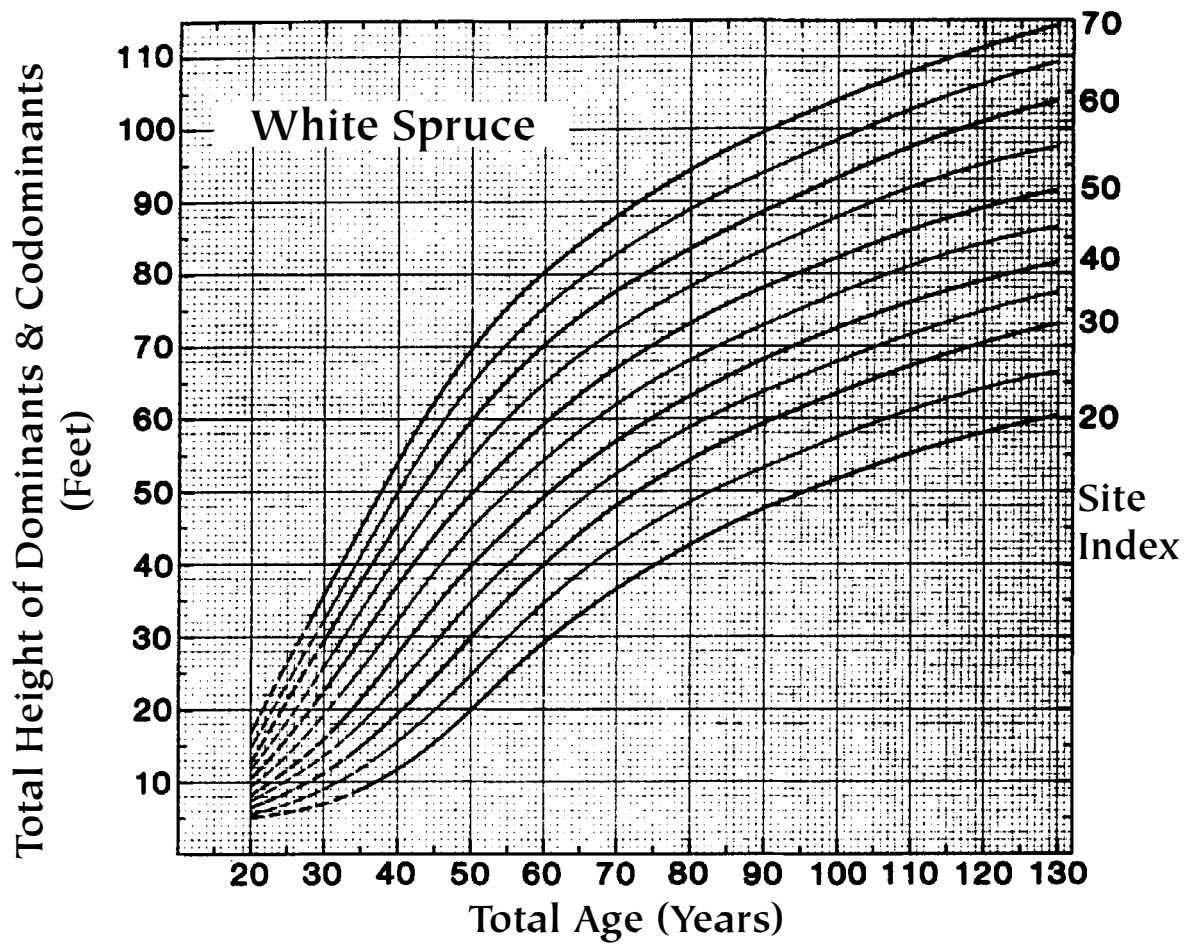


Figure 67.—White spruce (Carmean and Hahn 1981, revision of Gevorkiantz 1957g)
 Minnesota
 Number of plots and number of dominant and codominant trees not given
 Total height and breast height age, anamorphic, Gevorkiantz (1957g) equation not given
 Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):
 SI: 20 30 40 50 60 70
 Years: 15 13 11 10 9 8

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	11.3079	0.5419	-0.0345	34.1568	-0.6078	0.99	2.18	6.4
SI	0.0380	1.5142	-0.0124	-6.4840	-0.3550	0.99	2.29	6.4

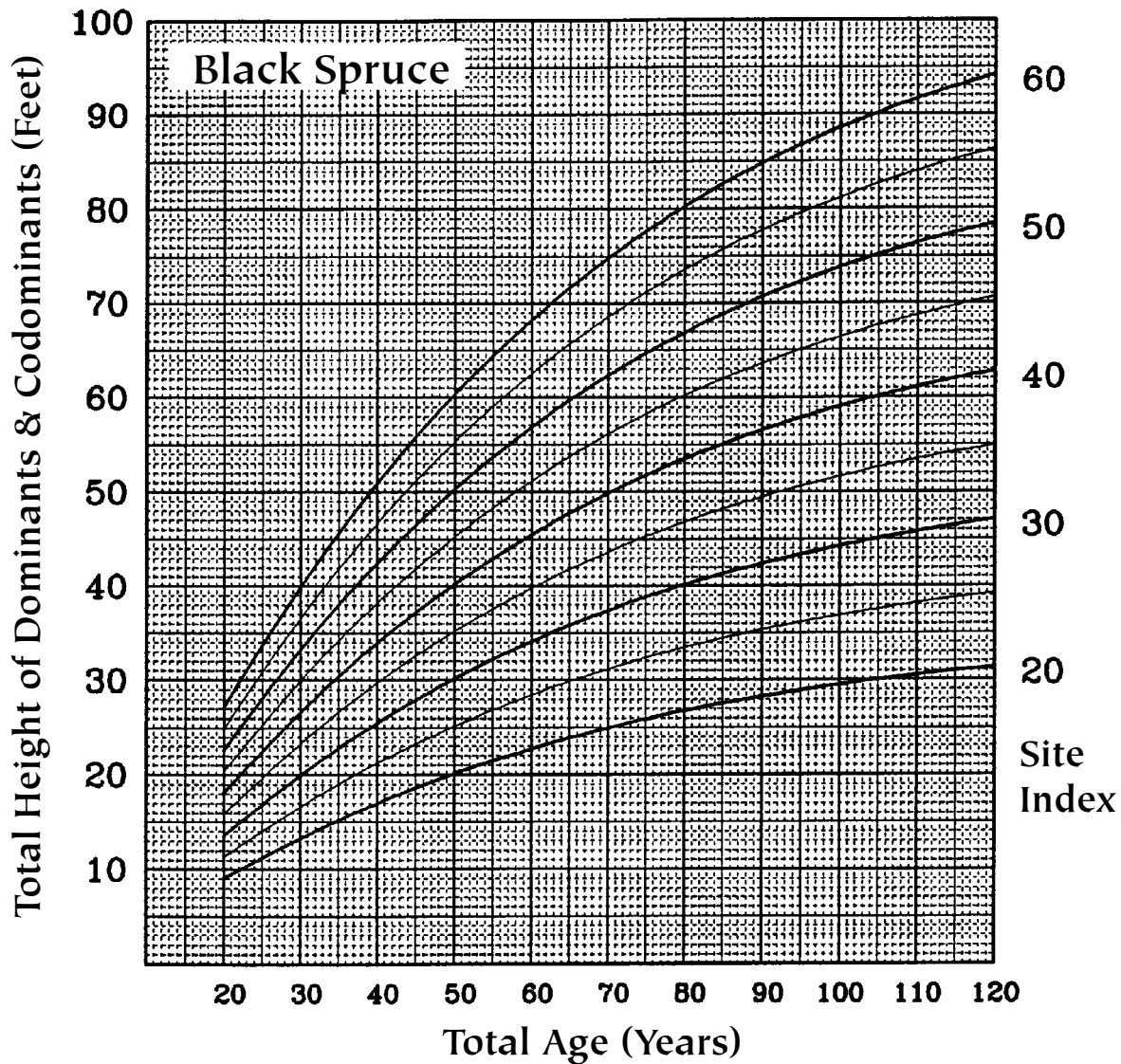


Figure 70.—Black spruce (Gevorkiantz 1957a, derived from Fox and Kruse 1939)
 Northeastern Minnesota—Superior National Forest
 Number of plots and number of dominant and codominant trees not given
 Total height and total age, anamorphic, equation not given
 Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):
 SI: 20 30 40 50 60 70 80 90
 Years: 15 13 11 10 9 8 7 6

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.7620	1.0000	-0.0201	1.2307	0.0000	0.99	0.72	1.9
SI	0.5675	1.0000	-0.0201	-1.2307	0.0000	0.99	0.72	1.9

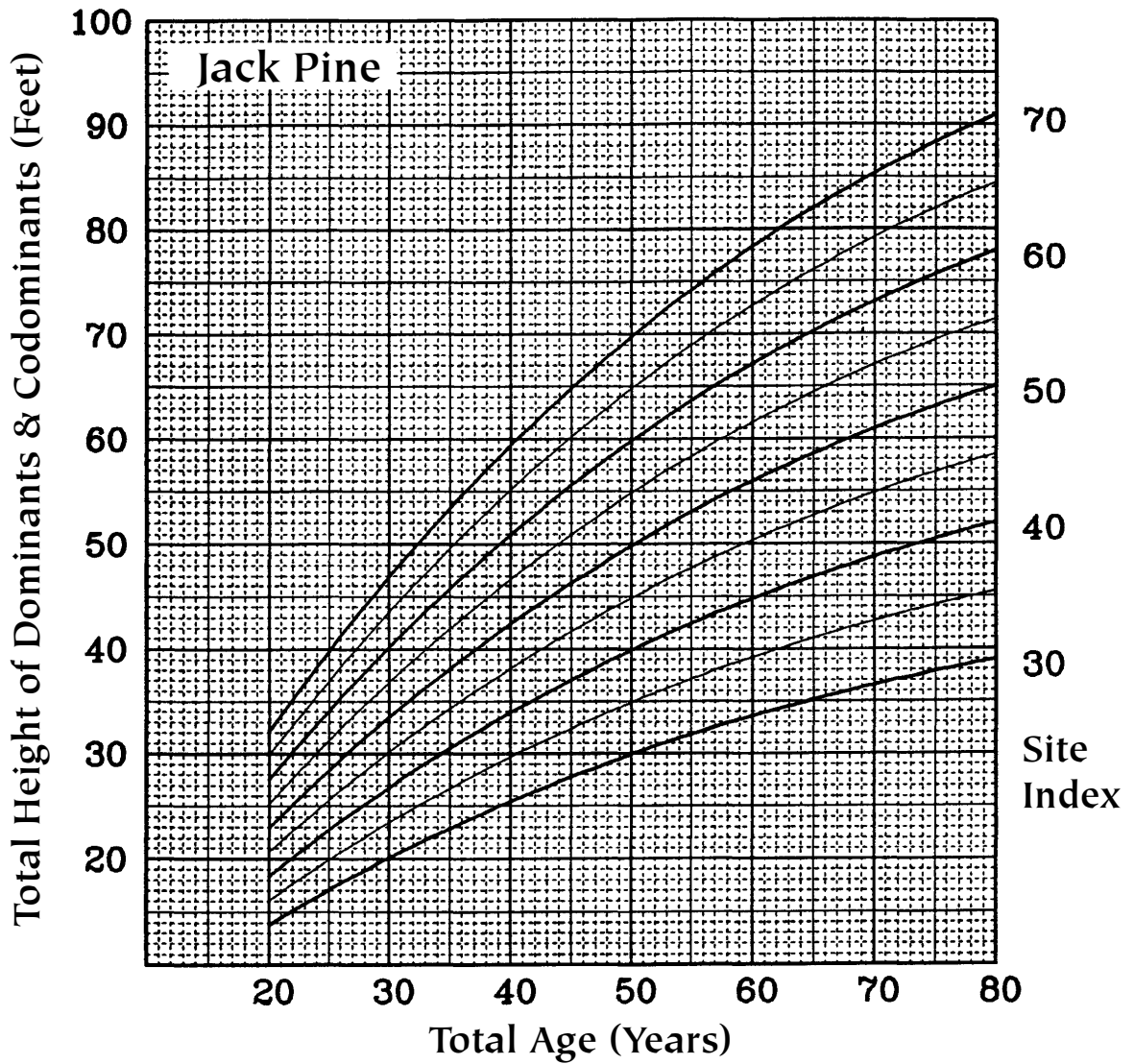


Figure 74.—Jack pine (Gevorkiantz 1956c, derived from Wackerman *et al.* 1929, and from Eyre and LeBarron 1944)
 Lake States
 Number of plots and number of dominant and codominant trees not given
 Total height and total age, anamorphic, equation not given
 Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):
 SI: 30 40 50 60 70 80 90
 Years: 9 8 7 6 5 4 4

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.6330	1.0000	-0.0223	1.2419	0.0000	0.99	0.50	1.1
SI	0.6124	1.0000	-0.0223	-1.2419	0.0000	0.99	0.50	1.1

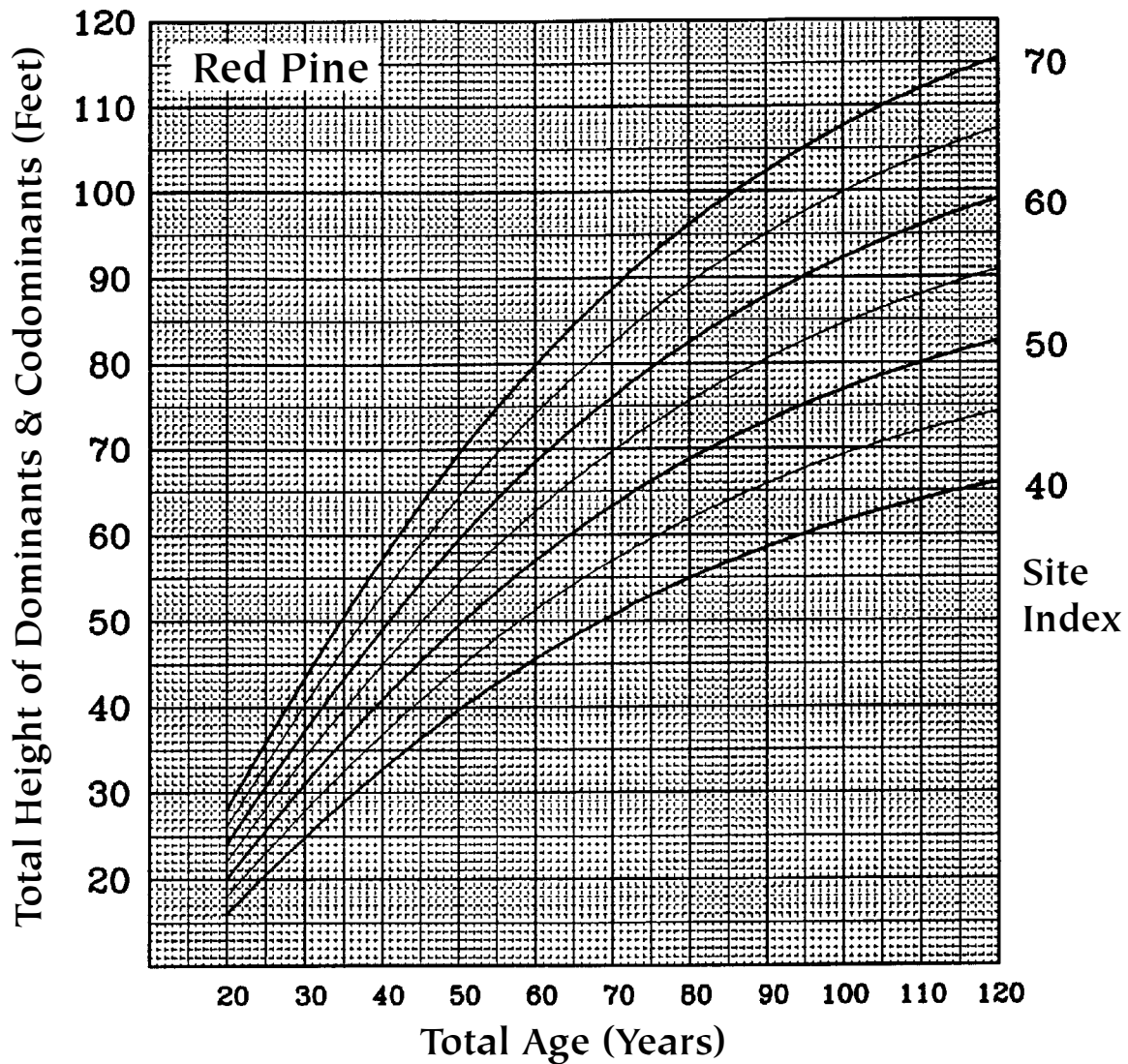


Figure 95.—Red pine (Gevorkiantz 1957c, derived from Eyre and Zehngraff 1948, and Brown and Gevorkiantz 1934)

Minnesota

Number of plots and number of dominant and codominant trees
not given

Total height and total age, anamorphic, equation not given

Convert d.b.h. age to total age by adding years according to
site index (BH = 0.0):

SI: 40 50 60 70+

Years: 8 6 5 4

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.8900	1.0000	-0.0198	1.3892	0.0000	0.99	0.64	1.4
SI	0.5291	1.0000	-0.0198	-1.3892	0.0000	0.99	0.64	1.4

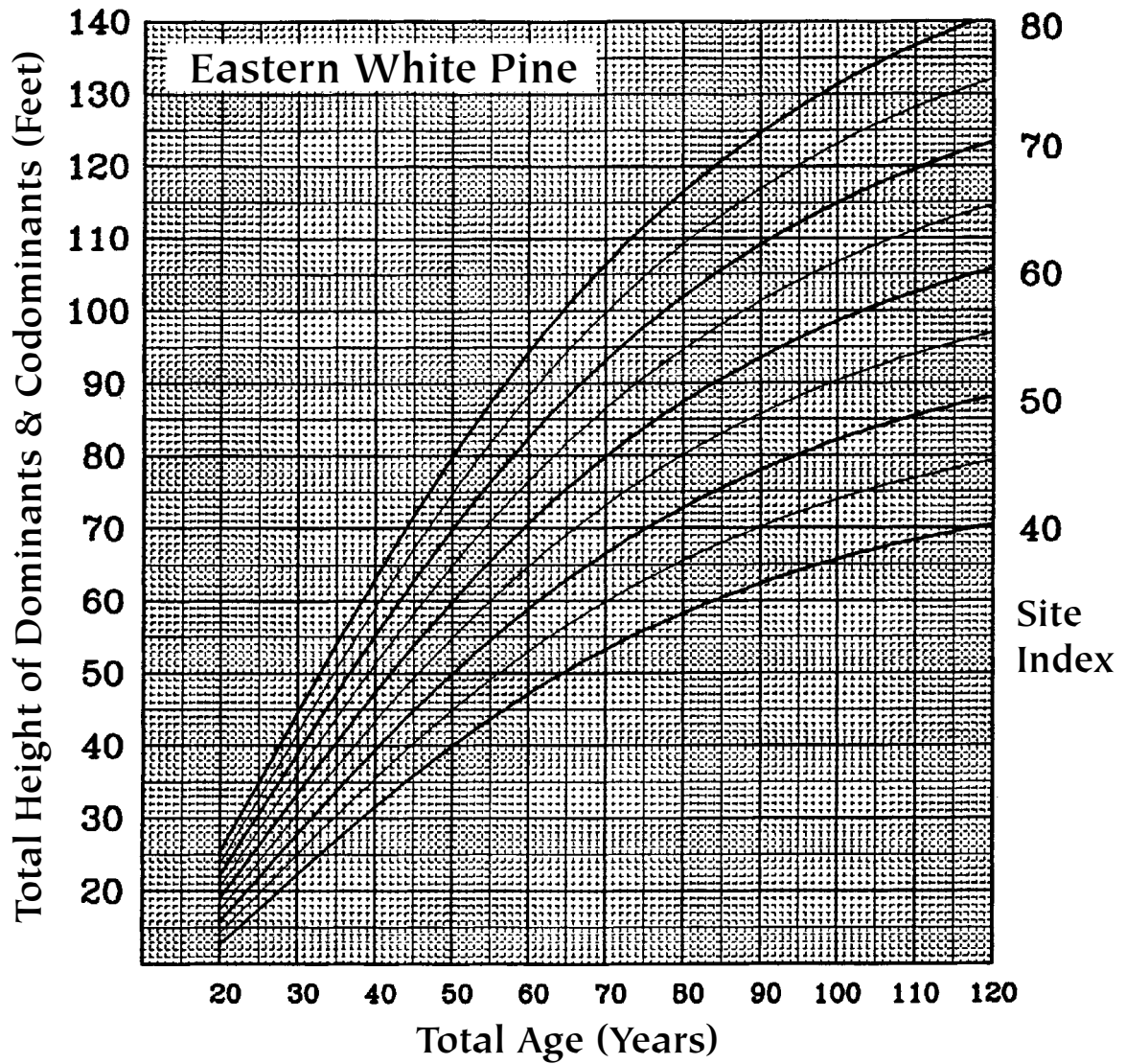


Figure 103.—Eastern white pine (Gevorkiantz 1957, derived from Gevorkiantz and Zon 1930)
 Northern Wisconsin
 92 plots, number of dominant and codominant trees not given
 Total height and total age, anamorphic, equation not given
 Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):
 SI: 40 50 60 70 80
 Years: 12 12 10 8 6

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.9660	1.0000	-0.0240	1.8942	0.0000	0.99	0.66	1.7
SI	0.5086	1.0000	-0.0240	-1.8942	0.0000	0.99	0.66	1.7

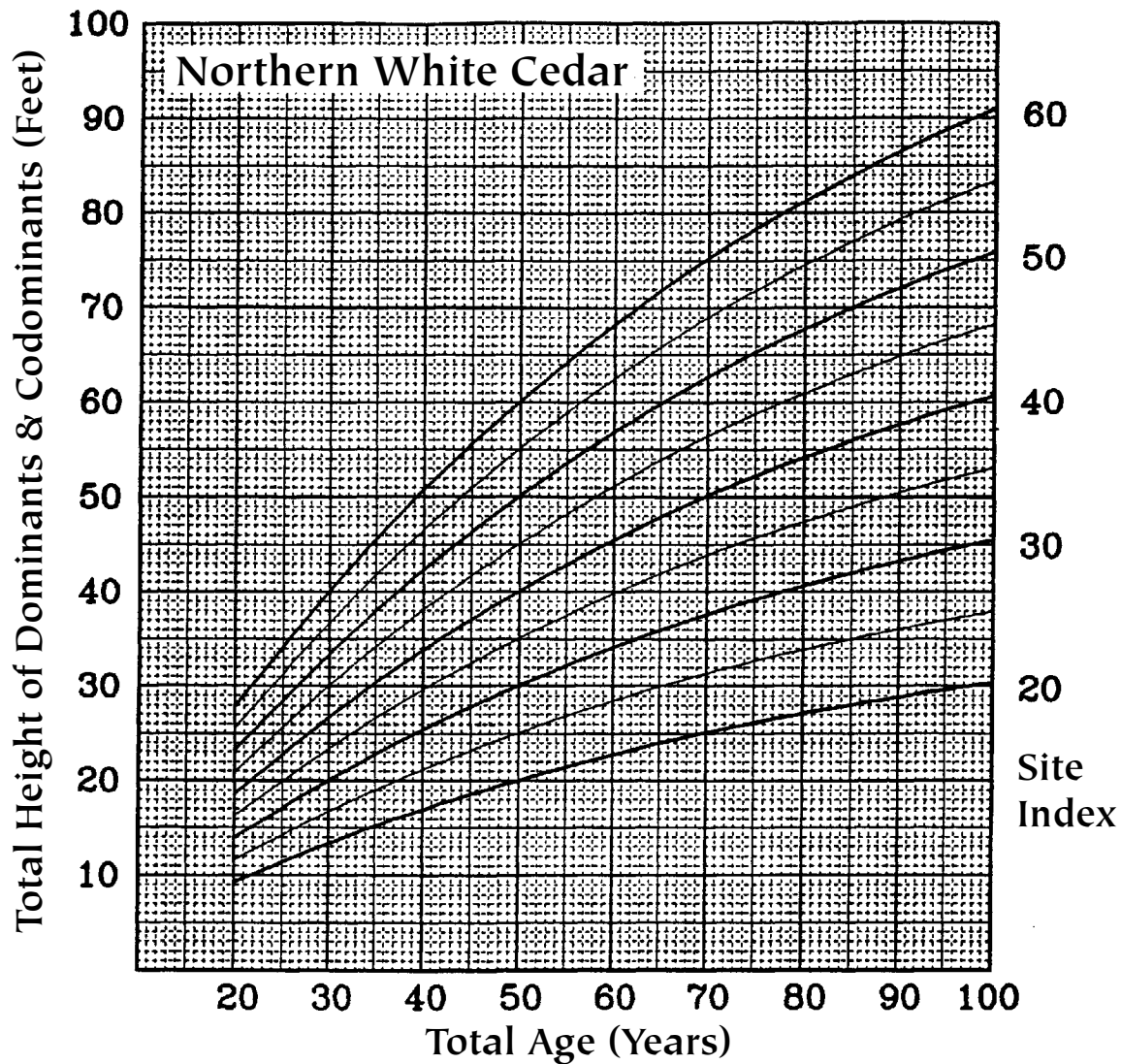


Figure 126.—Northern white-cedar (Gevorkiantz 1957e)
 Lake States
 Number of plots and number of dominant and codominant trees
 not given
 Total height and total age, anamorphic, equation not given
 Convert d.b.h. age to total age by adding years according to
 site index (BH = 0.0):
 SI: 20 30 40 50 60
 Years: 20 15 15 10 10

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.9730	1.0000	-0.0154	1.0895	0.0000	0.99	0.66	1.7
SI	0.5068	1.0000	-0.0154	-1.0895	0.0000	0.99	0.66	1.7

Alterations

Alteration Procedures

An alteration is any change to CSA data or a CSA map made at the area level. You are making the actual changes to your CSA attribute data since FDM (Forest Development Module) was installed in your area computer. For map changes, you are giving instructions to someone else who will be making the digital map changes. As you make your changes, make sure there is a one-to-one

relationship between the stands in your area computer and the stands on the CSA township map. There is no minimum number of alterations per township required in order to have the township processed. New township maps will be made and delivered to the area if there is any change to the township map or township data.

Schedule

Please have your alterations to Grand Rapids by your area's annual alteration date. Contact Resource Assessment if you want to process your alterations prior to doing timber planning and we will schedule an additional alteration date to update your CSA data.

Area	Submittal Date	Area	Submittal Date
Littlefork	January 1	Moose Lake	August 1
Orr	February 1	Hinckley	August 1
Tower	February 1	Lewiston	August 1
Hill City	March 1	Caledonia	August 1
Cambridge	March 1	Preston	August 1
St. Cloud	March 1	Lake City	August 1
Cloquet	April 1	Baudette	September 1
Two Harbors	April 1	Blackduck	October 1
Grand Marais	April 1	Aitkin	October 1
Bemidji	May 1	Deer River	November 1
Bagley	May 1	Effie	November 1
Brainerd	May 1	Hibbing	December 1
Little Falls	May 1	Rochester	December 1
Warroad	June 1	Mankato	December 1
Wannaska	June 1	New Ulm	December 1
Park Rapids	July 1	Wilmar	December 1
Alexandria	July 1	Faribault	December 1
Detroit Lakes	July 1	North Metro	December 1
Backus	July 1	East Metro	December 1
Pequot Lakes	July 1	West Metro	December 1

Alterations to Stands Administered by Other Divisions

Since the implementation of FDM in 1995, the master file for all CSA data in the area resides in the area computer. Attribute changes made to stands administered by other divisions are made at the area computer. Map changes made to stands administered by other divisions should be made on the same photocopy township maps that Forestry uses to show their changes. Alterations to stands not administered by Forestry may be done by Forestry personnel or an agreement may be made with an-

other division to have their personnel change CSA data in the area computer and on the alteration map.

When it comes time for alteration processing, the area has responsibility for delivering error free data to Grand Rapids by their scheduled date. The Division of Forestry area office is responsible for all CSA data within their administrative boundaries.

Map Changes

Map Changes

Use the township photocopy maps provided to you to show map changes.

Show new type lines, labels, inclusions, roads, and streams, etc., in red. Make sure all type lines close upon themselves. When adding linear features such as roads, streams, ditches, railroads, power lines, or pipelines, draw them in with a single red line and identify the line with a comment such as "light duty road," "trail," "drainage ditch," "railroad," etc. If there is any confusion between your red cover type line changes and these linear features, draw the appropriate map symbol instead of a red line.

Acres

Always enter an acre figure when stand area changes. Do not leave the acre field blank or enter "0." Acre figures will be updated when you load the diskette you receive following alterations.

Labels

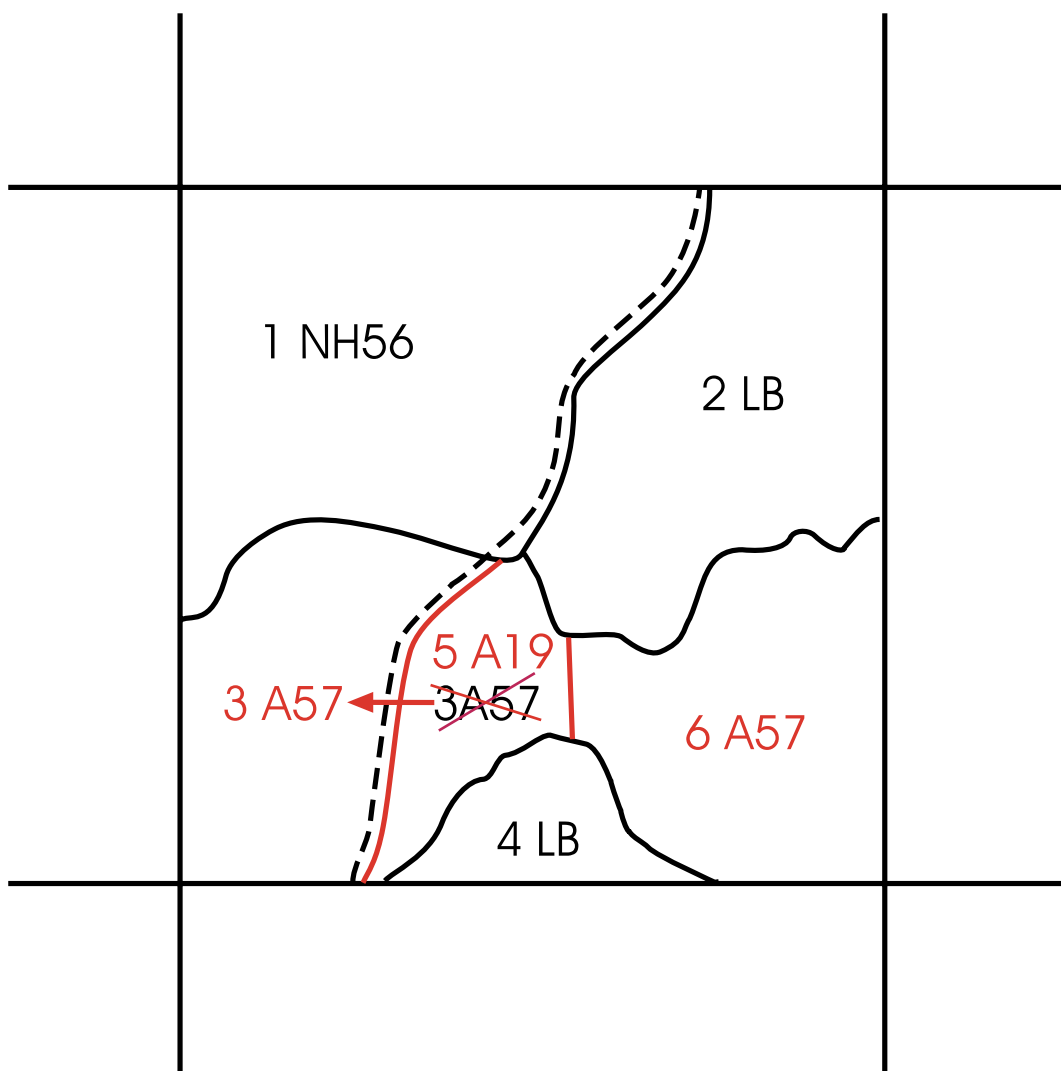
Stand labels on the map are taken from the main cover type, size, and density data in FDM. It is okay to cross out an incorrect label on the map and write in the correct label. This is not what changes the label on the map. Inclusions are an exception to this. To change an inclusion label on the map, cross it out, and write in the inclusion label you want.

Comments

Write any comment on the map you think will make the changes clearer. Use the terms add, delete, and move when making comments about map changes. Make your comments in red. No need for comments such as "change acres for stand 11" since acre changes are automatic.

Add a Stand

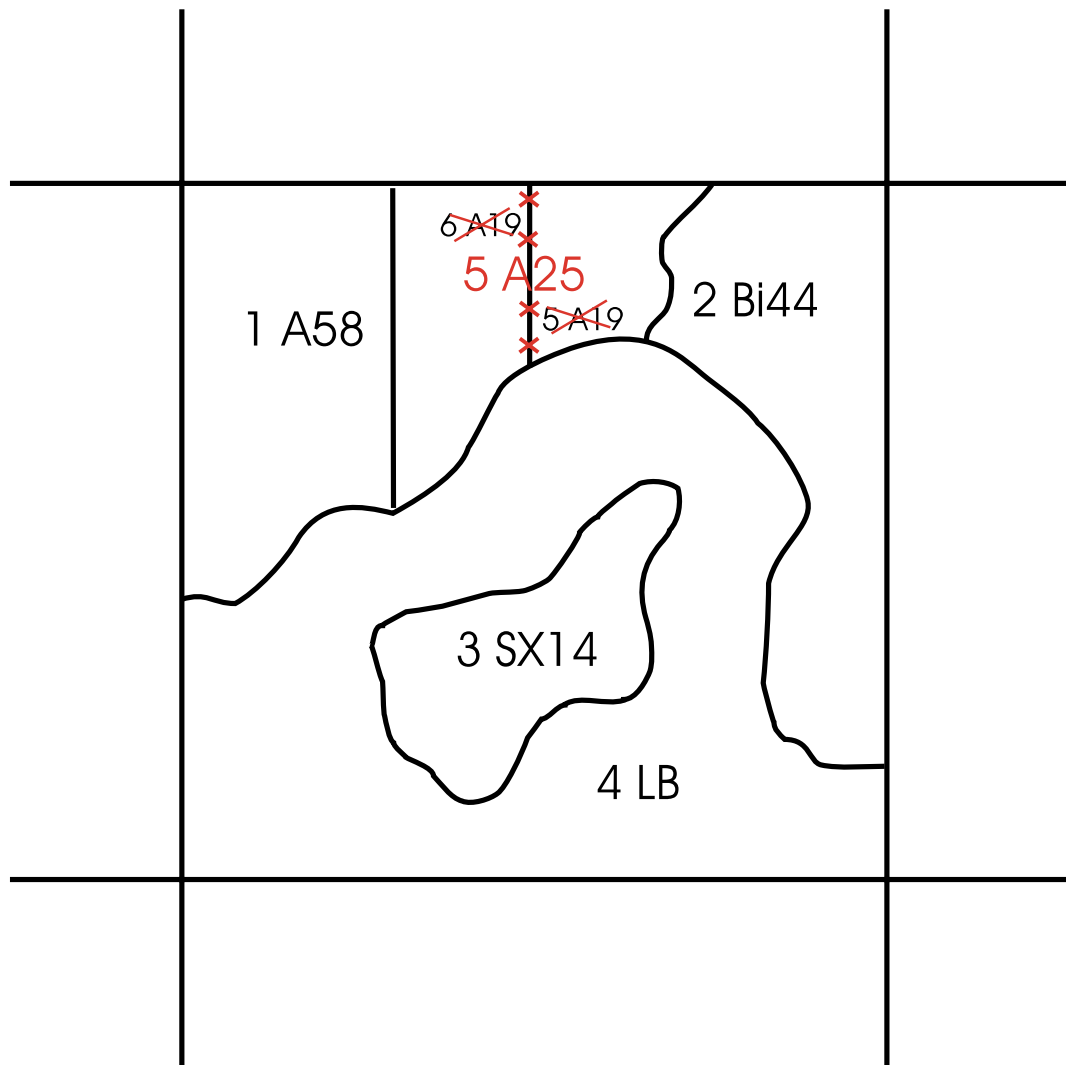
Add new stands by drawing in the new type lines in red. Cross out old type lines with red Xs. Write in new labels in red. The stand number is the critical part of the stand label. The actual main cover type label that appears on the map will come from the data you enter into the area computer. As you add (or delete) stands on the map, be sure you add (or delete) the corresponding stands in FDM. As you add (or delete) stands in FDM, be sure that you add (or delete) the corresponding stand on the map.



- Part of stand 3 A57 is harvested, creating new stand 5 A19.
- Label for stand 3 A57 is moved.
- New stand 6 A57 is created when original stand 3 A57 is split by harvest. Data is copied from stand 3 A57 to stand 6 A57 using the “copy function” in FDM.
- Acre figures for stands 3, 5, and 6 are updated. Don't spend a lot of time calculating acre figures. The number you enter will be overwritten by the computer-generated acre figure if the two are different.

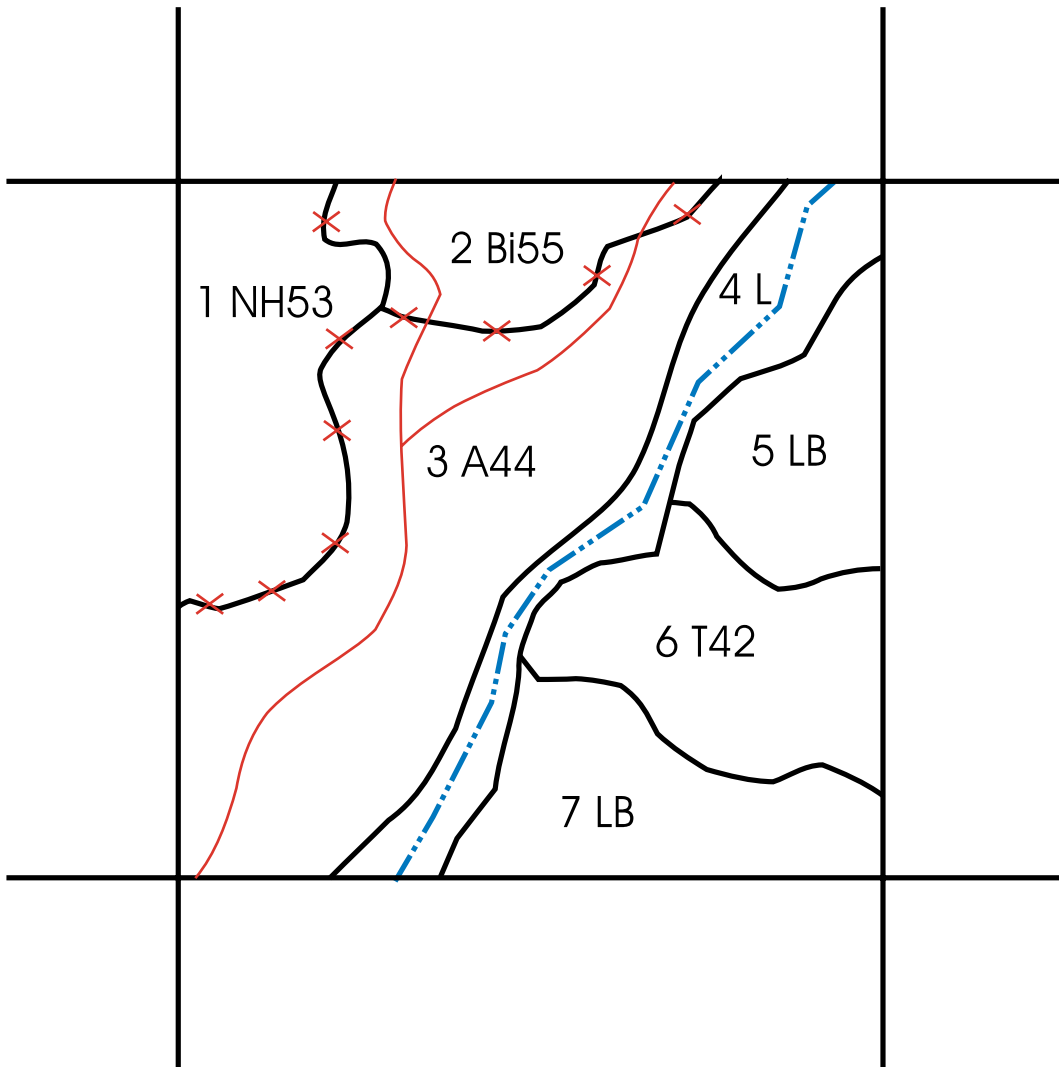
Delete a Stand

Use red **X**s to delete lines, labels, inclusions, roads, streams, etc. **Do not use white-out.** The deleted lines, labels, inclusions, roads, and streams need to be seen by the digitizer to be removed. You may reuse stand numbers once they have been deleted. Stand numbers may only be used once per section on the map. FDM will not allow you to duplicate numbers in your area data. Make sure that the stand number on the map corresponds with the correct number and data in the area CSA data.



- Stands 5 A19 and 6 A19 are combined as stand 5 A25. Stand 6 A19 is deleted in FDM.
- Acre figure for stand 5 A25 is updated.

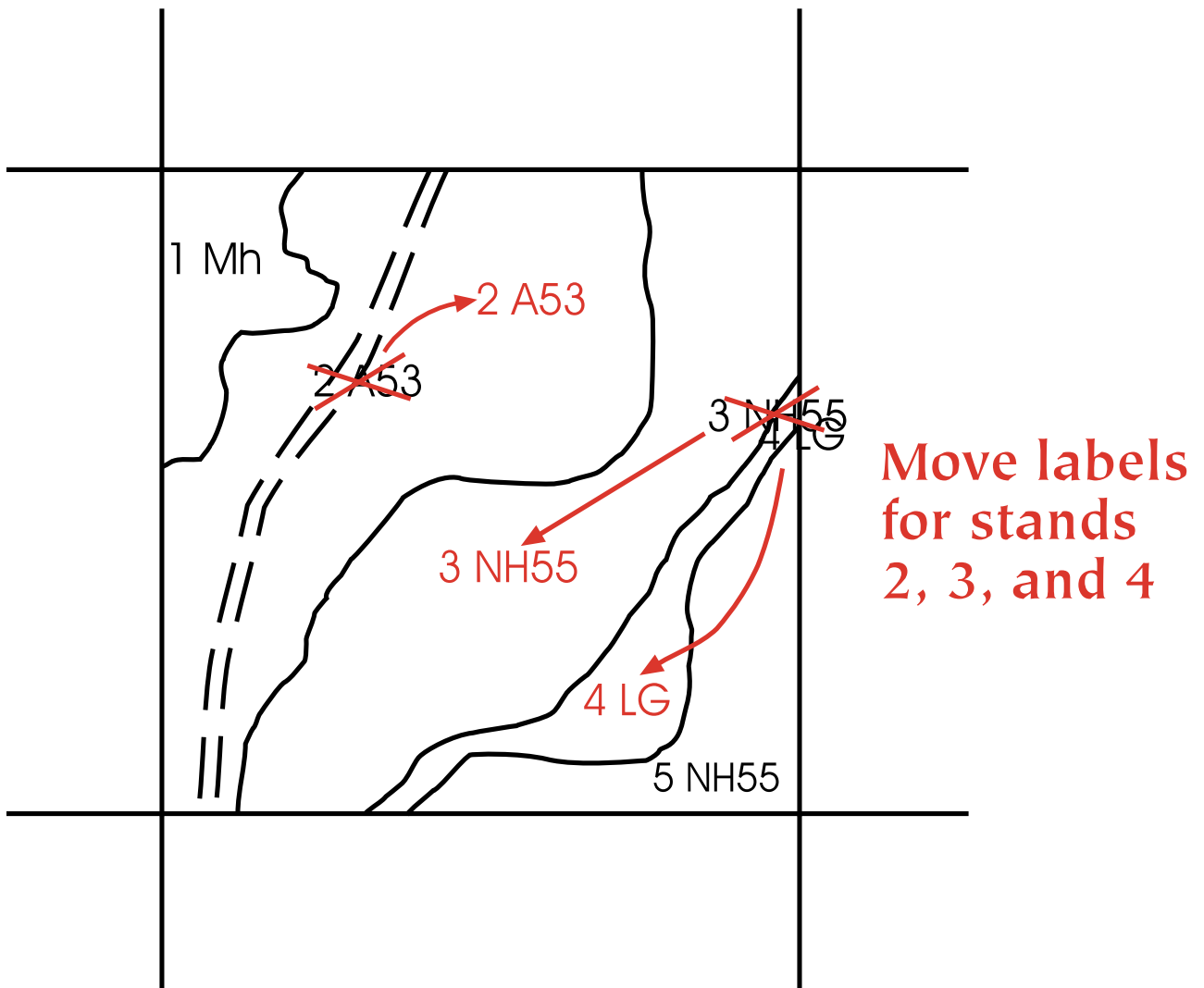
Change Type Lines Without Adding or Deleting a Stand



- Type lines are changed for stands 1 NH53, 2 Bi55, and 3 A44.
- Acre figures for stands 1 NH53, 2 Bi55, and 3 A44 are updated. No other changes are made to the data for these stands.
- Be sure labels still lie within their appropriate stands as type lines are changed.

Moving Labels

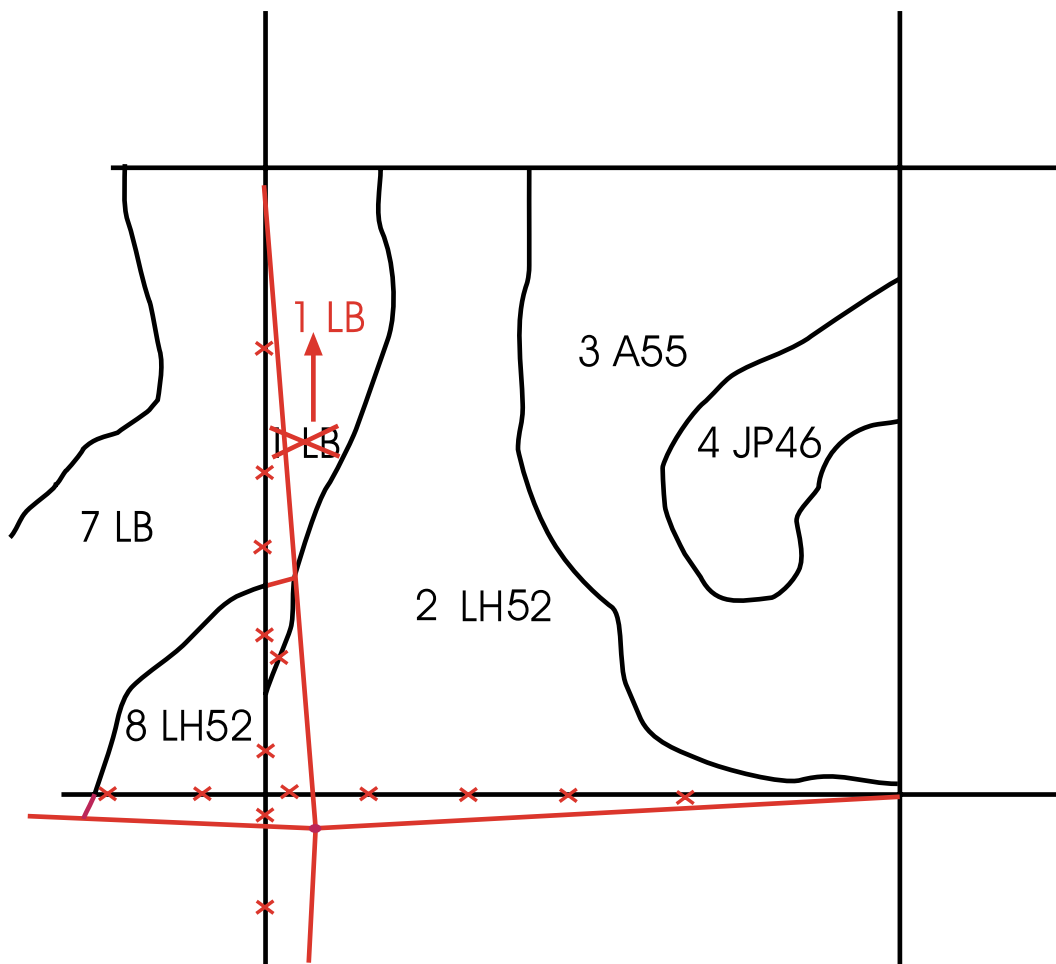
Make sure your cover type label stays in the stand it pertains to. As you move type lines on the map, you may also have to move their label. Move labels by crossing out the old label and writing in the new label. Draw an arrow from the old label to the new label with the comment "move this label." The actual label point is slightly below and left of the cover type label.




- Map changes only. No change to data.

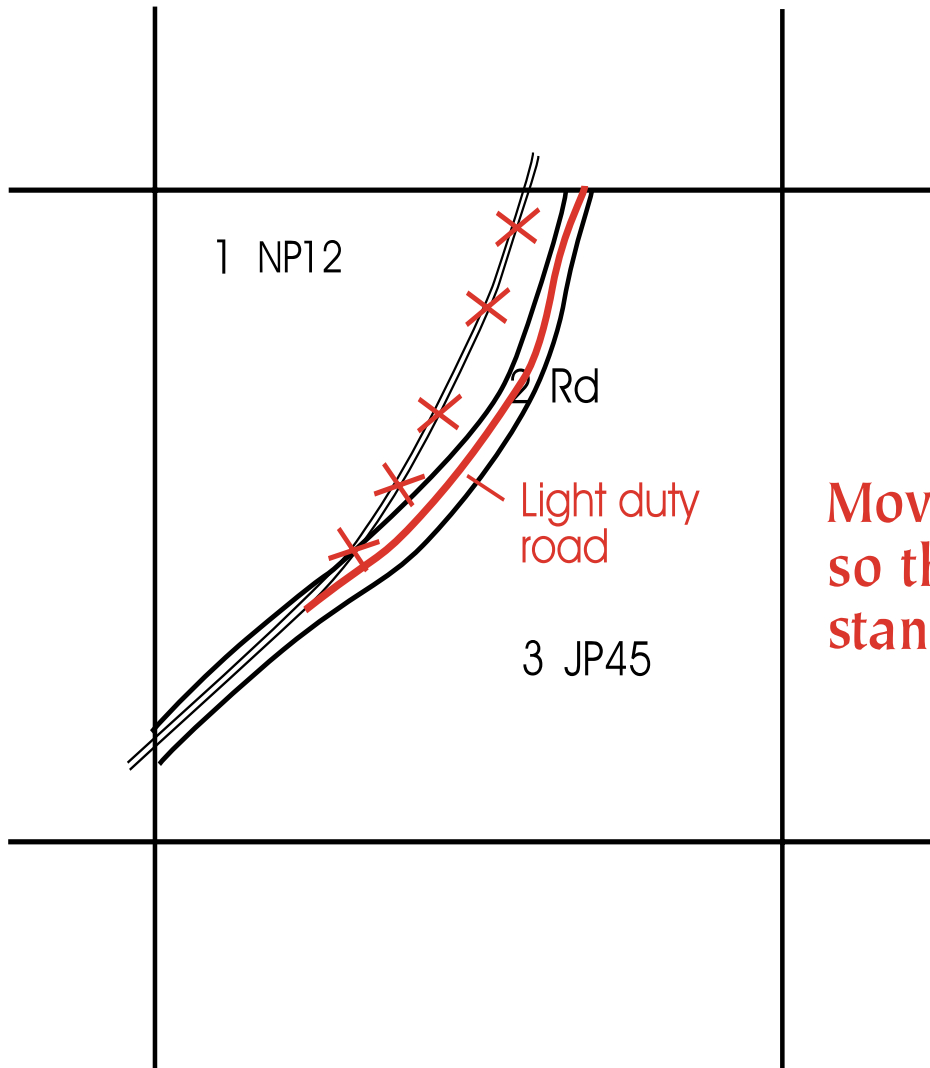
Corner Change

You may change the location of a corner if you are sure the location on your map is incorrect. Redraw all the changed section lines in **red** to define the new corner location. Delete the old section lines using red **X**s. Change any type lines or labels affected by the changed section lines. A map symbol will show the location of the original USGS corner.



- Redraw the corrected section lines that define the corrected corner.
- Delete the old section lines.
- Add type lines so that all type lines close.
- Delete type lines that are no longer accurate.
- Move label for stand 1 LB so that it lies within the appropriate stand.
- Acre figures for stands 7 LB, 8 LH52, 1 LB, and 2 LH52 are updated in FDM.
- This symbol  will mark the location of the original USGS corner. You do not need to add this symbol—it will be done automatically.

Move a Map Symbol so That it Lies Within the Right Stand

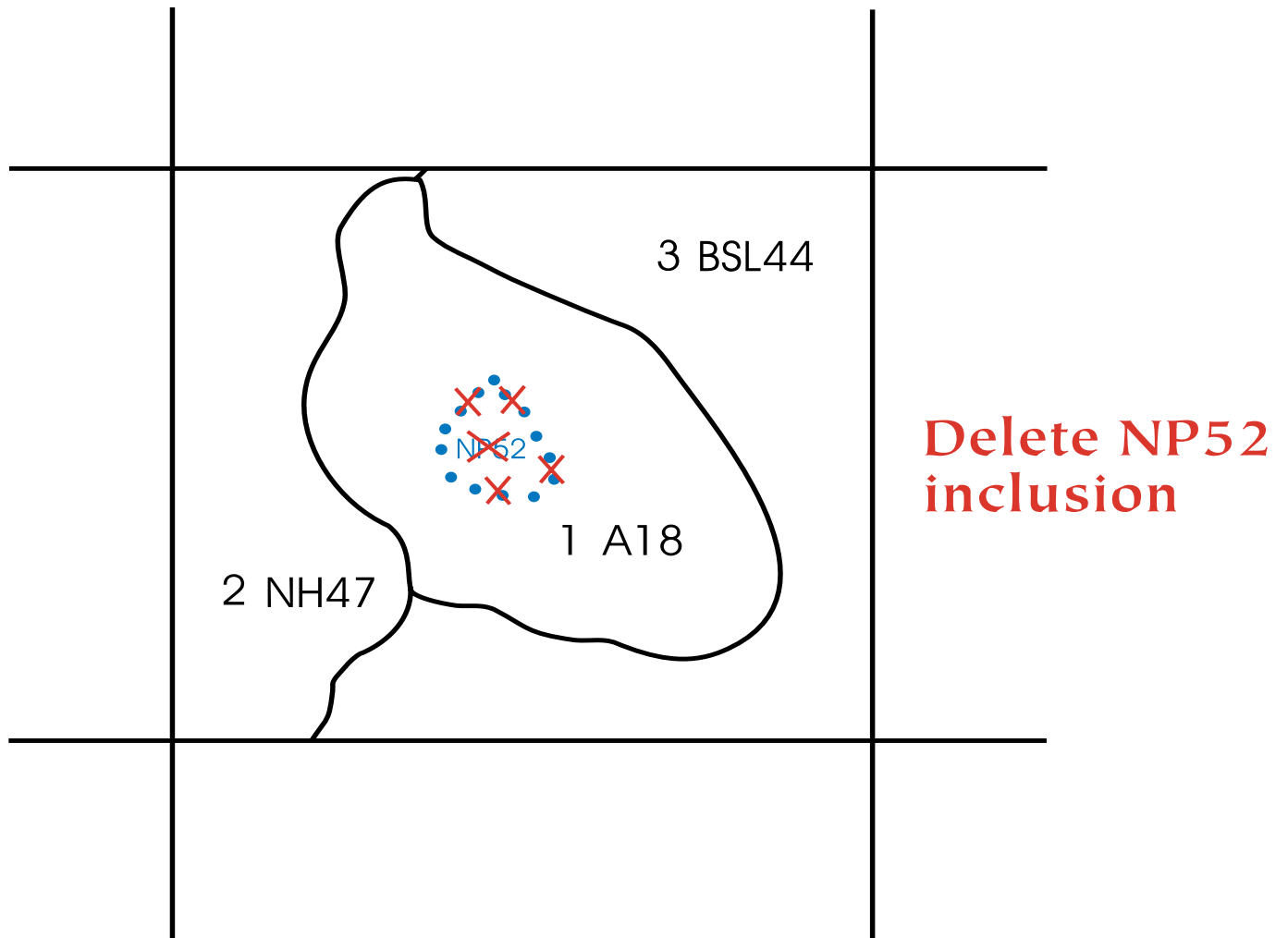


**Move road symbol
so that it lies within
stand 2**

INCLUSIONS

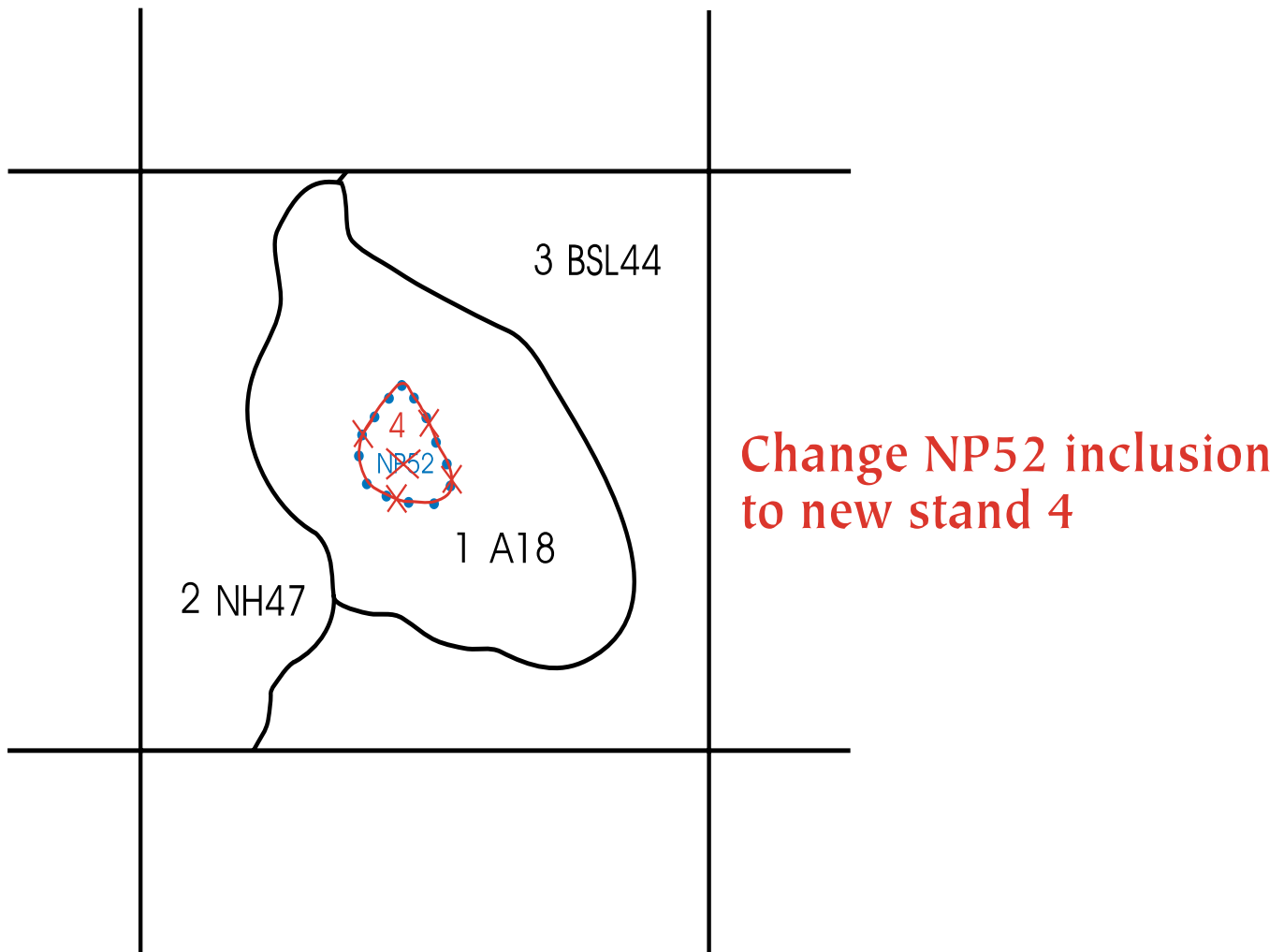
There will be no such thing as an inclusion in the new inventory system (FIM/FORIST). Minimum stand size is now one acre. Do not create any new inclusions. Eliminate existing inclusions when ever possible. Inclusions will be converted into stands or eliminated when the new inventory system is implemented. We will continue to maintain existing inclusions until the new inventory system is implemented. Alter existing inclusions as shown on the following pages:

Delete an Inclusion



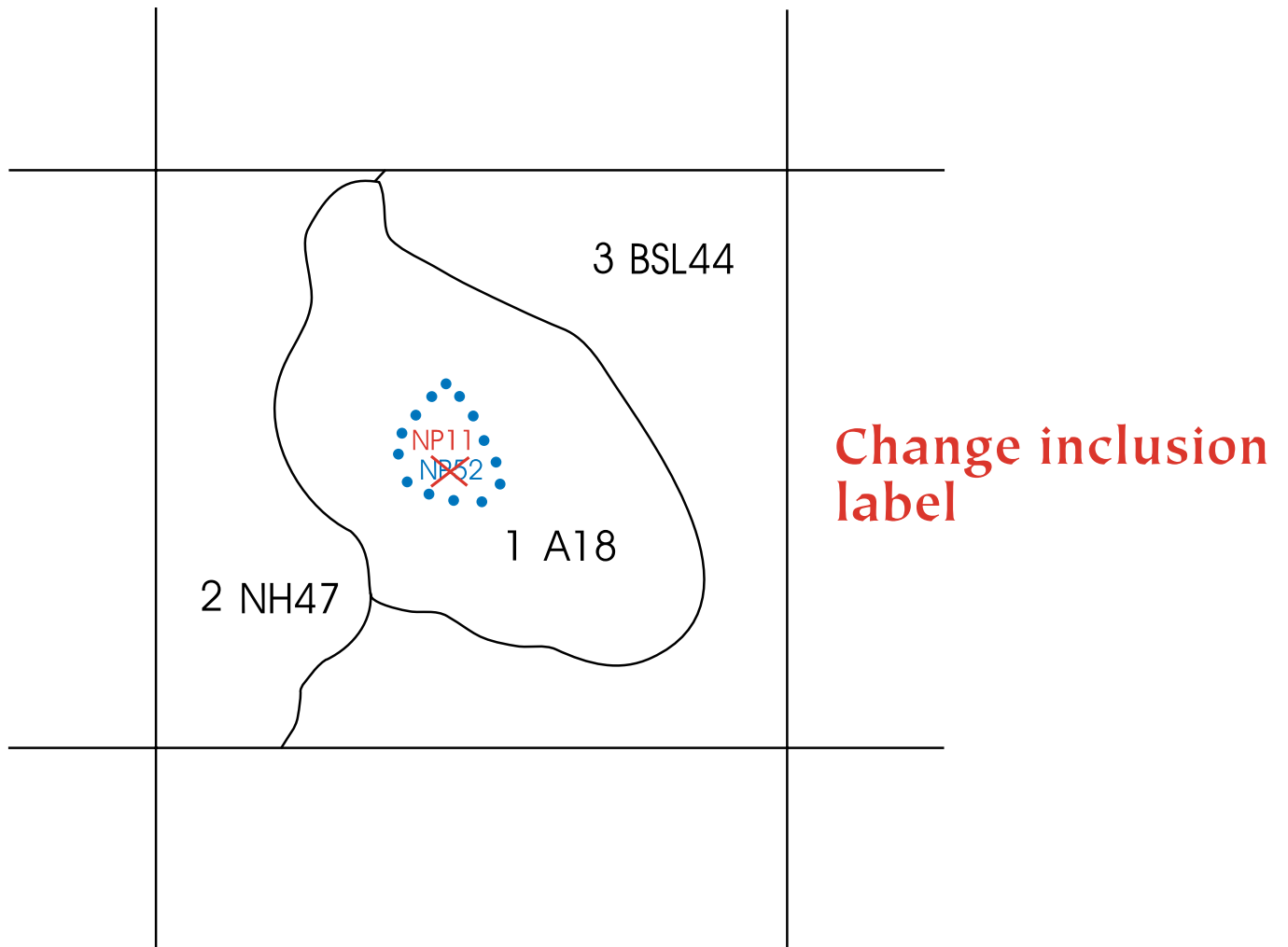
- No acre change to stand 1.
- Change stand data for stand 1 to reflect deletion of inclusion.

Convert an Inclusion Into a Stand



- Add stand 4 to your CSA data.
- Change acre figure for stand 1.
- Change stand data for stand 1 to reflect elimination of inclusion from the stand.

Change an Inclusion Label



- Change stand data for stand 1 to reflect change in the inclusion.

Attribute Changes

Changing CSA Attribute Data

Introduction

This chapter will cover the FDM procedures for doing CSA alterations. It is pertinent to state land only as private stand data is not part of the division's corporate CSA database.

The FDM part of the alteration process consists of creating new stands and modifying, deleting, splitting, or combining stands that have changed over the last year. This is an ongoing process that occurs throughout the year. When it is time to do the area's alterations, the FDM error check routine must be run to determine if the altered CSA data is error free. If not, the errors must be corrected. Then, the error check is run again to make sure all the data is accurate. If it is, a disk of the clean CSA data is sent to the Grand Rapids Resource Assessment Unit along with the map changes that have occurred over the past year. When the alterations are done, a disk is sent back to the area that contains the data for any stands which have revised acres due to changes to the maps and any stands that don't have data attached to them.

When you finish this chapter, you will be able to do the following:

- Create a new CSA stand
- Modify CSA stand data
- Delete a CSA stand
- Split a CSA stand
- Combine CSA stands
- Run the alteration error check

- Create a disk of altered data
- Load the updated acres and unlabelled stands into the FDM

You will also know the answer to the following questions:

- What is meant by the "master" database?
- What are unlabelled stands?

Terms

You will need to know the following terms to learn the material in this chapter:

Attribute Data

The data that describes something. For example, the CSA stand data is the attribute data that describes a stand. Attribute data is kept in a database and has an identifier or link with the item it identifies. The stand ID is the link between CSA stand data and associated data in other tables and the CSA stand maps.

Record/Row

Used in database management to denote a complete unit of related data items. Record is synonymous with "row." For example, all the information about a single CSA stand is a record or row in the CSA database.

Key Concepts

An understanding of these concepts is necessary to use the FDM to do CSA alterations.

What is meant by the "master" database?

The term "master" refers to the official database. In the case of the CSA database, the area FDM program holds the "master" CSA database for the area. It is the official copy of the CSA data for the area to which changes (alterations) are made. No one else has an official or valid copy of it. Of course copies can be made, but they have no official standing and any changes made to them can't be accepted as valid.

Two key elements of the concept is that **the area is responsible for the accuracy and completeness of the data. The area is also responsible for the security of the data.** If the database is lost or destroyed on the area FDM computer, no one else can replace it because no one else has a valid copy of it. A copy of the area database will be kept in St. Paul, but it will only be accurate as of the last inventory alterations window for the area. The St. Paul copy will not have any of the changes made throughout the year by the area because the area is the only place where changes can be made to the data. Therefore, **it is vital that the area keep**

adequate backups of the FDM data.

What are unlabelled stands?

Unlabelled stands are created when a stand on a CSA map doesn't have any attribute data associated with it. This happens when mistakes are made while drawing cover type lines and an extra stand is mistakenly made on the map. The same mistake can be made during the digitizing process, which is essentially drawing the maps in the computer. It also happens when a new stand is drawn on the map and the forester forgets to enter the associated attribute data into the FDM (a new stand is not created).

The mistakes are usually uncovered during the alteration process when the GIS matches all the stands on the maps with their associated attribute data. A list of unlabelled stands is part of the data sent back to the area after the alteration process. The area must correct the situation by creating the attribute data or redrawing the cover type lines on the map so the extra stand is eliminated. The corrections will be captured by the GIS during the next alteration window.

Should completed projects and regeneration surveys ever be deleted?

Completed project and regeneration survey data is historical data for a stand and should be kept for reference. The FDM was designed to make historical stand activity data available for analysis and planning purposes.

There is probably only one reason for deleting a completed project or regeneration survey. If a stand number changes, the related project and regeneration survey data will no longer be

valid because their stand IDs will not relate them to the correct stand. You should recreate the project and regeneration data with the new stand ID. Then the old project and regeneration data can be deleted.

Doing CSA Inventory Alterations Overview

Managing CSA data for the alteration process

Keeping CSA data current so it is ready for the yearly alteration "window" goes on all year long. The process consists of:

- Creating new CSA stands
- Modifying existing CSA stand data
- Deleting CSA stands
- Splitting a CSA stand into two or more stands
- Combining two or more CSA stands into one stand

Whenever a field inspection, project, or natural disaster changes a stand's condition, some sort of change to the CSA data is necessary (see the *CSA Inventory Manual* for the policy and procedure on when a stand should be altered).

This overview will tell you how to do these changes to the CSA data in the FDM. You will have to determine which specific set of directions or combination of directions you need to accomplish the changes. For example, the process of splitting a stand consists of creating a new stand, estimating its acres, and updating (estimating) the acres in the original stand. You would use the directions to create a stand and modify a stand. The exact acres for both stands will be determined from

the cover type map during your alteration window.

Creating new CSA stands

Each CSA stand has to have an associated Supplemental Stand Data record. In fact, the supplemental stand record must be created before a CSA stand can be created. Start at the main menu and select *Stand Information and Supplemental Stand Data*. You will be at the first Supplemental Stand Data screen in the database. A new supplemental stand record must be created before a new CSA stand can be created. This is to ensure that a supplemental stand record exists for each CSA stand. Therefore, the process to create a new CSA stand starts at the Supplemental Stand Data screen. It doesn't matter which supplemental stand you start from.

The bottom prompt line has the instructions for "Add a New Stand." The cursor is placed at the Stand # field of the stand ID. To create a new stand, you must enter a new stand ID. The stand ID is composed of: **Stand # - Section - Twp - Rge - E/W - County - Owner - Landowner**. The Owner is always "1" and the Landowner is always "0000000" for state land stands. The stand ID has to be "validated" or checked against the CSA database to make sure there isn't another stand with the same ID. This has to be done before data can be entered. A message in red will tell you that the new stand will be added to the supplemental and the CSA tables. If the stand ID is a duplicate, it won't be accepted and a message will say "This Stand is Already Recorded."

At this point the only data in the supplemental stand record is the

stand ID. Now you can enter any other supplemental data you have. You do have to add data to the new CSA stand since the only data in it at this point is the stand ID. From the F10 - Options Menu, pick the "Jump to CSA" option to go to the new CSA stand. You will "jump" to the new CSA stand. Switch to "modify" mode to add the rest of the stand data.

With the exception of the "Owner" and "Landowner #," the CSA data is the same as that entered on a CSA "Green Sheet." **See the CSA Manual for data definitions.**

"Acres" and "Stand Age - Survey" must have three characters entered in them. Enter a "0" in front of the number if it is only two characters. (e.g., "020" for 20 years; 099 for 99 acres). Current stand age is calculated for you. It is (today's year) - (year of survey) + (stand survey age).

Fields with a red * next to them have a pop-up code table you can use to pick the code you want. Use it to make sure your entries are accurate. The "Last Update" and "By" fields are automatically filled in from the system date and Forester ID code table.

Modifying CSA stand data

These directions will teach you how to modify data in an existing CSA stand. Start at the main menu and select **Stand Information and CSA**. This will take you to the first CSA record in the database. You must use the F10 menu "Search for a desired stand" function to find the record you want to modify. You will be prompted to enter the stand ID of the stand you want to find.

If you enter all the information for a stand, the search will find the single stand in the database with that stand ID. You will get a message saying "No match found" if the stand doesn't exist in the database. You can also enter just part of the stand ID to make the search more general. This is useful if you don't know the full ID for the stand. For example, if you entered "01" for stand # and "16" for section, the search will find the first occurrence of stand # "1" in section "16." Use the "Search Next" function to search through the stands that meet the search criteria.

When you find the stand to modify, switch the screen to "modify" mode and make any necessary changes. With the exception of the "Owner" and "Landowner #," the CSA data is the same as that entered on a CSA "Green Sheet." **See the CSA Manual for data definitions.** The F10 - Options Menu has instructions for moving around the screens.

Fields with a red * next to them have a pop-up code table you can use to pick the code you want. Use it to make sure your entries are accurate. You will get a "beep" and/or an error message if you try to enter letters into fields that can hold only numbers and visa versa.

Deleting a CSA stand

Every CSA stand has an associated Supplemental Stand Data record. A CSA stand can't exist without its associated Supplemental Stand Data record. **Deleting a supplemental stand record also deletes its associated CSA stand.** This is the only way to delete a CSA stand from the FDM. *Be sure that you want to*

delete the CSA stand. Once you delete the supplemental stand, it, and its associated CSA stand, is gone for good. The only way to recover them is to recreate them or from a backup of the database.

Start from the main menu and select **Stand Information and Supplemental Stand Data**. This brings you to the first supplemental stand record in the database. Use the F10 menu "Search for a desired stand" function to find the stand you want to delete.

Switch the screen to "modify" mode so you can delete the supplemental stand and its associated CSA stand from the FDM. Select the "Delete Stand" option from the bottom prompt line. A window will pop up in the middle of the screen with a "Cancel" or "OK" option. Select "OK" to delete the supplemental stand and its associated CSA stand. Select "Cancel" if you don't want to delete the stand. Once you delete the supplemental stand, you will end up at another supplemental screen. You can escape back to the menus or repeat the process to delete another stand.

Splitting a CSA stand into two stands

You will need to split a stand into two stands when the stand conditions on part of the stand change enough so that it is not the same stand anymore. This could happen when just part of the stand is harvested, regenerated, or has some type of management done on it. Other causes for splitting a stand could be a fire, wind storm, insect and disease infestation, or other natural disaster that effects only part of the stand.

The process of splitting a stand consists of modifying the current stand and creating a new stand for the part of the stand that changed. Here are the steps involved.

- **Modify the existing stand.** Use the directions in the “Modifying CSA Stand Data” section in this chapter. In most cases the only modification necessary will be to change the acres. Remember, the acres figure you enter is an estimate. Actual stand acres are calculated from the maps during the alteration process.
- **Create a new stand.** Use the directions in the “Creating a New CSA Stand” section in this chapter. You must assign a new stand number to the stand.

These directions refer only to the alterations work that is done in the FDM. You must also make the appropriate map updates. The directions also assume that the only reason you are creating the new stand is to update the CSA inventory. If you also plan to do some management on the new stand, go to Chapters 6, 7, and 8 of the *FDM Manual* for the appropriate directions.

Combining two or more CSA stands into one stand

You will need to combine two or more stands into one stand when the stand conditions on all the stands change enough so that they are all the same. This could happen when two or more stands are harvested, regenerated, or have some type of similar management done on them. Other reasons for combining stands could be a fire, wind storm, insect and disease infestation, or other natural disaster that effects two or more stands and leaves them in the same condition.

The process of combining stands consists of modifying one of the stands to represent the new stand and then deleting the remaining stands. Here are the steps involved.

- **Modify one of the existing stands.** Use the directions in the “Modifying CSA Stand Data” section in this chapter. In some cases, the only modification necessary will be to change the acres because the other stand(s) will have changed to match the stand you are modifying.
- **Delete the extra stand(s).** Use the directions in the “Deleting a CSA Stand” section in this chapter. Make sure you really want to delete the stand(s). The only way to get them back is to recreate them or from a backup of the database.

These steps refer only to the work that is done in the FDM. You must also make the appropriate map updates.

The deleted stand(s) may have had management work done on them. Data about the work would be contained in Project Summaries and Prescription Detail, Contracts, and Regeneration Surveys. **Once you delete the stand(s), all the associated historical data will no longer be related to the correct stand and it will have no value as historical data for the stand(s). If any of the data is applicable to the combined stand, you should create new projects, regeneration surveys, and contracts for the new combined stand.** Only then can you safely delete the projects, regeneration surveys, and contracts that were from the deleted stands.

Running the alteration error check

Run the alteration error check anytime changes are made to the CSA data. This ensures that your data is always accurate and avoids a large clean-up project just before your alteration window. The program checks the stand data to make sure it meets CSA inventory standards for accuracy and completeness. For example, if you had entered “16” as a stand’s cover type, the error check program would tell you that it was not a valid cover type. Only when the error check report says that all the data is clean can you send the data disk, the error check report, and the updated maps to the Resource Assessment Unit to have your alterations processed.

This routine creates the error check report and a disk with your CSA data on it. Start at the main menu and select *Utilities: Alterations Processing and Edit/ Create Alterations File*. Respond to the questions and prompts asked about floppy disk drives and your printer. The error check routine will check all your CSA data and print the error report on your printer. It will also copy a file of your CSA data to the floppy disk.

If the error report shows no errors in the CSA data, you are done and the error check report, disk, and maps can be sent to the Resource Assessment Unit for alterations processing. If there are errors, you must correct them and run the error check routine again. **The Resource Assessment Unit will not accept the disk and maps until your error check report shows the data is clean. Also, the date and time on the CSA disk file and the report date and time must be the same to**

guarantee that the data file is truly error free.

Remember, you must send the following items to the Resources Assessment Unit before your alterations will be processed.

- The error check report showing no errors.
- The disk with the CSA data file on it (the file date and time must match the error check report date and time).
- Updated maps.

Loading updated acres and unlabelled stands into the FDM

This routine is done after your area's alterations have been processed and you receive the alteration products back from the Resource Assessment Unit. One of the products will be a disk with the data to update the acres on your FDM CSA data. Acres will need to be updated on some of the altered stands because changes to the cover type maps will have changed acres in the attribute data. The disk will also have the stand IDs for any unlabelled stands in your FDM CSA database. Unlabelled stands are stands that the GIS discovered didn't have any attribute data associated with them when they went through the alteration process.

First you have to load the updated acres and unlabelled stand into the FDM. Then you will have to add the correct data for the unlabelled stands to the appropriate stands in the CSA database. Start at the main menu and select *Utilities; Alterations Processing; and Receive Alterations File*. Respond to the prompts about where and when to insert the disk. The updated acres will be loaded and the

appropriate CSA stands will have their acres updated.

Unlabelled stands will also be loaded into the CSA database. The only data in these stand records will be the stand ID. Use the printed report of unlabelled stands that comes with the alterations products to identify the stands. Then, use the directions in the "Modifying CSA Stands" section in this chapter to enter the rest of the data for the unlabelled stands.

stand, estimating its acres, and updating (estimating) the acres in the original stand. You would use the directions to create a stand and modify a stand. The exact acres for both stands will be determined from the cover type map during your alteration window.

Managing CSA Data for the Alteration Process

Keeping CSA data current so it is ready for the yearly alteration "window" goes on all year long. The process consists of:

- Creating new CSA stands
- Modifying existing CSA stand data
- Deleting CSA stands
- Splitting a CSA stand into two or more stands
- Combining two or more CSA stands into one stand

Whenever a field inspection, project, or natural disaster changes a stand's condition, some sort of change to the CSA data is necessary (see the *CSA Inventory Manual* for the policy and procedure on when a stand should be altered). The change can be any of the above changes or some combination of them.

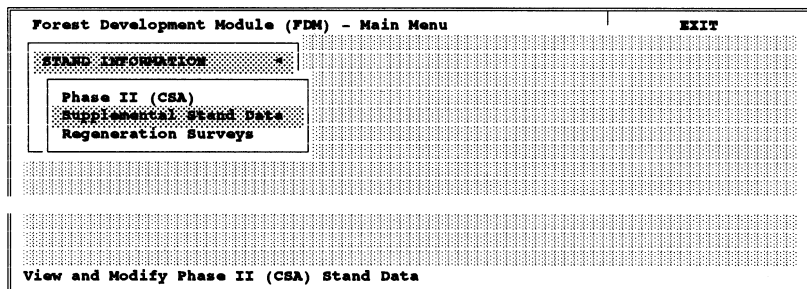
This set of directions will show how to do these changes to the CSA data in the FDM. You will have to determine which specific set of directions or combination of directions you need to accomplish the changes. For example, the process of splitting a stand consists of creating a new

Creating a New CSA Stand

This section will show you how to create new CSA stands and their associated Supplemental Stand Data records. Each CSA stand has to have an associated Supplemental Stand data record. In fact, the supplemental stand record must be created before a CSA stand can be created.

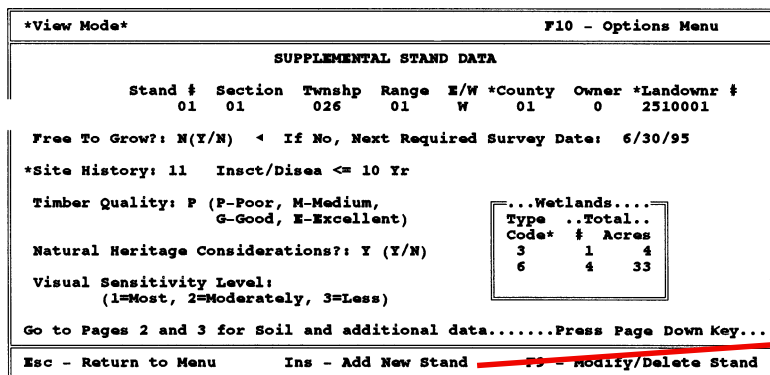
Creating a new Supplemental Stand record

1. From the FDM main menu press **[S]**.



- We are using the mnemonics method to make menu selections because it uses the fewest key-strokes and is fastest.

2. Press **[S]**.



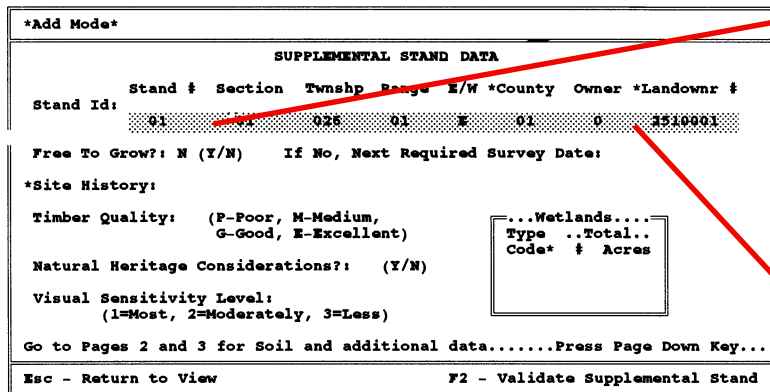
- A new supplemental stand record must be created before a new CSA stand can be created. This is to ensure that a supplemental stand record exists for each CSA stand. Therefore, the process to create a new CSA stand starts at the Supplemental Stand Data screen.

- It doesn't matter which supplemental stand you start from.

- The bottom prompt line has the instructions for "Add a New Stand."

- Pressing **[ins]** puts you in "add" mode.

3. Press **[ins]**.



- The cursor is placed at the stand # field. To create a new stand, you must enter a new stand ID. The stand ID is composed of:

Stand # - Section - Twp - Rge - E/W - County - Owner - Landowner

- The stand ID is unique for every stand in the CSA database, including private stands.

- The Owner and Landowner # fields are used to differentiate between a

- Use the **→** and **←** keys to move to the fields. **BackSpace** over the data in them (if necessary) and enter the new stand ID data.
- Press **F2** when done entering the stand ID to “validate” the new stand.

```

*Add Mode*
SUPPLEMENTAL STAND DATA
Stand # Section Twnshp Range E/W *County Owner *Landownr #
Stand Id: 06 01 026 01 E 01 0 2510001

Free To Grow?: N (Y/N) If No, Next Required Survey Date:
*Site History:
OK
Cancel

Go to Pages 2 and 3 for This stand will also be added to the "Phase 1" table
Add this Stand
  
```

- Press **←** to choose OK and add the new stand to the Supplemental Stand Data table and the CSA table. Press **↓** and **←** to cancel the addition and return to the supplemental data screen if you decide not to add the new stand.

```

*Modify Mode* F10 - Options Menu
SUPPLEMENTAL STAND DATA
Stand # Section Twnshp Range E/W *County Owner *Landownr #
Stand Id: 06 01 026 01 E 01 0 2510001

Free To Grow?: N (Y/N) If No, Next Required Survey Date:
*Site History:
Timber Quality: (P-Poor, M-Medium, G-Good, E-Excellent)
Natural Heritage Considerations?: (Y/N)
Visual Sensitivity Level: (1=Most, 2=Moderately, 3=Less)
...Wetlands...
Type ..Total..
Code* # Acres

Go to Pages 2 and 3 for Soil and additional data.....Press Page Down Key...
F2 - End Modification and accept changes Del - Delete Stand
  
```

- Go on to the next section on “Adding data to the new CSA stand.

state and private stand. The Owner code is “1” for state and “0” for private. The Landowner # is “0000000” for state land and a combination of the RAN and a four-digit landowner number for private (RAN9999).

- The stand ID has to be “validated” or checked against the CSA database to make sure there isn’t another stand with the same ID. This has to be done before any more data can be entered.
- A message in red will tell you that the new stand will be added to the supplemental and the CSA tables.
- If the stand ID is a duplicate, it won’t be accepted and a message will say, “This Stand is Already Recorded.” Press **F2** and **Ins** and start at step four again.
- At this point, the only data in the supplemental stand record is the stand ID. Now you can enter any other supplemental data you have. If you don’t have any, you can go the next section “Adding data to a new CSA stand.”

Adding data to the new CSA stand

Now you are going to add data to the new CSA stand created in the previous section.

1. Press **Ctrl****F1** to jump to the new CSA stand screen.

View Mode		F10 - Options Menu													
PHASE II (CSA) DATA															
Stand ID:	06	Section	01	Twnshp	026	Range	01	E/W	E	*County	01	Owner	1	*Landowner#	0000000
.....Administration.....			Main Cover....			Understory....							
*RAN	*StFor	*WildlfComp	*Acq	*Admin	*Type	*Size	Density	*Type	*Size	Density					
255*															
Acres	Year	Topo	SI	*Class	Phys	...Stand Age...	BA/	Cds/	Mbf/	Cond	Timber				
Survey															
Current															
Acre															
Acre															
Acre															
Class															
Status															
.....Main Species.....					Shrub Species.....									
*Spec	DBH	Hgt	Vol/Acre	*Dam	%Aff	%Mort	*Spec	Dist	Den	Browse	*Cover				
Go to Page 2 for additional data.....Press Page Down Key.....															
Esc - Return to Menu						F9 - Modify Data									

2. Press **F9** to switch to “modify” mode.

Modify Mode		F10 - Options Menu													
PHASE II (CSA) DATA															
Stand ID:	06	Section	01	Twnshp	026	Range	01	E/W	E	*County	01	Owner	1	*Landowner#	0000000
.....Administration.....			Main Cover....			Understory....							
*RAN	*StFor	*WildlfComp	*Acq	*Admin	*Type	*Size	Density	*Type	*Size	Density					
255*															
Acres	Year	Topo	SI	*Class	Phys	...Stand Age...	BA/	Cds/	Mbf/	Cond	Timber				
Survey															
Current															
Acre															
Acre															
Acre															
Class															
Status															
.....Main Species.....					Shrub Species.....									
*Spec	DBH	Hgt	Vol/Acre	*Dam	%Aff	%Mort	*Spec	Dist	Den	Browse	*Cover				
Go to Page 2 for additional data.....Press Page Down Key.....															
F2 - End Modifications and accept changes															

- Remember, you must create the supplemental stand record first. If you haven't done that, go to step 1 in the “Adding Supplemental Stand Data” section and start there.

- You can also use the F10 - Options Menu to jump to the CSA stand.

- Creating the supplemental stand record created the CSA stand with the stand ID data in it but nothing else. Therefore, we have to switch to “modify” mode to add the rest of the stand data.

- With the exception of the “Owner” and “Landowner #,” the CSA data is the same as that entered on a CSA “Green Sheet.” See the *CSA Manual* for data definitions.

- “Acres” and “Stand Age - Survey” must have three characters entered in them. Enter a “0” in front of the number if it is only two characters. (e.g., “020” for 20 years; 099 for 99 acres).

- Use the **↓**, **↑**, **←**, **→**, and **↵** keys to move around the screen and add data for the new stand.
- To use the pop-up code feature, move the cursor to a field that has a red * next to it and press **F1**.

PHYSCLAS	PHYS CODE	PHYS NAME	Physclas									
1	0	N/A										
2	1	Xeric										
3	2	Xeromesic										
4	3	Mesic										
5	4	Hydromesic										
6	5	Hydric										

1 of 6 12 - 14

*RAN	*StFor	*WildlfComp	*Acq	*Admin	*Type	*Size	Density	*Type	*Size	Density
255										

Acres	Year	Topo	SI	*Class	Survey	Stand Age...	BA/	Cds/	Mbf/	Cond	Timber
85						10					

Go to Page 2 for additional data.....Press Page Down Key.....

Move to the record you want; press F2 to select it, Esc to cancel

- Move the cursor to the code you want and press **F2** to select it.
- Use **PgDn** to go to page 2 of the CSA screen and continue entering data.

Modify Mode						F10 - Options Menu					
PHASE II (CSA) DATA											
Recon	Stand	Dist to	Signf	Misc	Misc	Page 2					
*Level	Origin	*Road	*Cond	Cds/Acre	Mbf/Acre						
4											
.....Trees 5" DBH and Larger.....											
*Species DBH Distribution Vol/Acre *Damage Harvest											
Large Species 2:											
Large Species 3:											
Large Species 4:											
Large Species 5:											
.....Trees less Than 5" DBH.....											
*Species *Size Density Distribution *Damage											
Small Species 1:											
Small Species 2:											
Small Species 3:											
Small Species 4:											
Remarks:			Last Update:			By:					
F2 - End Modification and accept changes											

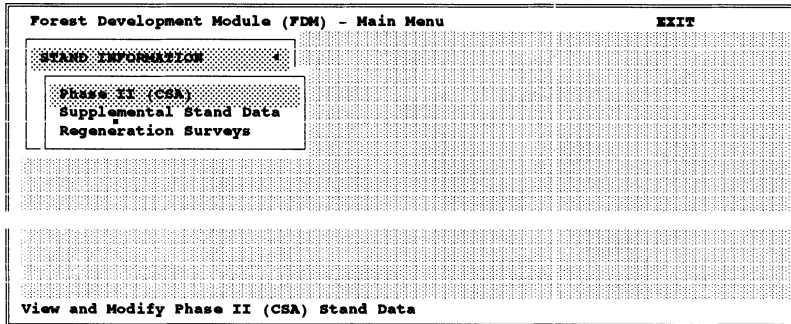
- Press **F2** when you are done entering data.
- Press **Esc** until you get back to the menu you want.

- Current stand age is calculated for you. It is (today's year) - (year of survey) + (stand survey age).
- To correct mistakes, move the cursor to the field, **BackSpace** over the error, and type in the correct data.
- Fields with a red * next to them have a pop-up code table you can use to pick the code you want. Use it to make sure your entries are accurate. Use **↓**, **↑**, **PgDn**, and **PgUp** to move through the code table. Press **F2** to select it. Press **Esc** to get back to the CSA screen without making a selection from the pop-up table.
- You will get a "beep" and/or an error message if you try to enter letters into fields that can hold only numbers and visa versa. **BackSpace** over the error and type in the correct data.
- The "Last Update" and "By" fields are automatically filled in from the system date and Forester ID code table.
- F2** ends data entry, adds the new data to the database, and puts you back in "view" mode.
- Esc** will not back you up if you are in "modify" mode. You must end "modify" mode by pressing **F2** first.

Modifying CSA Stand Data

In this section you will learn how to modify CSA data.

1. From the FDM main menu press **[S]**.



2. Press **[P]**.

View Mode		F10 - Options Menu									
PHASE II (CSA) DATA											
Stand ID:	Stand #	Section	Twship	Range	E/W	*County	Owner	*Landowner#			
03	06		036	20	W	13	1	0000000			
.....Administration.....		Main Cover...		Understory...					
*RAN	*StFor	WildlfComp	Acq	Admin	*Type	Size	Density	*Type	Size	Density	
351	12	3	2	3	20	5	3	01	1	9	
Acres	Year	Topo	SI	Class	Phys	...Stand Age...	BA/	Cds/	Mbf/	Cond	Timber
008	83	2	54	3	65	76	060	15	00.0	3	2
.....Main Species.....					Shrub Species.....					
*Spec	DBH	Hgt	Vol/Acre	*Dam	%Aff	%Mort	*Spec	Dist	Den	Browse	*Cover
23	14	64	05.7	28	2	1	10	1	1	4	2
Go to Page 2 for additional data.....Press Page Down Key.....											
Esc - Return to Menu						F9 - Modify Data					

- We are using the mnemonics method to make menu selections because it uses the fewest key-strokes and is fastest.

- This is the CSA stand screen. It is the same for state and private stands. In fact, private stands are in the same database as the state stands are. You can tell the difference by looking at the **Owner** ("1" for state and "0" for private). The **Landowner #** is also different ("0000000" for state land and a combination of the RAN and a four-digit landowner number for private).

3. Press **F10**.

```

*View Mode*                               F10 - Options Menu
-----
View the Next Stand                        Ctrl/PgDn
Search for a desired stand                  Ctrl/F4
Search for next desired Stand              Ctrl/F7
Clear Options Menu                         Esc
-----
Acres Year Topo SI P
025 87 2 12 C
.....Main Species.....Shrub Species.....
*Spec DBH Hgt Vol/Acre *Dam %Aff %Mort *Spec Dist Den Browse *Cover
06 13 12 02.8 00 0 0 12 1 1 3 4
Go to Page 2 for additional data.....Press Page Down Key.....

```

- The "Search for a desired stand" function allows you to search the CSA database for a specific stand ID. The stand ID is composed of:

Stand # - Section - Twp - Rge - E/W - County - Owner - Landowner

The stand ID is unique for every stand in the CSA database, including private stands.

4. Press the **D** mnemonics key for the "Search for desired stand" menu choice.

```

*Search*
-----
PHASE II (CSA) DATA
-----
Stand # Section Twnshp Range E/W *County Owner *Landowner#
Stand ID: 01 01 026 01 E 01 0 2510001
-----
.....Administration.....Main Cover...Understory...
*RAM *StFor WildlfComp Acq Admin *Type Size Density *Type Size Density
255 00
Go to Page 2 for additional data..... Enter Stand Id to Search for
Esc - Exit Stand Search F2 - Initiate Stand Search

```

- The cursor is placed under the existing stand # so you can enter the stand ID information. If you enter all the information for a stand, the search will find the single stand in the database with that stand ID. You will get a message saying "No match found" if the stand doesn't exist in the database.

5. Enter the stand ID information. Use the **←**, **→**, **Tab**, or **↵** keys to move between fields. Use **BackSpace** to erase mistakes.

```

*Search*
-----
PHASE II (CSA) DATA
-----
Stand # Section Twnshp Range E/W *County Owner *Landowner#
Stand ID: 01 01 026 01 E 01 0 2510001
03* 01 01 01 E 01 1 0000000*
-----
.....Administration.....Main Cover...Understory...
*RAM *StFor WildlfComp Acq Admin *Type Size Density *Type Size Density
255 00
Go to Page 2 for additional data..... Enter Stand Id to Search for
Esc - Exit Stand Search F2 - Initiate Stand Search

```

- Enter the ID of the stand you want to modify.
- You can also enter just part of the stand ID to make the search more general. This is useful if you don't know the full ID for the stand. For example, if you entered "01" for stand # and "16" for section, the search will find all the first occurrence of stand # "1" in section "16."
- The top and bottom prompt lines give information as to what you are doing and instructions on how to do it. Pressing **F2** starts the search.

6. Press **F2**.


```

*View Mode*                               F10 - Options Menu
                                           PHASE II (CSA) DATA
Stand # Section Twnshp Range E/W *County Owner *Landowner#
Stand ID: 03      01      026   01   E   01      1      0000000

.....Administration.....      ....Main Cover....      ....Understory...
*RAM *StFor WildlfComp Acq Admin *Type *Size Density *Type *Size Density
111 02      5      0      6      25  3      5      12  1      2

Go to Page 2 for additional data.....Press Page Down Key.....
Esc - Return to Menu                               F9 - Modify Data

```

- If you entered part of the stand ID information (for example, stand # "01" and section "16"), you will get the next stand # 1 in section 16 in the database. Use **(Ctrl)F7** to search through the stands until you find the one you want to modify.

7. Press **(F9)** to switch to "modify" mode.

```

*View Mode*                               F10 - Options Menu
                                           PHASE II (CSA) DATA
Stand # Section Twnshp Range E/W *County Owner *Landowner#
Stand ID: 01      22      045   26   W   04      1      0000000

.....Administration.....      ....Main Cover....      ....Understory....
*RAM *StFor *WildlfComp *Acq *Admin *Type *Size Density *Type *Size Density
111      6      85

Acres Year Topo  ST Class Phys Stand Age... BA/ Sls/ Mbf/ Cond Timber
055  92  1  5  3 Survey Current  Acre Acre Acre Class Status

.....Main Species.....      ....Shrub Species.....
*Spec DBH Hgt Vol/Acre *Dam %Aff %Mort *Spec Dist Den Browse *Cover
04

Go to Page 2 for additional data.....Press Page Down Key.....
Esc - Return to Menu                               F9 - Modify Data

```

- With the exception of the "Owner" and "Landowner #," the CSA data is the same as that entered on a CSA "Green Sheet." **See the CSA Manual for data definitions.**
- "Acres" and "Stand Age - Survey" must have three characters entered in them. Enter a "0" in front of the number if it is only two characters. (e.g., "020" for 20 years; 099 for 99 acres).
- Current stand age is calculated for you. It is (today's year) - (year of survey) + (stand survey age).

8. Use the **(↓)**, **(↑)**, **(←)**, and **(→)** keys to move around the screen. **(BackSpace)** over incorrect data and enter the correct data.

- To correct mistakes, move the cursor to the field, **(BackSpace)** over the error, and type in the correct data.

9. To use the pop-up code feature, move the cursor to a field that has a red * next to it and press **(F1)**.

- Fields with a red * next to them have a pop-up code table you can use to pick the code you want. Use it to make sure your entries are accurate. Use **(↓)**, **(↑)**, **(PgDn)**, and **(PgUp)** to move through the code table. Press **(F2)** to select the code you want. Press **(Esc)** to get back to the CSA screen without making a selection from the pop-up table.

PHYSCLAS	PHYS CODE	PHYS NAME
1	0	N/A
2	1	Xeric
3	2	Xeromesic
4	3	Mesic
5	4	Hydromesic
6	5	Hydric

1 of 6

*RAN	*StFor	*WildlfComp	*Acq	*Admin	*Type	*Size	Density	*Type	*Size	Density
255										

Acres	Year	Topo	SI	*Class	Phys	...Stand	Age...	BA/	Cds/	Mbf/	Cond	Timber
85								Current	Acres	Acres	Acres	Status
								10				

Go to Page 2 for additional data.....Press Page Down Key.....

Move to the record you want; press F2 to select it, Esc to cancel

- You will get a “beep” and/or an error message if you try to enter letters into fields that can hold only numbers and visa versa. **BackSpace** over the error and type in the correct data.

- Use **↓** and **↑** to move to the code you want and press **F2** to select it.
- Use **PgDn** to go to page 2 of the CSA screen and continue modifying data.

Modify Mode						F10 - Options Menu	
PHASE II (CSA) DATA						Page 2	
Recon	Stand	Dist to	Signf	Misc	Misc		
*Level	Origin	*Road	*Cond	Cds/Acre	Mbf/Acre		
1	4	1		2			
.....Trees 5" DBH and Larger.....							
*Species DBH Distribution Vol/Acre *Damage Harvest							
Large Species 2:							
Large Species 3:							
Large Species 4:							
Large Species 5:							
.....Trees less Than 5" DBH.....							
*Species *Size Density Distribution *Damage							
Small Species 1: 23 2 2							
Small Species 2:							
Small Species 3:							
Small Species 4:							
Remarks:						Last Update: 02/21/92 By: 0307	
F2 - End Modification and accept changes							

- BackSpace** is the only way to erase incorrect data.

- The “Last Update” and “By” fields are automatically filled in from the system date and Forester ID code table.

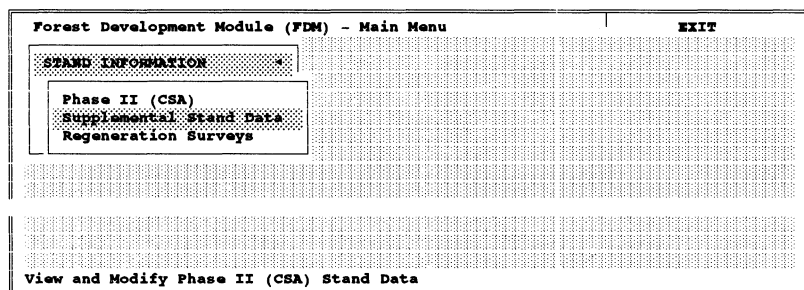
- Press **F2** to end modification and add the new data to the database.
- Press **Esc** until you get back to the menu you want.

- F2** ends data modification, adds the new data to the database, and puts you back in “view” mode.
- Esc** will not back you up if you are in “modify” mode. You must end “modify” mode by pressing **F2** first.

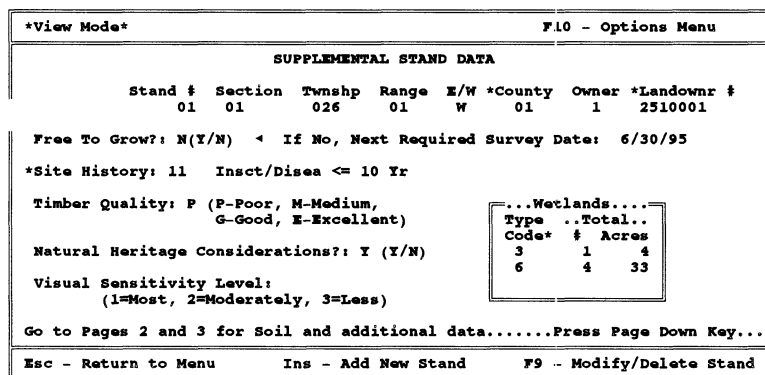
Deleting a CSA Stand

Every CSA stand has an associated Supplemental Stand Data record. A CSA stand can't exist without its associated supplemental stand. **Deleting a supplemental stand record also deletes its associated CSA stand.** This is the only way to delete a CSA stand from the FDM. *Be sure that you want to delete the CSA stand. Once you delete the supplemental stand, it, and its associated CSA stand, is gone for good.* The only way to recover them is to recreate them or from a backup of the database.

1. From the FDM main menu press **[S]**.



2. Press **[S]**.



- We are using the mnemonics method to make menu selections because it uses the fewest key-strokes and is fastest.

- This is the Supplemental Stand Data screen. It is the same for state and private stands. In fact, private stands are in the same database as the state stands are. You can tell the difference by looking at the **Owner** field ("1" for state and "0" for private). The **Landowner #** is also different ("0000000" for state land and a combination of the RAN and a four-digit landowner number for private).

- Now you must search for the specific stand you want to delete.

3. Press **F10**.

```

*View Mode*                               F10 - Options Menu
-----
Stand #   Sec
Stand Id: 01   0
Timber Quality: P (P-Poor, M-Medium, G-Good, E-Excellent)
Natural Heritage Consi
Visual Sensitivity Lev
(1=Most, 2=Moderately, 3=Less)
Go to Pages 2 and 3 for Soil and additional data.....Press Page Down Key...
Esc - Return to Menu      Ins - Add New Stand      F9 - Modify/Delete Stand
  
```

View the Next Stand	Ctrl/PgDn
View the Previous Stand	Ctrl/PgUp
Search for desired value at cursor	Ctrl/Z
Search Next desired value at cursor	Alt/Z
Jump to Project Summary for this stand	Ctrl/F5
Search for desired Stand	Ctrl/F6
Search for next desired Stand	Ctrl/F7
Add this stand to 'Holding List'	Alt/A
Clear Options Menu	Esc

- The F10 menu “Search for a desired stand” function allows you to search the supplemental stand database for a specific stand ID. The stand ID is composed of:

Stand # - Section - Twp - Rge - E/W - County - Owner - Landowner

- The stand ID is unique for every stand in the supplemental stand database, including private stands.
- It doesn't matter which Supplemental Stand Data screen you start the search from.

4. Press the **D** mnemonics key for the “Search for desired stand” menu choice.

```

*Search*
SUPPLEMENTAL STAND DATA
-----
Stand #   Section   Twnshp   Range   E/W   *County   Owner   *Landownr #
Stand Id: 01   01   026   01   E   01   0   2510001
04   01   026   01   E   01   1   0000000
Free To Grow?: N (Y/N)      If No, Next Required Survey Date: 6/30/95
*Site History: 11   Insect/Disea <= 10
Timber Quality: P (P-Poor, M-Medium, G-Good, E-Excellent)
Natural Heritage Considerations?: Y (Y/N)
Visual Sensitivity Level:
(1=Most, 2=Moderately, 3=Less)
Go to Pages 2 and 3 for Soil and additional da Enter Stand Id to Search for .
Esc - Exit Stand Search      F2 - Initiate Stand Search
  
```

Wetlands...	Type	Total..
Code*	#	Acres
3	1	
6	4	33

- The cursor is placed under the existing stand # so you can enter the stand ID information. If you enter all the information for a stand, the search will find the single stand in the database with that stand ID. You will get a message saying “No match found” if the stand doesn't exist in the database.
- In this example, we are changing the stand # to “04” and the owner to “1” (state land) and landowner # to “0000000” (state land). This search will be for a state land stand.

5. Enter the stand ID information. Use the **←**, **→**, **Tab**, or **↵** keys to move between fields. Use **BackSpace** to erase mistakes. Press **F2** when done.

```

*View Mode*                               F10 - Options Menu
SUPPLEMENTAL STAND DATA
Stand # Section  Twship Range  E/W *County Owner *Landownr #
Stand Id: 04      01      026   01   E   01     1   0000000
Free To Grow?: N(Y/N)  < If No, Next Required Survey Date:
*Site History:
Timber Quality: (P-Poor, M-Medium,
                G-Good, E-Excellent)
Natural Heritage Considerations?: (Y/N)
Visual Sensitivity Level:
(1=Most, 2=Moderately, 3=Less)
Go to Pages 2 and 3 for Soil and additional data.....Press Page Down Key...
Esc - Return to Menu      Ins - Add New Stand      F9 - Modify/Delete Stand
  
```

- The top and bottom prompt lines give information as to what you are doing and instructions on how to do it. Pressing **F2** starts the search. It may take awhile if you have a lot of CSA stands.
- The search found the supplemental stand you want to delete.
- You can also enter just part of the stand ID to make the search more general. This is helpful if you don't know the full stand ID. For example, if you entered "01" for stand # and "16" for section, the search will find all the occurrences of stand # "1" in every section "16" (state or private). Any parts of the stand ID left blank will act as wildcards and will allow any value in the database to appear there. Use the **Ctrl F7** keys to go through the resulting list of Supplemental Stand Data screens until you find the one you want.

6. Press **F9** to switch to "modify" mode.

```

*Modify Mode*                               F10 - Options Menu
SUPPLEMENTAL STAND DATA
Stand # Section  Twship Range  E/W *County Owner *Landownr #
Stand Id: 04      01      026   01   E   01     1   0000000
Free To Grow?: N(Y/N)  If No, Next Required Survey Date: 6/30/95
*Site History: 11 Pastured - now ended
Timber Quality: P (P-Poor, M-Medium,
                G-Good, E-Excellent)
Natural Heritage Considerations?: Y (Y/N)
Visual Sensitivity Level:
(1=Most, 2=Moderately, 3=Less)
Go to Pages 2 and 3 for Soil and additional data.....Press Page Down Key...
F2 - End Modification and accept changes      Del - Delete Stand
  
```

- **F9** puts the screen in "modify" mode so you can delete the supplemental stand and its associated CSA stand from the FDM.
- Watch the top and bottom prompt lines on all the screens for information on what your options are and how to do them.

7. Press **Del** to delete the supplemental stand record and its associated CSA stand.

Modify Mode F10 - Options Menu

SUPPLEMENTAL STAND DATA

Stand #	Section	Twnshp	Range	E/W	*County	Owner	*Last Dwnr #
Stand Id: 01	01	026	01	E	01	0	2510001

Free To Grow?: N (Y/N) If No, / / ired Survey Date: 6/30/95

*Site History: 11 Pastured - no

Visual Sensitivity Level:
(1=Most, 2=Moderately, 3=Less)

Go to Pages 2 and 3 for Soil and additional data.....Press Page Down Key...

Delete this Stand

- A window will pop up in the middle of the screen with a “Cancel” or “OK” option. Press when the cursor is on “Cancel” if you don’t want to delete the supplemental stand. The bottom prompt tells you what Cancel or OK will do.

- Remember, this will also delete the associated CSA stand! Be sure that is what you want to do.

8. Press then to delete the supplemental stand and its associated CSA stand from the FDM.

9. Press until you get back to the menu you want.

- Once you delete the supplemental and CSA stand, you will end up at another supplemental screen. will take you back to the menus.

Splitting a CSA Stand Into Two Stands

You will need to split a stand into two stands when the stand conditions on part of the stand change enough so that it is not the same stand anymore. This could happen when just part of the stand is harvested, regenerated, or has some type of management done on it. Other causes for splitting a stand could be a fire, wind storm, insect and disease infestation, or other natural disaster that effects only part of the stand.

The process of splitting a stand consists of modifying the current stand and creating a new stand for the part of the stand that changed. Here are the steps involved. They can be followed in any order.

Modify the existing stand

Use the directions in the “Modifying CSA Stand Data” section in this chapter. In most cases the only modification necessary will be to change the acres. Remember, the acres figure you enter is an estimation. Actual stand acres are calculated from the maps during the alteration process.

Create a new stand

Use the directions in the “Creating a New CSA Stand” section in this chapter. You must assign a new stand number to the stand. Use the “CSA Inventory Manual” and current stand numbering policy to number the stand.

These directions refer only to the alterations work that is done in the FDM. You must also make the appropriate map updates. The directions also assume that the only reason you are creating the new stand is to update the CSA inventory. If you also plan to do some management on the new stand, go to Chapters 6, 7, and 8 of the *FDM Manual* for the appropriate directions.

Combining Two or More CSA Stands Into One Stand

You will need to combine two or more stands into one stand when the stand conditions on all the stands change enough so that they are all the same. This could happen when two or more stands are harvested, regenerated, or have some type of similar management done on them. Other reasons for combining stands could be a fire, wind storm, insect and disease infestation, or other natural disaster that affects two or more stands and leaves them in the same condition.

The process of combining stands consists of modifying one of the stands to represent the new stand and then deleting the remaining stands. (You could create a new stand instead of modifying an existing stand if that is easier.) Here are the steps involved. They can be followed in any order.

Modify one of the existing stands

Use the directions in the “Modifying CSA Stand Data” section in this chapter. In some cases, the only modification necessary will be to change the acres because the other stand(s) will have changed to match the stand you are modifying. Remember, the acres figure you enter is an estimation. Actual stand acres are calculated from the maps during the alteration process.

Delete the extra stand(s)

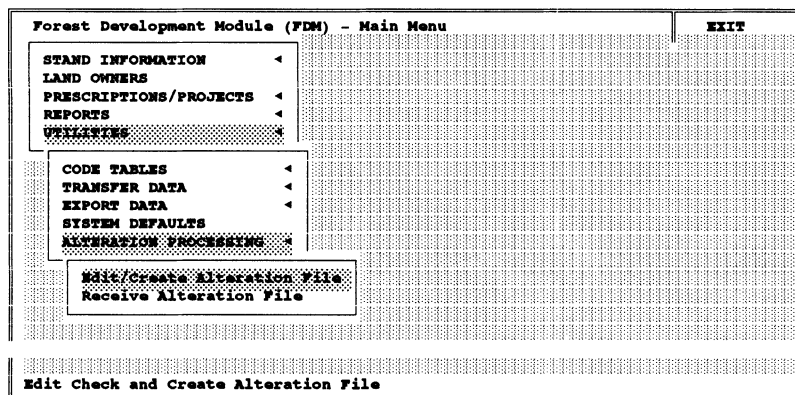
Use the directions in the “Deleting a CSA Stand” section in this chapter. *Make sure you really want to delete the stand(s). The only way to get them back is to recreate them or from a backup of the database.*

These steps refer only to the work that is done in the FDM. You must also make the appropriate map updates. The deleted stand(s) may have had management work done on them. Data about the work could be contained in Project Summaries and Prescription Detail, Contracts, and Regeneration Surveys. Once you delete the stand(s), all the associated historical data will no longer be related to the correct stand and it will have no value as historical data for the stand(s). If any of the data is still applicable to the combined stand, create new projects, regeneration surveys, and contracts for the new combined stand. They should contain all the historical work that would otherwise be lost. Then, delete the projects, regeneration surveys, and contracts that were from the deleted stands.

Running the Alteration Error Check

Run the alteration error check anytime you make a change to the CSA data to make sure the data is always accurate. You must also run it just before you send your data in for alterations processing. The program checks the data to make sure it meets CSA inventory standards for accuracy and completeness. For example, if you had entered "16" as a stand's cover type code, the error check program would tell you that it was not a valid cover type. You would have to go into the FDM CSA data and make the necessary corrections to the stand. **Only when the error check report says that all the data is clean can you send the data disk, the clean error check report, and the updated maps to the Resource Assessment Unit to have your alterations processed.**

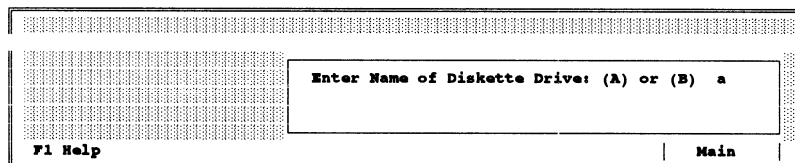
This routine creates the error check report and a disk with your CSA data on it.



1. Start from the main menu and press:

- U**
- A**
- E**.

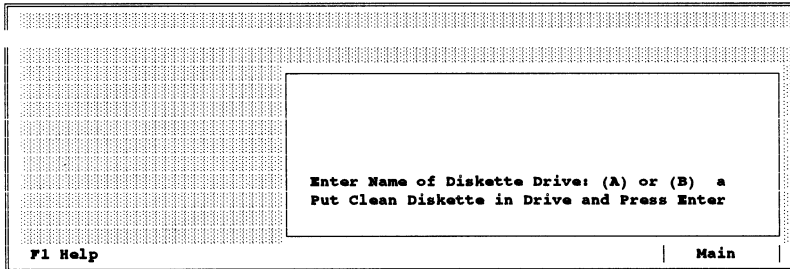
- We are using the mnemonics method of making menu selections because it uses the fewest key-strokes and is the fastest.



2. Press **[A]** for the A: drive.

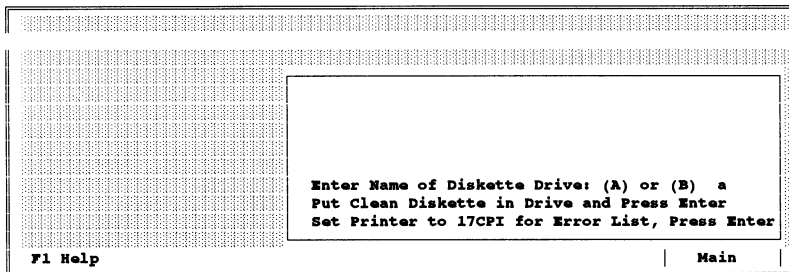
or

Press **[B]** for the B: drive and then press **[↵]**.



- You are prompted to enter the letter of the floppy disk drive you want the CSA data copied to. We recommend the 3 1/2" drive because the disks are more durable than 5 1/4" disks.

3. Put the disk into the A: or B: drive and press **[↵]**.



- Put a freshly formatted disk that has no other files on it into the drive you indicated so it is ready for the CSA data to be written to it.

4. Set your printer to 17 characters per inch and press **[↵]**.

- The error report will be printed on your printer. Set the printer so it will print condensed print or 17 characters per inch (use the printer manual if you don't know how). This ensures that each line of the report prints on one line and doesn't "wrap" to the next line. If it does, it will be difficult to read.

```

IV914FDM - EDIT CSA INVENTORY ATTRIBUTE RECORDS

** PROCESSING INPUT RECORD NUMBER:    62 **
** CLEAN RECORD COUNT:                27 **
** PROBLEM RECORD COUNT:              34 **

COBOL STOP RUN AT: 0010 IN IV914F
PKZIP (R) FAST! Create/Update Utility Version 1.1 03-15-90
Copr. 1989-1990 PKWARE Inc. All Rights Reserved. PKZIP/h for help
PKZIP Reg. U.S. Pat. and Tm. Off.

Updating ZIP: FDMFH2.ZIP
Updating: FDMFH2.SEQ imploding (81%), done.

```

- Your screen will look much like this as the error check is being done. The messages have no real significance except to show you that the FDM is working on your data. Be patient. It may take a few minutes if you have many CSA stands in your area.
- The error check report will print on your printer and the CSA file and error check report file will be copied to the floppy disk. You will end up back at this menu screen when the error check routine is done.

```

Forest Development Module (FDM) - Main Menu
EXIT

STAND INFORMATION <
LAND OWNERS <
PRESCRIPTIONS/PROJECTS <
REPORTS <
UTILITIES <

CODE TABLES <
TRANSFER DATA <
EXPORT DATA <
SYSTEM DEFAULTS <
ALTERATION PROCESSING <

Edit/Create Alteration File
Receive Alteration File

Edit Check and Create Alteration File

```

5. Press **[Esc]** until you get back to the menu you want.

If the error report shows no errors in the CSA data, you are done and the error check report, disk, and maps can be sent to the Resource Assessment Unit for alterations processing. If there are errors, you must correct them and run the error check routine again. **The Resource Assessment Unit will not accept the disk and maps until your error check report shows the data is clean. Also, the date and time on the CSA disk file and the report date and time must be the same to guarantee that the data file is truly error free.**

We recommend that the error check routine be run every time CSA data is updated. That way, corrections can be made as you update CSA data throughout the year and you won't have a large backlog of corrections to make immediately before your alterations window.

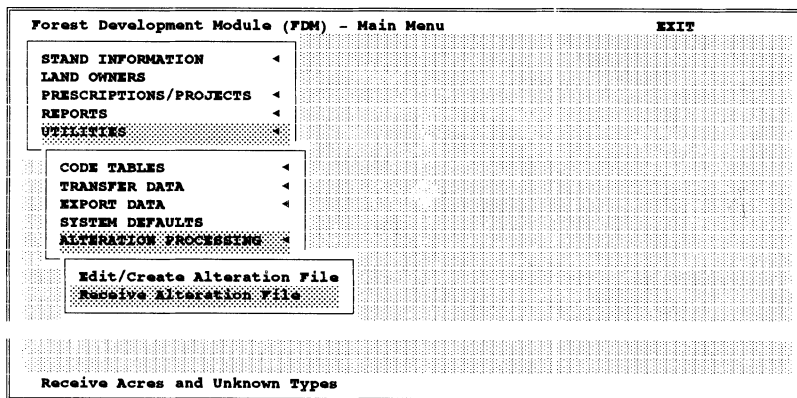
Remember, you must send the following items to the Resource Assessment Unit before your alterations will be processed:

- The error check report showing no errors.
- The disk with the CSA data file on it (the file date and time must match the error check report date and time).
- Updated maps.

Loading Updated Acres and Unlabelled Stands Into the FDM

This routine is done after your area's alterations have been processed and you receive the alteration products back from the Resource Assessment Unit. Along with the usual updated maps and reports will be a disk. It will have the data to update the acres on your FDM CSA data. Acres will need to be updated on some of the altered stands because changes to the cover type maps will have changed acres in the attribute data. It will also have data (stand IDs) for any unlabelled stands in your FDM CSA database. Unlabelled stands are stands that the GIS discovered didn't have any attribute data associated with them when they went through the alteration process.

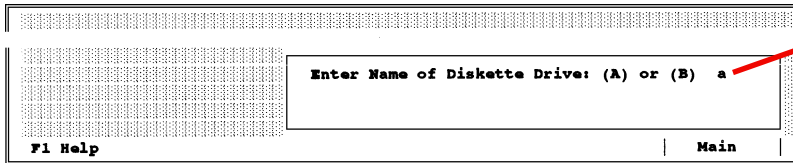
These directions will show you how to load the updated acres and unlabelled stands into the FDM. Then you will have to add the correct data for the unlabelled stands to the appropriate stands in the CSA database. One of the alteration products is a list of all the unlabelled stands. The list will make it easy for you to find the stands after they are loaded into the FDM so you can add data to them.



1. Start at the main menu and press:

- U**
- A**
- R**

- We are using the mnemonics method of making menu selections because it uses the fewest key-strokes and is the fastest.

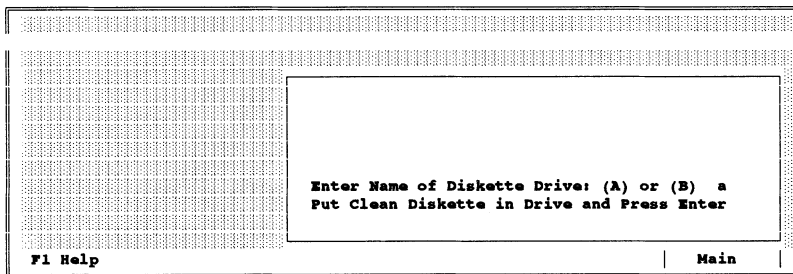


- You need to tell the FDM which disk drive the updated acres and unlabelled stands are in.

2. Press **[A]** for the A: drive.

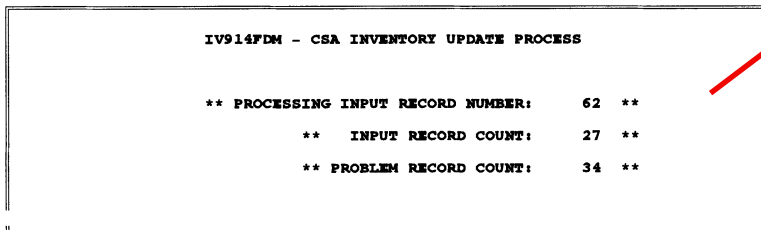
or

Press **[B]** for the B: drive and then press **[↵]**.

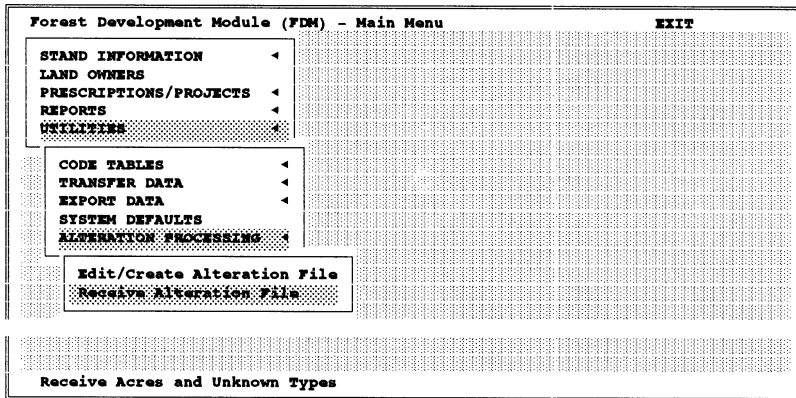


- Next you are instructed to put the disk in the drive and press **[↵]**.

3. Put the disk into the A: or B: drive and press **[↵]**.



- Your screen will look much like this as the updated acres and unlabelled stands are loaded into the CSA database. The messages have no real significance except to show you that the FDM is working on your data. Be patient. It may take a few minutes if you have many CSA stands needing updating.



- You will be returned to the last menu you were at when the updated acres and unlabelled stands have finished loading into the database. You can go on and do other work in the FDM or exit. You should update the unlabelled stands as soon as possible to make sure you don't forget about them.

4. Press **Esc** until you get back to the menu you want.

This finishes the process of loading the updated acres. The stands have automatically had their acres updated. No more work needs to be done to them.

The unlabelled stands have also been loaded into the CSA database. The only data in each unlabelled stand record is the stand ID. **You must collect and enter the rest of the data for these stands.** We suggest you do this as soon as possible so you don't forget about them. If the data isn't correctly entered, the error check routine will catch the problem the next time it is run. You will not be able to process your alterations the next time your alterations window comes because the unlabelled stands won't pass the error check.

Use the directions in the "Modifying CSA Stand Data" section on page 16 of the *FDM Manual* to find and add the rest of the data to the stands. The list of unlabelled stands that comes with the alteration maps and reports will tell which stands need updating. **Remember, the stands won't pass the error check routine until they have all the stand data correctly added to them.**

PHASE II INVENTORY (CSA) SINGLE-FIELD EDITS (Revised 2/3/1998)

FIELD	GREEN SHEET	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
----	CARD/COLS	-----	-----	-----

PHASE II INVENTORY (CSA) SINGLE-FIELD EDITS (Revised 2/3/1998) Page 1 of 6

 * SINGLE-FIELD EDITS *

FIELD	GREEN SHEET	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
----	CARD/COLS	-----	-----	-----

TYPE SEQUENCE NUMBER	1/02-03	01 - 89	-E-	E001-INVALID TYPE SEQUENCE #
----------------------	---------	---------	-----	------------------------------

ALTERATION NUMBER	1/04-05	anything	---	---
-------------------	---------	----------	-----	-----

SECTION	1/06-07	01 - 36	-E-	E002-INVALID SECTION
---------	---------	---------	-----	----------------------

TOWNSHIP	1/08-10	026 - 168	-E-	E003-INVALID TOWNSHIP
----------	---------	-----------	-----	-----------------------

RANGE	1/11-12	01 - 51	-E-	E004-INVALID RANGE NUMBER
-------	---------	---------	-----	---------------------------

E/W	1/13	8 - 9	-E-	E005-INVALID RANGE DIRECTION
-----	------	-------	-----	------------------------------

COUNTY	1/14-15	01 - 87	-E-	E006-INVALID COUNTY
--------	---------	---------	-----	---------------------

RAN	1/16-18	anything	---	---
-----	---------	----------	-----	-----

STATE FOREST	1/19-20	anything	---	---
--------------	---------	----------	-----	-----

OTHER MGMT. UNIT	1/21-23	anything	---	---
------------------	---------	----------	-----	-----

MGMT CODE	1/24-24	0-9	---	---
-----------	---------	-----	-----	-----

ACQUISITION STATUS	1/25-25	0 - 9	-E-	E007-INVALID ACQUISITION
--------------------	---------	-------	-----	--------------------------

ADMINISTRATOR	1/26-26	0 - 7	-E-	E008-INVALID ADMINISTRATOR
---------------	---------	-------	-----	----------------------------

MAIN COVER DATA:

COVER TYPE	1/27-28	01, 06, 09, 12 - 15, 17, 20, 25, 30, 40, 51 - 55, 61 - 62, 64, 70 - 79, 81 - 88, 91 - 99	-E-	E009-INVALID COVER TYPE
------------	---------	--	-----	-------------------------

SIZE CLASS	1/29-29	0 - 8	-E-	E010-INVALID COVER SIZE CLASS
------------	---------	-------	-----	-------------------------------

DENSITY	1/30-30	0 - 9	-E-	E011-INVALID COVER DENSITY
---------	---------	-------	-----	----------------------------

UNDERSTORY DATA:

COVER TYPE	1/31-32	same range as main cover type,	-E-	E012-INVALID UNDER TYPE
------------	---------	--------------------------------	-----	-------------------------

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/warning	ERROR/warning MESSAGE
		plus 00		
SIZE CLASS	1/33-33	0 - 3	-E-	E013-INVALID UNDER SIZE CLASS
DENSITY	1/34-34	0 - 9	-E-	E014-INVALID UNDER DENSITY
ACRES	1/35-37	000 - 999 (WARNING if equal to 000 or greater than 640)	-E- -w-	E015-INVALID ACRES W015-??? acres
INVENTORY YEAR	1/38-39	74 - current year	-E-	E016-INVALID INVENTORY YEAR
TOPOGRAPHY	1/40-40	0 - 3	-E-	E017-INVALID TOPOGRAPHY
SITE INDEX	1/41-42	00 - 99	-E-	E018-INVALID SITE INDEX
PHYSIOGRAPHIC CLASS	1/43-43	0 - 5	-E-	E019-INVALID PHYS CLASS
STAND AGE	1/44-46	000 - 999 (WARNING if greater than 200)	-E- -w-	E020-INVALID AGE W020-??? age
BASAL AREA/ACRE	1/47-49	000 - 999 (WARNING if greater than 250)	-E- -w-	E021-INVALID BASAL AREA/ACRE W021-??? basal area/acre
CORDS/ACRE	1/50-51	00 - 99 (WARNING if greater than 50)	-E- -w-	E022-INVALID CORDS/ACRE W022-??? cords/acre
MBF/ACRE	1/52-54	00.0 - 99.9 (WARNING if greater than 25.0)	-E- -w-	E023-INVALID MBF/ACRE W023-??? mbf/acre
CONDITION CLASS	1/55-55	0 - 4	-E-	E024-INVALID CONDITION CLASS
TIMBER STATUS	1/56-56	0 - 9	-E-	E025-INVALID TIMBER STATUS
MAIN SPECIES DATA:				
SPECIES	1/57-58	00 - 06, 12 - 17, 21 - 28, 31 - 36, 38 - 39, 41 - 43, 45, 51 - 56, 61 - 65, 71 - 73, 81 - 86, 91 - 94, 99	-E-	E026-INVALID MAIN SPECIES
DBH	1/59-60	00 - 99 (WARNING if greater than 25)	-E- -w-	E027-INVALID MAIN SPECIES DBH W027-??? main species dbh
HEIGHT	1/61-62	00 - 99	-E-	E028-INVALID MAIN SP. HEIGHT
VOLUME/ACRE	1/63-65	00.0 - 99.9	-E-	E029-INVALID MAIN SP. VOL/ACRE
DAMAGE	1/66-67	00 - 10, 15 - 33, 40 - 45, 50 - 57, 60 - 62, 99	-E-	E030-INVALID MAIN SP. DAMAGE
PERCENT DAMAGE	1/68-68	0 - 5	-E-	E031-INVALID MAIN SP. % DAMAGE

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
PERCENT MORTALITY	1/69-69	0 - 5	-E-	E032-INVALID MAIN SP. % MORT
SHRUB SPECIES DATA:				
SPECIES COMPOSITION	1/70-71	00 - 20	-E-	E033-INVALID SHRUB SP. COMP
DISTRIBUTION	1/72-72	0 - 3	-E-	E034-INVALID SHRUB DISTR.
DENSITY	1/73-73	0 - 3	-E-	E035-INVALID SHRUB DENSITY
BROWSE	1/74-74	0 - 4	-E-	E036-INVALID SHRUB BROWSE
GROUND COVER	1/75-75	0 - 9	-E-	E037-INVALID SHRUB GND. COVER
RECONNAISSANCE LEVEL	1/76-76	0 - 9	-E-	E038-INVALID RECON. LEVEL
STAND ORIGIN	1/77-77	0 - 3	-E-	E039-INVALID STAND ORIGIN
DISTANCE TO ROAD	1/78-78	0 - 9	-E-	E040-INVALID DISTANCE TO ROAD
SIGNIFICANT CONDITION	1/79-79	0 - 9	-E-	E041-INVALID SIG. CONDITION
LARGE SPECIES 2 DATA:				
SPECIES	2/31-32	same range as main species	-E-	E042-INVALID L2 SPECIES
DBH	2/33-34	00, 05 - 99 (WARNING if greater than 25)	-E- -w-	E043-INVALID L2 SPECIES DBH W043-??? L2 species dbh
DISTRIBUTION	2/35-35	0 - 3	-E-	E044-INVALID L2 SPECIES DIST
VOLUME/ACRE	2/36-38	00.0 - 99.9	-E-	E045-INVALID L2 SPECIES VOL/AC
DAMAGE	2/39-40	same range as main species damage	-E-	E046-INVALID L2 SPECIES DAMAGE
HARVEST	2/41-41	0, 1, 9	-E-	E047-INVALID L2 SP. HARVEST
LARGE SPECIES 3 DATA:				
SPECIES	2/42-43	same range as main species	-E-	E048-INVALID L3 SPECIES
DBH	2/44-45	00, 05 -99 (WARNING if greater than 25)	-E- -w-	E049-INVALID L3 SPECIES DBH W049-??? L3 species dbh
DISTRIBUTION	2/46-46	0 - 3	-E-	E050-INVALID L3 SPECIES DIST
VOLUME/ACRE	2/47-49	00.0 - 99.9	-E-	E051-INVALID L3 SPECIES VOL/AC
DAMAGE	2/50-51	same range as main species damage	-E-	E052-INVALID L3 SPECIES DAMAGE
HARVEST	2/52-52	0, 1, 9	-E-	E053-INVALID L3 SP. HARVEST

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
LARGE SPECIES 4 DATA:				
SPECIES	2/53-54	same range as main species	-E-	E054-INVALID L4 SPECIES
DBH	2/55-56	00, 05 -99 (WARNING if greater than 25)	-E- -w-	E055-INVALID L4 SPECIES DBH W055-??? L4 species dbh
DISTRIBUTION	2/57-57	0 - 3	-E-	E056-INVALID L4 SPECIES DIST
VOLUME/ACRE	2/58-60	00.0 - 99.9	-E-	E057-INVALID L4 SPECIES VOL/AC
DAMAGE	2/61-62	same range as main species damage	-E-	E058-INVALID L4 SPECIES DAMAGE
HARVEST	2/63-63	0, 1, 9	-E-	E059-INVALID L4 SP. HARVEST
LARGE SPECIES 5 DATA:				
SPECIES	2/64-65	same range as main species	-E-	E060-INVALID L5 SPECIES
DBH	2/66-67	00, 05 -99 (WARNING if greater than 25)	-E- -w-	E061-INVALID L5 SPECIES DBH W061-??? L5 species dbh
DISTRIBUTION	2/68-68	0 - 3	-E-	E062-INVALID L5 SPECIES DIST
VOLUME/ACRE	2/69-71	00.0 - 99.9	-E-	E063-INVALID L5 SPECIES VOL/AC
DAMAGE	2/72-73	same range as main species damage	-E-	E064-INVALID L5 SPECIES DAMAGE
HARVEST	2/74-74	0, 1, 9	-E-	E065-INVALID L5 SP. HARVEST
MISC. CORDS/ACRE	2/75-77	00.0 - 99.9 (WARNING if greater than 10.0)	-E- -w-	E066-INVALID MISC CORDS/ACRE W066-??? misc cords/acre
MISC. MBF/ACRE	2/78-80	00.0 - 99.9 (WARNING if greater than 5.0)	-E- -w-	E067-INVALID MISC MBF/ACRE W067-??? misc mbf/acre
SMALL SPECIES 1 DATA:				
SPECIES	3/31-32	same range as main species	-E-	E068-INVALID S1 SPECIES
SIZE CLASS	3/33-33	0 - 3	-E-	E069-INVALID S1 SP. SIZE CLASS
DENSITY	3/34-34	0 - 9	-E-	E070-INVALID S1 SP. DENSITY
DISTRIBUTION	3/35-35	0 - 3	-E-	E071-INVALID S1 SPECIES DIST.
DAMAGE	3/36-37	same range as main species damage	-E-	E072-INVALID S1 SPECIES DAMAGE
SMALL SPECIES 2 DATA:				
SPECIES	3/38-39	same range as main species	-E-	E073-INVALID S2 SPECIES

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
SIZE CLASS	3/40-40	0 - 3	-E-	E074-INVALID S2 SP. SIZE CLASS
DENSITY	3/41-41	0 - 9	-E-	E075-INVALID S2 SP. DENSITY
DISTRIBUTION	3/42-42	0 - 3	-E-	E076-INVALID S2 SPECIES DIST.
DAMAGE	3/43-44	same range as main species damage	-E-	E077-INVALID S2 SPECIES DAMAGE
SMALL SPECIES 3 DATA:				
SPECIES	3/45-46	same range as main species	-E-	E078-INVALID S3 SPECIES
SIZE CLASS	3/47-47	0 - 3	-E-	E079-INVALID S3 SP. SIZE CLASS
DENSITY	3/48-48	0 - 9	-E-	E080-INVALID S3 SP. DENSITY
DISTRIBUTION	3/49-49	0 - 3	-E-	E081-INVALID S3 SPECIES DIST.
DAMAGE	3/50-51	same range as main species damage	-E-	E082-INVALID S3 SPECIES DAMAGE
SMALL SPECIES 4 DATA:				
SPECIES	3/52-53	same range as main species	-E-	E083-INVALID S4 SPECIES
SIZE CLASS	3/54-54	0 - 3	-E-	E084-INVALID S4 SP. SIZE CLASS
DENSITY	3/55-55	0 - 9	-E-	E085-INVALID S4 SP. DENSITY
DISTRIBUTION	3/56-56	0 - 3	-E-	E086-INVALID S4 SPECIES DIST.
DAMAGE	3/57-58	same range as main species damage	-E-	E087-INVALID S4 SPECIES DAMAGE
REMARKS	3/59-80	anything	---	

*** END OF SINGLE-FIELD EDITS ***

GREEN SHEET
 CARD/COLS VALID CONTENTS ERROR/
 warning ERROR/warning MESSAGE

 PHASE II INVENTORY (CSA) MULTIPLE-FIELD CROSS-CHECKS (Revised 2/3/1998) Page 1 of 15

 * MULTIPLE-FIELD EDITS (CONSISTENCY CROSS-CHECKS) *

GREEN SHEET
 CARD/COLS VALID RELATIONSHIP ERROR/
 warning ERROR/warning MESSAGE

TOWNSHIP
 RANGE
 E-W
 1/08-10 The Township, Range, and E-W fields
 1/11-12 (with E-W translated from 8 or 9 to
 1/13-13 W or E) are used to call up any
 matching records in the
 State Township File. This file
 contains one record for every
 valid County-Township-Range-EW
 combination in Minnesota. If
 no such Township-Range-EW
 combination is found in this file,
 an ERROR is generated. -E- E100-TOWN/RANGE NOT IN MINN.

TOWNSHIP
 RANGE
 E-W
 COUNTY
 1/08-10 The Township, Range, and E-W fields,
 1/11-12 (with E-W translated from 8 or 9 to
 1/13-13 W or E) are used to call up any
 1/14-15 matching records in the
 State Township File. This file
 contains one record for every
 valid County-Township-Range-EW
 combination in Minnesota. If
 none of the matching records
 contains the same value for County
 as is on the Inventory record,
 an ERROR is generated. The
 error message will display the
 valid county or counties (up to
 three, which is the Minn. maximum)
 for that Township-Range-EW
 combination. -E- E105-COUNTIES IN TWP: -----

SECTION
 TOWNSHIP
 RANGE
 E-W
 COUNTY
 ACQUISITION STATUS
 1/06-07 The legal description (SECTION,
 1/08-10 TOWNSHIP, RANGE, E-W, COUNTY) is
 1/11-12 used to call up any matching records
 1/13-13 in the Compressed Land File, which
 1/14-15 contains one or more records for
 1/25-25 each county-township-range-section

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
ADMINISTRATOR	1/26-26	unit administered by the State or by a County. If no records with that legal description exist in the Land File, a WARNING is generated.	-w-	W110-legal not on Land File
		If one or more records is found in the Compressed Land File that matches on legal description, then do the following checks:		
		ACQUISITION STATUS on the Inventory record should match ACQUISITION on at least one of the matching Land land records.	-w-	W110-Land File acq differs
		ADMINISTRATOR on the Inventory record should match ADMINISTRATOR on at least one of the matching Land land records.	-w-	W110-Land File admin differs
		The *combination* of ACQUISITION STATUS and ADMINISTRATOR values on the inventory record should exist on at least one of the matching Land records.	-w-	W110-Land File acq/adm differs
		Given a MAIN SPECIES, and in some cases a PHYSIOGRAPHIC CLASS, the MAIN COVER TYPE should be one of a limited number of types. If the MAIN COVER TYPE does not have one of these values, a WARNING is generated.	-w-	W120-cover/phys/??? main sp.

The valid relationships among these fields is as follows ("N/A" under PHYSIOGRAPHIC CLASS means it does not apply):

MAIN SPECIES	PHYS. CLASS	COVER TYPE
00	N/A	82 - 88, 90 - 99
01	N/A	01, 09, 40, 20
02	1 - 3	20, 40
	4 - 5	09
03	1 - 3	20, 40
	4 - 5	09
04	1 - 3	20, 40
	4 - 5	09

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
	05	1 - 3 4 - 5		
	06	N/A		
	12	N/A		
	13	N/A		
	14	1 - 3 4 - 5		
	15	1 - 3 4 - 5		
	16	N/A		
	17	N/A		
	21	1 - 3 4 - 5		
	22	N/A		
	23	1 - 3 4 - 5		
	24	1 - 3 4 - 5		
	25	N/A		
	26	N/A		
	27	N/A		
	28	N/A		

(continued on next page)
(continued from previous page)

MAIN SPECIES	PHYS. CLASS	COVER TYPES
31	N/A	30, 20, 40, 79
32	N/A	30, 20, 40, 79
33	N/A	30, 20, 40, 79
34	N/A	30, 20, 40, 79
35	N/A	30, 20, 40, 79
36	N/A	30, 20, 40, 79
38	1 - 3 4 - 5	20, 01, 40
39	1 - 3 4 - 5	01, 09
41	N/A	40
42	N/A	40
43	N/A	40
45	1 - 3 4 - 5	20, 01, 40
51	N/A	09
52	N/A	51
53	N/A	52
54	N/A	53
55	N/A	54
56	N/A	55
61	N/A	55
62	N/A	61

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
	63	N/A		
	64	N/A		
	65	N/A		
	71	1 - 3		
		4 - 5		
	72	N/A		
	73	N/A		
	81	N/A		
	82	N/A		
	83	N/A		
	84	N/A		
	85	N/A		
	86	N/A		
	91	1 - 3		
		4 - 5		
	92	N/A		
	93	N/A		
	94	N/A		
MAIN COVER SIZE CLASS	1/29-29			
MAIN SPECIES DBH	1/59-60			
		The following relationships must hold between MAIN COVER SIZE CLASS and MAIN SPECIES DBH:		
		MAIN COVER SIZE CLASS	MAIN SPECIES DBH	
		0	00 - 00	
		1	00 - 00	
		2	01 - 02	
		3	03 - 04	
		4	05 - 08	
		5	09 - 14	
		6	15 - 19	
		7	20 - 24	
		8	25 - 99	
MAIN COVER TYPE	1/27-28			
MAIN COVER SIZE CLASS	1/29-29			
MAIN COVER DENSITY	1/30-30			
		If MAIN COVER TYPE is less than 82, then both the MAIN COVER SIZE and the MAIN COVER DENSITY must be greater than zero.		
MAIN COVER TYPE	1/27-28			
MAIN COVER SIZE CLASS	1/29-29			
MAIN COVER DENSITY	1/30-30			
UNDERSTORY TYPE	1/31-32			
UNDERSTORY SIZE	1/33-33			

FIELD ----- GREEN SHEET CARD/COLS VALID CONTENTS ----- ERROR/warning MESSAGE -----
 UNDERSTORY DENSITY 1/34-34

MAIN COVER TYPE 1/27-28 If MAIN COVER TYPE is in the group
 MAIN COVER SIZE CLASS 1/29-29 (01 - 65), then do the following
 STAND AGE 1/44-46 check:

The following relationships should hold between SIZE CLASS and STAND AGE: -w- W160-cover/size/??? age

SIZE CLASS	STAND AGE
0	anything
1	015 or less
2	005 - 030
3	010 - 055
4	015 or greater
5	020 or greater
6	030 or greater
7	040 or greater
8	040 or greater

MAIN COVER TYPE 1/27-28 If MAIN COVER TYPE is in the group
 MAIN COVER SIZE CLASS 1/29-29 (01-74, 81), then do the
 MBF/ACRE 1/52-54 following check:

If MAIN COVER SIZE CLASS is 6 or greater, then MBF/ACRE must be greater than 00.0. -E- E170-COVER/SIZE/MBF

MAIN COVER TYPE 1/27-28 The following relationships
 SITE INDEX 1/41-42 must hold between MAIN COVER TYPE and SITE INDEX: -E- E190-COVER/SITE INDEX

COVER TYPE	SITE INDEX
01 - 11	01 - 99
12	35 - 99
13 - 25	01 - 99
30	40 - 99
40 - 62	01 - 99
70 - 74	23 - 99
75 - 77	00 - 22
78	00 - 34
79	00 - 39
81	01 - 99

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
MAIN COVER TYPE SITE INDEX STAND AGE	1/27-28 1/41-42 1/44-46	If MAIN COVER TYPE is in the group (01-74, 81), then do the following check: If STAND AGE is greater than 20, then SITE INDEX should be greater than 00. If MAIN COVER TYPE is in the group (87, 88, 90 - 99), then SITE INDEX and STAND AGE should contain zeros.		W200-cover/age/??? site index W200-cover/age/??? site index
MAIN COVER TYPE STAND AGE	1/27-28 1/44-46	The following relationships should hold between MAIN COVER TYPE and STAND AGE: COVER TYPE STAND AGE ----- 12 090 or less 13 120 or less 14 090 or less 25 100 or less 53 100 or less 61 120 or less 62 100 or less 74 120 or less		W210-cover/??? age
MAIN COVER TYPE STAND AGE BASAL AREA/ACRE	1/27-28 1/44-46 1/47-49	If MAIN COVER TYPE is in the group (01 - 74, 81), then do the following checks: If STAND AGE is greater than 030, then BASAL AREA/ACRE must be 020 or greater. If STAND AGE is less than 015, then BASAL AREA/ACRE should be 100 or less.		W220-cover/age/??? basal area W220-cover/age/??? basal area
MAIN COVER TYPE STAND AGE CORDS/ACRE MBF/ACRE	1/27-28 1/44-46 1/50-51 1/52-54	If MAIN COVER TYPE is in the group (01 - 74, 81), then do the following checks:		

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
		<p>Compute stand volume in cords = $CORDS/ACRE + (MBF/ACRE)*2$. Then the following relationships should hold between STAND AGE and stand volume in cords:</p>		
		<p>STAND AGE STAND CORDS/ACRE ----- 000 - 009 10.0 or less 010 - 019 15.0 or less 020 - 029 40.0 or less 030 - 039 50.0 or less 039 and up anything</p>		W230-cover/age/??? volume
MAIN COVER TYPE BASAL AREA/ACRE	1/27-28 1/47-49	If MAIN COVER TYPE is greater than 81, then BASAL AREA/ACRE must be 100 or less.	-E-	E240-COVER/BASAL AREA
MAIN COVER TYPE BASAL AREA/ACRE MAIN SPECIES DBH	1/27-28 1/47-49 1/59-60	If MAIN COVER TYPE is in the group (01-74, 81), then do the following checks: If MAIN SPECIES DBH is less than 03, then BASAL AREA/ACRE should be 100 or less. if MAIN SPECIES DBH is 05 or greater, then BASAL AREA/ACRE should be 030 or greater.	-w-	W250-cover/dbh/??? basal area
MAIN COVER TYPE CORDS/ACRE MBF/ACRE	1/27-28 1/50-51 1/52-54	If MAIN COVER TYPE is greater than 81, then STAND CORDS/ACRE = $CORDS/ACRE + (MBF/ACRE)*2$ should be 10.0 or less.	-w-	W250-cover/dbh/??? basal area
MAIN COVER TYPE CORDS/ACRE MAIN SPECIES DBH MAIN SPECIES VOL/ACRE LG. SPECIES 2 DBH LG. SPECIES 2 VOL/ACRE LG. SPECIES 3 DBH LG. SPECIES 3 VOL/ACRE LG. SPECIES 4 DBH	1/27-28 1/50-51 1/59-60 1/63-65 2/33-34 2/36-38 2/44-45 2/47-49 2/55-56	If MAIN COVER TYPE is in the group (01 - 74, 81), then do the following check: Compute sum of species cords/acre (summed across Main Species and each of the Large Species) in the following manner:	-w-	W260-cover/??? volume

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
LG. SPECIES 4 VOL/ACRE	2/58-60	If (respective) DBH is between 05 and 14 inclusive, and (corresponding) HARVEST is not equal to 9, add (corresponding) VOL/ACRE to sum of species cords/acre.		
LG. SPECIES 5 DBH	2/66-67			
LG. SPECIES 5 VOL/ACRE	2/69-71			
MISC. CORDS/ACRE	2/75-77			
		NOTE: No Harvest for Main Species		
		Then add MISC CORDS/ACRE to sum of species cords/acre.		
		(CORDS/ACRE) - (sum of species cords/acre) must be greater than or equal to -0.5 and less than or equal to 0.5 cords).	-E-	E270-CORDS/AC NOT = SPP. SUM
		NOTE: Remember to take into account the implied decimal points (see Green Sheet) in these calculations.		
MAIN COVER TYPE	1/27-28	If MAIN COVER TYPE is in the group (01 - 74, 81), then do the following check:		
MBF/ACRE	1/52-54			
MAIN SPECIES DBH	1/59-60	Compute sum of species MBF/acre (summed across Main Species and each of the Large Species) in the following manner: If (respective) DBH is 15 or greater, and (corresponding) HARVEST is not equal to 9, add (corresponding) VOL/ACRE to sum of species MBF/acre.		
MAIN SPECIES VOL/ACRE	1/63-65			
LG. SPECIES 2 DBH	2/33-34			
LG. SPECIES 2 VOL/ACRE	2/36-38			
LG. SPECIES 3 DBH	2/44-45			
LG. SPECIES 3 VOL/ACRE	2/47-49			
LG. SPECIES 4 VOL/ACRE	2/55-56			
LG. SPECIES 4 VOL/ACRE	2/58-60			
LG. SPECIES 5 DBH	2/66-67			
LG. SPECIES 5 VOL/ACRE	2/69-71			
MISC. MBF/ACRE	2/78-80			
		NOTE: No Harvest for Main Species		
		Then add MISC MBF/ACRE to sum of species MBF/acre.		
		(MBF/ACRE) - (sum of species MBF/acre) must be equal to zero.	-E-	E280-MBF/AC NOT = SPP. SUM
		NOTE: Remember to take into account the implied decimal points (see Green Sheet) in these calculations.		

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
MAIN COVER TYPE	1/27-28	If TIMBER STATUS is 0,		
TIMBER STATUS	1/56-56	then MAIN COVER TYPE must be 91 or greater.	-E-	E290-COVER/TIMBER STATUS
MAIN COVER SIZE CLASS	1/29-29	If MAIN COVER SIZE CLASS is 4 or greater, then do the following check:		
MAIN COVER DENSITY	1/30-30			
MAIN SPECIES DBH	1/59-60			
MAIN SPECIES VOL/ACRE	1/63-65	1. Compute sum of species cords/acre (summed across Main Species and each of the large Species) in the following manner:		
LG. SPECIES 2 DBH	2/33-34			
LG. SPECIES 2 VOL/ACRE	2/36-38			
LG. SPECIES 2 HARVEST	2/41-41			
LG. SPECIES 3 DBH	2/44-45			
LG. SPECIES 3 VOL/ACRE	2/47-49			
LG. SPECIES 3 HARVEST	2/52-52			
LG. SPECIES 4 DBH	2/55-56			
LG. SPECIES 4 VOL/ACRE	2/58-60			
LG. SPECIES 4 HARVEST	2/63-63			
LG. SPECIES 5 DBH	2/66-67			
LG. SPECIES 5 VOL/ACRE	2/69-71			
LG. SPECIES 5 HARVEST	2/74-74			
MISC. CORDS/ACRE	2/75-77	Then add MISC CORDS/ACRE to sum of species cords/acre.		
MISC. MBF/ACRE	2/78-80			

NOTE: No Harvest for Main Species

NOTE: Remember to take into account
the implied decimal points
(see Green Sheet) in these
calculations.

2. Compute sum of species MBF/acre
(summed across Main Species and
each of the large Species)
in the following manner:

If (respective) DBH is 15 or
greater, and (corresponding)
HARVEST is not equal to 9,
add (corresponding) VOL/ACRE to
sum of species MBF/acre.

Then add MISC MBF/ACRE to
sum of species MBF/acre.

NOTE: No Harvest for Main Species

NOTE: Remember to take into account

FIELD ----- GREEN SHEET CARD/COLS ----- VALID CONTENTS ----- ERROR/warning MESSAGE -----

the implied decimal points (see Green Sheet) in these calculations.

(continued on next page)

(continued from previous page)

3. Compute total stand volume in cords = sum of species cords/acre + [(sum of species MBF/acre) * 2].

4. Then the following relationships must hold between MAIN COVER DENSITY and total stand volume in cords:

-E- E300-COVER SIZE/DENS/CORDS/MBF

MAIN COVER DENSITY	TOTAL STAND CORDS/ACRE
0	0.0 - 2.9
1	3.0 - 7.5
2	7.6 - 12.5
3	12.6 - 17.5
4	17.6 - 22.5
5	22.6 - 27.5
6	27.6 - 32.5
7	32.6 - 37.5
8	37.6 - 42.5
9	42.6+

= = = = =

UNDERSTORY COVER TYPE 1/31-32 If UNDERSTORY COVER TYPE is greater than 81, then UNDERSTORY SIZE CLASS 1/33-33 UNDERSTORY SIZE CLASS and UNDERSTORY DENSITY 1/34-34 UNDERSTORY DENSITY must both be 0.

-E- E310-UNDER COVER/SIZE/DENSITY

= = = = =

MAIN SPECIES 1/57-58 If MAIN SPECIES is 00, then MAIN SPECIES DBH 1/59-60 the other six fields listed must MAIN SPECIES HEIGHT 1/61-62 contain zeros. MAIN SPECIES VOL/ACRE 1/63-65 MAIN SPECIES DAMAGE 1/66-67 MAIN SPECIES % DAMAGE 1/68-68 MAIN SPECIES % MORTALITY 1/69-69

-E- E320-MAIN SPECIES 00 HAS DATA

= = = = =

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
MAIN SPECIES DAMAGE	1/66-67	If MAIN SPECIES DAMAGE is 00, then		
MAIN SPECIES % DAMAGE	1/68-68	MAIN SPECIES % DAMAGE must be 0.	-E-	E330-MAIN SP. DAM 0, %DAM > 0
SHRUB SPECIES:				
COMPOSITION	1/70-71	If COMPOSITION is 00, then		
DISTRIBUTION	1/72-72	DISTRIBUTION, DENSITY, and		
DENSITY	1/73-73	BROWSE must all be 0.	-E-	E340-SHRUB COMP 00 HAS DATA
BROWSE	1/74-74			
LARGE SPECIES 2 DATA:				
SPECIES	2/31-32	If LARGE SPECIES 2 SPECIES is 00,		
DBH	2/33-34	the other five fields listed		
DISTRIBUTION	2/35-35	must contain zeros.	-E-	E350-L2 SPECIES 00 HAS DATA
VOLUME/ACRE	2/36-38			
DAMAGE	2/39-40			
HARVEST	2/41-41			
LARGE SPECIES 3 DATA:				
SPECIES	2/42-43	If LARGE SPECIES 3 SPECIES is 00,		
DBH	2/44-45	the other five fields listed		
DISTRIBUTION	2/46-46	must contain zeros.	-E-	E360-L3 SPECIES 00 HAS DATA
VOLUME/ACRE	2/47-49			
DAMAGE	2/50-51			
HARVEST	2/52-52			
LARGE SPECIES 4 DATA:				
SPECIES	2/53-54	If LARGE SPECIES 4 SPECIES is 00,		
DBH	2/55-56	the other five fields listed		
DISTRIBUTION	2/57-57	must contain zeros.	-E-	E370-L4 SPECIES 00 HAS DATA
VOLUME/ACRE	2/58-60			
DAMAGE	2/61-62			
HARVEST	2/63-63			
LARGE SPECIES 5 DATA:				
SPECIES	2/64-65	If LARGE SPECIES 5 SPECIES is 00,		
DBH	2/66-67	then the other seven fields listed		
DISTRIBUTION	2/68-68	must contain zeros.	-E-	E380-L5 SPECIES 00 HAS DATA
VOLUME/ACRE	2/69-71			
DAMAGE	2/72-73			
HARVEST	2/74-74			
MISC CORDS/ACRE	2/75-77			
MISC MBF/ACRE	2/78-80			

FIELD	GREEN SHEET CARD/COLS	VALID CONTENTS	ERROR/ warning	ERROR/warning MESSAGE
=	=	=	=	=
SMALL SPECIES 1 DATA:				
SPECIES	3/31-32	If SMALL SPECIES 1 SPECIES is 00,		
SIZE CLASS	3/33-33	then the other four fields listed		
DENSITY	3/34-34	must contain zeros.	-E-	E390-S1 SPECIES 00 HAS DATA
DISTRIBUTION	3/35-35			
DAMAGE	3/36-37			
=	=	=	=	=
SMALL SPECIES 2 DATA:				
SPECIES	3/38-39	If SMALL SPECIES 2 SPECIES is 00,		
SIZE CLASS	3/40-40	then the other four fields listed		
DENSITY	3/41-41	must contain zeros.	-E-	E400-S2 SPECIES 00 HAS DATA
DISTRIBUTION	3/42-42			
DAMAGE	3/43-44			
=	=	=	=	=
SMALL SPECIES 3 DATA:				
SPECIES	3/45-46	If SMALL SPECIES 3 SPECIES is 00,		
SIZE CLASS	3/47-47	then the other four fields listed		
DENSITY	3/48-48	must contain zeros.	-E-	E410-S3 SPECIES 00 HAS DATA
DISTRIBUTION	3/49-49			
DAMAGE	3/50-51			
=	=	=	=	=
SMALL SPECIES 4 DATA:				
SPECIES	3/52-53	If SMALL SPECIES 4 SPECIES is 00,		
SIZE CLASS	3/54-54	then the other four fields listed		
DENSITY	3/55-55	must contain zeros.	-E-	E420-S4 SPECIES 00 HAS DATA
DISTRIBUTION	3/56-56			
DAMAGE	3/57-58			
=	=	=	=	=

*** END OF MULTIPLE-FIELD CROSS-CHECKS ***

Products

Products

- Following your annual alteration cycle, you will automatically receive one color map and two black and white photocopy maps for each township that has been altered in any way. The scale of these maps will be 1:15840. One of the photocopy maps is used for alterations. The second photocopy map is for those areas that have work stations. Request additional maps from Grand Rapids whenever they are needed. There is no charge for Division of Forestry map requests. Map requests from outside the division will be billed.
- The CSA/alteration diskette will be sent to you from Grand Rapids. This diskette will update the acre figures in your area computer with computer-generated acre figures. Page 12-30 of the *FDM Manual* explains how to do this.
- Arc/View datasets are available from your regional GIS specialist upon request.
- You will receive a township summary for each township that was altered in any way. These summaries are divided into four parts:
 1. Changes to Acquisition and/or Administration codes made in St. Paul.
 2. Changes made to the stand acres when the computer-calculated acres are different than the area-calculated acres. These changes will be automatically made to your area dataset when you load the diskette you receive following alterations.
 3. Stands drawn on the map that have no data associated with them. They are labeled "UNK" on the map. Add data or delete the stand from the map. These stands already have numbers. These unknown stands will be entered into your area CSA data when you load the diskette you receive following alterations.
 4. Stands that have data, but no corresponding stand on the map. Add a stand for them on the map or delete the stand data.

Data Modeling

CSA Data Modeling

The use of models to grow forward CSA data has been integrated into the FIM (Forest Inventory Module) project. FIM has, in turn, been integrated into the FORIST (Forest Information System) project. The first modules of FORIST are being tested in the field at this time (2/14/00). Call FIS in St. Paul if you have questions about when and how modeling will be used.

Modeling

Scope

The development and implementation of models to update the CSA attribute database.

Models Under Consideration

Growth & yield

Model that changes volume, basal area, and age on merchantable stands.

Predictive

Model that assigns attributes to a stand using type-size-density classifications from remote sensing data.

To be used only on an interim basis until stand is verified by visual observation and/or plot work.

Regeneration

Model that changes the number of stems, DBH, and stand age on stands less than 5" diameter.

Successional

A model that assigns a type-size-density classification to disturbed stands. Initially based on local manager knowledge—eventually based on models being developed for ECS.

To be used only on an interim basis until stand is verified by visual observation and/or plot work.

Age/Diameter

Model that predicts DBH based on age, site index, and species.

Area Modeling Strategy - Prototype

Stands with major disturbance (harvesting, etc.)

At close of sale, area performs alteration. Updates stand type-size-density classification using the Successional Model. Other data is deleted with the exception of site index, physiographic class, topography class, timber status, and location data. Model updates stand age.

Within three years, area collects complete new data (all data fields based on actual field measurements) and updates database.

In lieu of field data, apply the Regeneration Model to update the stand attributes and database will be flagged to indicate such.

Stands approaching merchantability

Stands that have had field data recorded since disturbance will be modeled forward via the Regeneration Model until the model predicts, and is verified by the Age/Diameter Model, that they have reached merchantability (main species DBH \geq 6.0 inches). Area collects complete new data from field visit (all fields based on field measurements).

In lieu of field data, apply the Predictive Model and the database will be flagged to indicate such. Initially, the Predictive Model will require a photointerpreted type-size-density classification supplied by the area. Model will use this classification as an input and will update stand attributes based on the classification.

Stands where no field data was collected since disturbance will continue to be modeled forward via the Regeneration Model until the model predicts that they have reached merchantability. Area then collects new data from field visit.

In lieu of field data, apply the Predictive Model and the database will be flagged to indicate such. Area supplies type-size-density classification and model will update stand attributes.

Merchantable stands

Stands where new field data was collected at merchantability will then be modeled forward via the Growth & Yield Model and the database flagged to indicate such.

Stands will be targeted for further field visits based on area criteria and priorities that are developed as part of the timber management planning process.

Stands where no new field data was collected at merchantability will contain attributes that were generated by the Predictive Model. Apply the Growth & Yield Model to these attributes to update the stand and the database will be flagged to indicate such.

Stands will be targeted for further field visits based on area criteria and priorities that are developed as part of the timber management planning process.

Existing stands in the CSA database with original attribute data

Stand attributes will be modeled forward using the same techniques outlined above.

Data Recorders

Data Recorders

Data recorders are under development at this time. Data recorders are currently being used in the field to collect CSA data. Call Resource Assessment if you have questions about data recorders.

Insect & Disease Supplement

CSA Damage Codes - Stand Damage Supplement

The following pages describe the damage codes in more detail. For each damage code, hosts and identifiers are listed.

HOSTS - This is a listing of the most common hosts that a damage will occur on. It is unlikely you will see a particular damage on a species that is not listed as a host for that particular damage. By knowing the species, it will help in proper identification of the damage.

IDENTIFIERS - These are guides to help in making the correct identification of the damage. They are not all inclusive for a particular damage, but simply are the most common identifiers.

When coding a damage, if you are unsure or you see something that you believe is significant, it is important to seek help by:

- Talking with the regional forest health specialist (RFHS). If possible, collect specimens of the damage to show to the RFHS. They will also be aware of current insect and disease occurrence and will be able to alert you as to what to be looking for.
- Consulting references located in both area and field offices. Particularly look for the insect and disease looseleaf notebook which is filled with current insect and disease

literature. Other helpful publications include:

- *Insects That Feed on Trees and Shrubs* by Johnson and Lyon.
- *Eastern Forest Insects* by Baker.
- *A Guide to Insect Injury of Conifers in the Lake States* by Wilson.
- *Diseases of Trees and Shrubs* by Sinclair, Lyon, and Johnson.
- *Field Guide to Tree Diseases of Ontario* by Davis and Meyer.
- *A Guide to Common Insects and Diseases of Forest Trees in the Northeastern United States* (USFS).

CODE DAMAGE

00 HEALTHY - NO VISIBLE DAMAGE

Hosts: All Species

Identifiers:

- Crown: > 70% of crown has no visible damage.
- Bole: No visible damage.
- Entire Tree: No visible damage.

INSECTS

01 DEFOLIATORS

Hosts: All species

Identifiers:

- Leaves/needles missing or partially missing, skeletonized, or mined.
- Leaves distorted.
- Leaves/needles of a color other than the “normal” green color.

02 BARK BEETLES

Hosts: Conifers

Identifiers:

- Pockets of dead trees.
- Trees with dying or fading crowns.
- Pin holes or pitch tubes in bark associated with dying or fading crown.
- IF DEAD: Remove bark on bole and look for bark beetle galleries.

03 WOOD BORERS

Hosts: Pine (only)

Identifiers:

- Large holes in bole (at least ¼ inch) that enter into the wood; may be either oval or round.
- May be large quantities of coarse, fibrous frass (wood particles).
- Do not confuse with bark beetles which will make more numerous pin-head sized holes, finer boring dust and boring galleries under the bark, more superficial than wood borer galleries.

04 SARATOGA SPITTLEBUG (regen)

Hosts: Red pine and jack pine

Identifiers:

- Primarily found on pine trees 15 feet tall or less, particularly where sweet fern or woody shrubs such as willow and raspberry are growing among the trees.
- Flagging branches (branches with red foliage).
- Brown, flecking marks under the bark of two-year-old branch internodes.
- Can be confused with shoot blights, shoot borers, and drought.

CODE DAMAGE

05 WHITE PINE WEEVIL

Hosts: White and jack pines; all spruce species

Identifiers:

- Shepherd's crooking of terminal leader; two or more years' growth may be affected.
- White pine: Any crook or forking in main stem which is not caused by some other obvious agent.

06 SPRUCE BUDWORM

Hosts: Balsam fir, white spruce, and black spruce

Identifiers:

- Needles webbed together, especially in upper crown.
- Evidence of budworm, i.e., larvae, pupae, moths, or cast pupal skins.
- Groups of dead trees or trees with dead tops in stands with a history or prolonged budworm activity.

07 JACK PINE BUDWORM

Hosts: Jack pine and red pine

Identifiers:

- Needles webbed together, especially in upper crown.
- Evidence of budworm, i.e., larvae, pupae, moths, or cast pupal skins.
- Groups of dead trees or trees with dead tops in stands with a history of prolonged budworm activity.

08 SHOOT INSECTS (regen)

Hosts: Conifers

Identifiers:

- Terminal and lateral shoot discoloration and breakage.
- Shoots hollowed out and insect emergence holes.
- Old injury often shows up as deformed or crooked stems.

09 STEM BORERS

Hosts: Aspen, oaks, birch, maple

Identifiers:

- Boring holes, raised ridges, sawdust, galleries, and pitch masses.
- Stem breakage.
- D-shaped holes may be seen on birch and oak.
- Aspen and birch: Pitch or tree exudate often appearing as brown streaks on the bole.
- Oak: Declining and dead branches especially on drought-stressed oak.

CODE DAMAGE

10 ROOT COLLAR INSECTS (regen)

Hosts: Pines

Identifiers:

- Trees tipped over.
- Entire tree foliage fading.
- Black pitch, frass, larval borings in the root collar area of the tree.
- Can be confused with Armillaria root rot; Armillaria will not show the insect signs.

15 OTHER INSECTS

Hosts: All species

Identifiers:

- This damage code should only be used if you suspect the damage is caused by an insect but the insect does not appear on the insect list or you are unsure what insect caused the damage.

DISEASES

16 WHITE PINE BLISTER RUST (WPBR)

Hosts: White pine

Identifiers:

- Pitch streaking on bole or branches and associated with cankered areas which have discolored bark, sunken or roughened bark, or swollen stem.
- Flagged branch, fading foliage, or dead top without any obvious signs of porcupine feeding.

17 WPBR & WHITE PINE WEEVIL

Hosts: White pine

Identifiers:

- Both white pine blister rust and white pine weevil symptoms must be present.

18 SWEET FERN BLISTER RUST

Hosts: Jack pine and Scots pine

Identifiers:

- Localized area of dead cambium and bark.
- Fluted, misshapen bole; or long narrow dead area usually within 5 feet of the ground line.
- Orange-yellow blisters or pustules may appear on the edges of the canker in May.

CODE DAMAGE

19 SCLERODERRIS CANKER

Hosts: Pines

Identifiers:

- Branch flagging.
- Needles loose and falling off.
- In spring, needles on affected branches have brown bases before the branch flags.
- Pockets of dead trees.

20 SIROCOCCUS SHOOT BLIGHT

Hosts: Red pine

Identifiers:

- Current year needles brown and droop from their bases.
- Brown, drooping needles remain on the shoots for two or more years.
- Buds are killed.
- Little resin soaking or discoloration under the bark of the affected shoot.
- Often associated with overstory red pine.

21 BUTTERNUT CANKER

Hosts: Butternut

Identifiers:

- Dying branches or dead tops with epicormic shoots below the dead portions.
- Flattened or sunken area in bark on branches, main stem, or root collar.
- Longitudinal split in the bark with or without a black, watery material oozing from the split.

22 OAK MORTALITY

Hosts: All oaks

Identifiers:

Non-Oak Wilt

- Dead branches sticking up through the live crown due to twig, branch, and stem mortality progressing from top-down and outside-in.
- Tufted appearance of branches due to reduced growth of internodes and smaller leaves.
- Basal or epicormic shoots on main stem and along branches of hardwoods.
- Foliage may be thin, small, off-color, and fall prematurely.
- If D-shaped holes are present, use code 09, STEM BORERS.

CODE DAMAGE

Oak Wilt

All Oaks:

- Dead or dying oaks in groups in known infestation areas.
- Wilting, bronzing, and premature shedding of leaves from the top of the tree down in known infestation areas.

Red Oaks:

- Line between bronze tissue and green tissue on the leaves is very distinct; fallen leaves are likely to be green at the bases.
- Football-shaped fungal pads found between bark and wood surface on trees killed months earlier. A dark football-shaped stain will be left on the wood surface.

23 DWARF MISTLETOE

Hosts: Black and white spruces, tamarack

Identifiers:

- Proliferation of branches forming “witches’ brooms.”
- Vegetative shoots of the mistletoe plant.
- Pockets of dead and dying trees of any age with brooms.
- Infected trees of any age with brooms may also occur scattered throughout the stand (not in discrete pockets).

24 DIPLODIA TIP BLIGHT

Hosts: Pine species

Identifiers:

- Stunting and browning of current year shoots early in growing season.
- Branch flagging.
- Resin-soaked and discolored wood on affected branches.
- Pitchy canker that kills branch or tree top.

25 HYPOXYLON CANKER

Hosts: Aspen species

Identifiers:

- Yellow-orange slightly sunken areas with irregular margins.
- Areas of bark which become loose and blistered with small gray pillars (fruiting bodies) beneath the bark.
- Patches of gray-black, crust-like mounds forming on the wood.
- Roughened gray-black areas where the dead bark has cracked and fallen off in small patches.
- On older trees, cankers are often found just below the live crown or in the live crown area.
- Broken bole, usually higher on the bole, associated with an area at the break which is roughened and gray-black in color.

CODE DAMAGE

26 ASPEN DECAY (PHELLINUS)

Hosts: Aspen species

Identifiers:

- Hoof-shaped conks which are dark brown to black on the upper surface and tan to white on the lower surface.

27 HYPOXYLON & DECAY

Hosts: Aspen species

Identifiers:

- Must have signs and symptoms of both Hypoxylon and decay.

28 DECAY

Hosts: Any species

Identifiers:

- Conks.
- Hard, black irregular mass of fungal tissue.
- Holes (cavities).
- Decayed or punky wood seen in an open wound or crack.

29 DUTCH ELM DISEASE

Hosts: Elm species

Identifiers:

- A wilting and flagging (yellowing) of one or more of the upper branches.
- Discoloration and dropping of leaves from top down.
- Wilt symptoms are apparent throughout the crown.
- Leaves wilt and turn yellow or shrivel and are prematurely shed on individual branches, and symptoms are not associated with cankers on the branches or boles, especially on Chinese and Siberian elms.
- Dead elms with bark beetle galleries on wood surface.
- Dead elms unless there is another cause of death, i.e., flooding.

30 BIRCH DECLINE

Hosts: Birch species

Identifiers:

- Dead branches sticking up through the live crown due to twig, branch, and stem mortality progressing from top-down and outside-in.
- Tufted appearance of branches due to reduced growth of internodes and smaller leaves.
- Basal or epicormic shoots on main stem and along branches of hardwoods.
- Foliage may be thin, small, off-color, and fall prematurely.
- If D-shaped holes or galleries appearing as ridges in younger, thin barked trees are present, use code 09, STEM BORERS.

CODE DAMAGE

31 HARDWOOD CANKERS

Hosts: All hardwoods

Identifiers:

General:

- Localized area of dead cambium and bark.
- Fluted, misshapen bole; or long narrow dead area.

Nectria:

- Canker takes on target like appearance due to concentric callus ridges of exposed wood.

Eutypella:

- Canker has sunken center and flared margins often resembling a cobra's head.
- Bark remains attached to canker face.
- On maples.

32 NEEDLE RUSTS

Hosts: Pine and spruce species

Identifiers:

- Small, cream-colored or yellow pustules on the needles during spring or summer.
- Needles drop in the fall.

33 ARMILLARIA ROOT ROT

Hosts: All species

Identifiers:

- Entire foliage color will be faded green or red on young conifers.
- All leaders are drooping; usually associated with color change above.
- White mycelial fans under the bark at the ground line.
- Soil-encrusted black pitch at ground line; no insect activity in the area of pitch.
- Black shoestrings under the bark on dead trees.
- Honey-colored mushrooms at base of tree appearing during the fall.

40 OTHER DISEASES

Hosts: All species

Identifiers:

- This damage code should only be used if you suspect the damage is caused by a disease but the disease does not appear on the disease list or you are unsure what disease caused the damage.

ANIMALS

41 BEAVER

Hosts: All species

Identifiers:

- Chewed off or broken off trees with visible teeth marks.
- Trees and tops dragged into water.
- Flooded areas.

42 PORCUPINE

Hosts: All species, but especially pines

Identifiers:

- Dead tops with obvious signs of mechanical damage at base of dead portion.
- Trees with dead tops occur in pockets, or there are multiple trees affected.
- Pitch on main stem associated with an obvious wound with exposed wood.

43 RABBIT OR MICE (regen)

Hosts: All species

Identifiers:

- Wound (stripped bark) at ground line with exposed wood.
- Small teeth marks on wound surface.

44 DEER OR MOOSE (regen)

Hosts: All species

Identifiers:

- Buds and portions of shoots have been clipped off.
- Bark partially stripped off main stems where animals use trees for rubbing antlers.

45 SAPSUCKER

Hosts: All species

Identifiers:

- Rows of holes in bole.

46 OTHER ANIMALS

Hosts: All species

Identifiers:

- This damage code should only be used if you suspect the damage is caused by an animal but the animal does not appear on the animal list or you are unsure what animal caused the damage.

ENVIRONMENTAL DAMAGE

51 WINDTHROW

Hosts: All species

Identifiers:

- Trees tipped over with roots still attached.
- Damage may occur in strips through the stand.

52 DROUGHT

Hosts: All species

Identifiers:

- Wilting crowns, off-colored leaves, and leaves being shed.
- Dead tops.
- Epicormic shoots along bole and main branches which lack normal foliage.
- Dead pockets of trees.
- Dead, shallow-rooted understory trees.
- WITH a known dry period currently or in the recent past.

53 STEM BREAKAGE

Hosts: All species

Identifiers:

- Trees broken off with roots still in the ground.

54 FIRE

Hosts: All species

Identifiers:

- Triangular-shaped trunk scar with the base at the ground, and no decay is evident.
- If obvious fire scar has decay associated with it, code it to 28, DECAY.
- Blackened, charred stem.
- Scorched foliage with evidence of fire in the stand.

55 FLOODING

Hosts: All species

Identifiers:

- Decline and dieback, or mortality of groups of trees.
- WITH changes in water table levels resulting in standing water.
- Or, site conditions which provide opportunities for ponding or exposure to elevated water levels.

56 HAIL

Hosts: All species

Identifiers:

- Multiple wounds on branches and stems; wound will occur on all species or on multiple trees.
- Ground littered with branch tips.

CODE DAMAGE

57 OPEN CRACK

Hosts: All species

Identifiers:

- A long, narrow split in the bole that is open enough to insert a finger or pencil.
- If decayed wood is seen, the crack should be coded to 28, DECAY.

60 OTHER ENVIRONMENTAL DAMAGE

Hosts: All species

Identifiers:

- This damage code should only be used if you suspect the damage is caused by some environmental factor but that factor does not appear on the environmental damage list or you are unsure what environmental factor caused the damage.

HUMAN-CAUSED DAMAGE

61 MECHANICAL

Hosts: All species

Identifiers:

- Bark has been removed in a localized area, and the wood is exposed.
- If the wood shows decay, it should be coded to 28, DECAY.
- If the stem is broken, it should be coded to 53, STEM BREAKAGE.

62 CHEMICAL

Hosts: All species

Identifiers:

- Shoots over entire tree or on one side are misshaped.
- A variety of tree species and possible non-woody vegetation have discolored foliage or are dead.
- Damage may occur in pockets.

UNKNOWN OR NOT IN CODE LIST

99 UNKNOWN DAMAGE

Hosts: All species

Identifiers:

- Damage is unknown or does not fit any of the damage categories.

History of Lands

History of Lands in Minnesota

Federal Land Policies

With the cession of its western claims by Virginia in 1784, all of the area of which Minnesota is a part became public domain land. Under Article IV of the Constitution, this land was under complete control of the United States Congress. The Congress had the power to dispose of and make any needful rules respective to the territory belonging to the United States. Congress followed a basic policy of transferring ownership of the public domain to states, individuals, and corporations after termination of rights of occupancy by the Indians for over a century. It was through this policy that Minnesota received much of the land it manages.

Grants to the State

- **Trust Fund Lands** - Trust fund lands are lands granted to the state by the United States and are held by the state in trust for the public. Proceeds from the sale or use of such lands must be used for specified public purposes. For example, proceeds from certain lands must be used for school purposes. Trust fund lands are generally under the control of the Division of Forestry. Trust fund lands may be sold only at public sale after published notice. The Division of Fish and Wildlife, and other public agen-

cies, occasionally acquire trust fund lands by condemnation which is considered legally equivalent to a public sale. Trust fund lands bordering on public waters are withdrawn from sale by state law and may be sold only when specifically authorized by the Legislature. Trust fund lands may be leased for various purposes ranging from iron mining to lakeshore cabin sites.

- **School Trust Fund** - The Organic Act passed by Congress in March 1849 established a territorial government for Minnesota and reserved sections 16 and 36 of each township for the purpose of being applied to school and education in the territory. A later Enabling Act passed by Congress in February 1857, had provisions for lieu selections wherever parts of these sections had been disposed of or were meandered waters. Lands received in lieu of were called "indemnity school" or "lieu lands." Since that time the state has submitted lists for these selections with the final one being 1960. The Constitutional Convention of 1857 discussed the handling of school lands, and it was determined that the lands must be sold at public auction at a minimum of \$5 per acre, the principal to be reserved forever and the income from this fund be distributed to school districts in proportion to the number of students enrolled.

- **University Trust Fund** - In February 1851, the University was created by the Territorial Legislature. The Enabling Act of Congress in February 1851, directed the Secretary of the Interior to reserve from sale not to exceed two townships for support of the University. These lands were selected by the Governor and approved by the Commissioner of the General Land Office. The State Legislature in March 1868, put the administration of this grant under the State Land Office (State Auditor) with the proceeds going into the permanent University Fund. In 1931, the administration of this land was turned over to the Department of Conservation. In 1863, the Legislature accepted a grant of 120,000 acres based on 30,000 acres per representative and senator for the establishment of a College of Agriculture. By 1912 all of these lands had been disposed of and the income put into the University Permanent Fund.

- **Swamp** - Congress in 1849 granted to Louisiana "the whole of those swamp or overflowed lands which may or are found unfit for cultivation." Proceeds from sale were to be used exclusively, as far as necessary, for the construction of levees and drains. Similar grants were made in 1850 to 12 other states, accepting the lands shown by the notes of the public land surveyors or by selecting the land

through their own agents. Minnesota, Wisconsin, and Michigan were the only states which followed the former course. Land had to be 50 percent or more swamp to qualify. Although the Act specified that the sale of such lands should be devoted to drainage, the state spent no money for this purpose. About 34 percent of the area were granted to railroads. In 1881, an amendment was passed stating that swamp lands were to be sold in the same manner as school lands and that a permanent fund be created—the proceeds to be apportioned to schools.

- **Internal Improvement** - A federal statute of September 4, 1841, granted 500,000 acres of land for purposes of internal improvement to the nine public-land states then in the Union. It was not until 1866 that the state was aware that such a statute existed. After several years' controversy, it was decided to use the money from the sale of such lands for railroad bonds. About 99 percent of the funds so derived were used for this purpose. An amendment to the Constitution adopted in 1898 dedicated future income from the Internal Improvement Land Fund to the State Road and Bridge Fund.

Other Federal Grants

- **Salt Spring Lands** - The Enabling Act of 1857 provided a land grant of all salt springs within the state, not exceeding 12 in number, with six sections of land adjoining. They were to be selected by the Governor and to be used as the Legislature so directed. Some 7,600 acres were granted to a company which failed to find any water of commercial value. The Legislature in 1873 placed the remainder at the disposal of the University for the

support of the Geological and Natural History Survey. Proceeds from such lands go directly to the University.

- **Burntside State Forest** - In 1903 Congress, at the request of the State Forestry Board, gave indication it was willing to grant the State of Minnesota 20,000 acres of public land for forestry for experimental purposes. This area was selected in St. Louis County and was granted by Congress in 1904 with the provision that the land should be used for forestry purposes only. This land is under the control of the Division of Forestry. Income from this land is used by the division for forestry purposes. (A large portion of this land is now part of the Boundary Waters Canoe Area.)
- **Railroad Lands** - Beginning in 1854 Congress granted lands to the Territory of Minnesota to aid in the construction of railroads. These lands were alternate sections of public lands to a distance of six miles on each side of the railroad track. The legislature of the Territory (or future State of Minnesota) in turn was to grant the land to railroad companies authorized to receive grants under its acts of incorporation and Legislative Acts. Other grants were received up to 1866. However, in 1865, Congress increased the size of the grants to include alternate odd-numbered sections to a distance of 10 miles on each side of the railroad with lieu selections to a distance of 20 miles. Federal grants of public lands to the state to aid railroad construction totaled more than 8 million acres. A direct grant to the Northern Pacific Railroad of nearly 2 million acres brought the total to about 10 million acres of public domain land granted for railroad construction purposes. This figure comprises 20 percent of all the land area of Minnesota and

was by far the largest grant made by Congress for any single purpose. In addition, some of the railroads received 2,900,000 acres of the 4,700,000 acres of swamp land granted Minnesota.

Land Acquired by State

- **Volstead Land** - In 1908, the Volstead Act of the United States Congress made all unentered but unpatented public lands in Minnesota subject to all of the provisions of the law of the state relative to the drainage of swamp and overflowed lands and authorized the establishment of liens against such lands to meet their share of the cost in connection with any drainage project. With this encouragement, vast acres of swamp lands were included in drainage districts. The federal government refused to pay the taxes assessed against its lands adjoining drainage ditches, and in 1963, the state bought these lands from the federal government for their appraised value less the amount of the ditch bond taxes and accumulated interest. In this transaction the state purchased approximately 33,000 acres. The receipts from these lands are put into the State Forest Fund.
- **50-50 Lands** - Under Chapter 89 Minnesota Statutes, the counties of the state may elect to turn over tax-forfeited land to the state for management. These lands must be classified as Conservation Lands. If such lands are accepted by the Commissioner of Conservation, they will be devoted to forestry, watersheds, parks, game refuges, game management area, flood control, public hunting grounds, and other conservation uses. At the present time, Aitkin, Becker, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Fillmore,

Goodhue, Houston, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Mahnommen, Marshall, Mille Lacs, Pine, Red Lake, Roseau, St. Louis, Sherburne, Stearns, Wabasha, Wadena, and Winona counties have some land under this 50-50 agreement. This land may or may not be within a state forest but does assume state forest status. The counties receive 50 percent of the gross income from these lands. They can be released from state forest status by resolution of the county board and approval of the Commissioner of Conservation provided these tracts are found to be more valuable for agriculture or for the construction of industrial development as outlined in M.S.A. 89.01 Subd. 5 and subject to sale the same as other lands not reserved.

- **Pillsbury Lands** - The land was a gift to the State of Minnesota from ex-Governor John S. Pillsbury. It was composed of 990.55 acres of cut-over pine lands in Cass County near Gull Lake. Governor Pillsbury died before he completed conveying the land to the states and in 1902 his widow deeded the land to the State of Minnesota designating the University of Minnesota as beneficiary to receive two-thirds of all income ever derived from the land. This constituted the first forest reserve which is not part of the Pillsbury State Forest.
- **Other** - Other lands have been purchased, such as administrative sites; however, in 1963 the Minnesota State Legislature passed a Natural Resources and Recreation Act which provided money for the acquisition of land within the Minneapolis Memorial Hardwood State Forest located in southeastern Minnesota.

Other State-owned Lands

There are other state agencies owning land in Minnesota and on many of these the Division of Forestry has no jurisdiction. Some land owning agencies are the Division of Parks and Recreation, Highway Department, Welfare Department, Department of Corrections, and others. On the Division of Parks and Recreation lands, the Division of Forestry sells timber if any timber is to be sold. The Division of Forestry also aids other divisions of the department in leasing their lands especially for pole line rights-of-way.

Tax-forfeited Lands

Tax-forfeited lands are owned by the state by virtue of forfeiture for non-payment of taxes. Except for Conservation Area Lands, which are covered in a later paragraph, tax-forfeited lands are held by the state in trust for the taxing district in which they lie and are generally under the control of the county board. Tax-forfeited lands may be sold only at public sale after published notice. When any such lands are timbered, the appraisal of the timber value must be approved by the Commissioner of Conservation through the Division of Forestry before they may be sold. Tax-forfeited lands may be acquired by state agencies for public purposes by resolution of the county board. When so acquired, the lands are no longer held in trust for the taxing district.

Tax-forfeited Lands (County)

Tax-forfeited lands are lands that have forfeited to the state for failure to pay taxes. These lands are held in trust for the taxing districts to support local governmental activities within. These lands are administered by the counties under the supervision of the county board. Some counties employ a county land commissioner to manage these lands. In other counties, the county auditor and the county board take a more active part.

Laws governing tax-forfeited lands date back to the first legislature under Minnesota General Laws Chapter 1 and 2, 1859–1860. The Legislature failed to take into consideration the passing of the title to these tax-forfeited lands to the state, but rather anticipated that they would be redeemed by the original owner or would possibly be purchased by tax title by other people. Other legislatures attempted to pass these titles to the state on forfeited lands. Prior to 1916 failure by county auditors and county boards to act under the provisions of the law made little headway in attempting to pass title. The State Supreme Court added still another setback to tax-forfeiture title when they ruled there could be no forfeiture to the state or title to a purchaser until a notice of the right to redemption had been given the original owner. Numerous laws were passed to clarify title to tax-forfeited lands, however, in 1936 new laws became effective providing that tax delinquent lands would forfeit to the state after seven years and the state would thereby assume ownership. These lands are then state lands held in trust for the taxing districts and administered by counties subsequently taking on the name of the county lands. Other laws have been passed

since then clarifying tax-forfeiture land and timber policies.

The law provides that receipts from tax-forfeited lands be apportioned as follows: school districts 40 percent, county 30 percent, organized townships 20 percent, and the state 10 percent. In case of unorganized townships, their share goes to the county who then received 50 percent. This expense of running the tax-forfeited land department and certain bonded indebtedness is deducted from the receipts prior to apportionment. If the county board elects to make funds available for forest development, these funds are deducted before apportionment.

When tax-forfeited lands are sold, the title to the land is passed from the state to the new owner. Because of the past, these titles are not considered too saleable and, therefore, title clearing may become an expensive undertaking.

The Division of Forestry is charged with certain responsibilities in the administration of tax-forfeited lands. This is discussed in the *Cooperative Forest Management Manual*.

Tax-forfeited Lands (Consolidated Conservation)

At the turn of the century with logging declining, more emphasis was placed on an agricultural economy, and it was thought that the many thousands of acres of wetlands could be converted to farming in northern Minnesota. In 1887 the Legislature under pressure allowed organization of local drainage districts. This law had very little effect in the timbered regions; however, in 1909 the Legislature authorized the payment of

assessments on undeveloped state-owned swamp lands in the drainage districts. In 1908 the Congress passed the "Volstead Act" which permitted the establishment of liens on unperfected homesteads and other public lands in the drainage districts. The laws made it possible for a few land owners to petition for the construction of drainage ditches, the assessments were charged against all lands supposedly benefiting from the drainage. With all this encouragement, many miles of ditches were built in the drainage districts at a cost of millions of dollars. Much of the drained land was never occupied, others were abandoned because the land was too poor to develop and pay ditch assessments. Consequently, it forfeited. By 1930 the districts were in extremely difficult financial positions and the counties took them over to protect themselves, but in a number of cases, the burden was so great they could not carry the load.

The Act of April 19, 1929, M.S.A. 84A.01 of the Minnesota Legislature created the Red Lake Game Reserve in Beltrami, Lake of the Woods, and Koochiching counties, with specific boundaries authorizing the state to take absolute title, free from any trust in favor of the taxing district to all parcels of tax-forfeited land outside the corporate limits of cities and villages under the provisions of the Tax-Forfeiture Act of 1927 for assuming payment of assessments. It was required that all lands be classified as to the suitability for agriculture, forestry, or game productions. It allowed for the sale of lands more suited for agriculture and timber production than game production, with provisions covering receipts. In 1931 a similar act was passed (Chapter 84A.20) referring to certain counties, namely Aitkin, Roseau, and Mahanomen in which the state would assume the ditch bonds in return for clear title for lands in the drainage district. This Act described the lands

as suitable for use for afforestation, reforestation, flood control projects, and other public uses. In 1933 a third act (Chapter 84A.31) was enacted that took in Marshall County. This act resulted in a reforestation project for that county.

Under these acts the land was placed under the management of the Department of Conservation. M.S.A. provides for the administration of tax-forfeited lands and required county boards to classify these lands as "agriculture" or "non-agriculture." In 1949 the Legislature combined receipts from the lands acquired under these acts into "Consolidated Conservation Area Funds." The act specified what items of income are to flow into the fund and what is to be paid out.

Leased Lands

This type of land has carried a number of names, which has caused confusion and misunderstanding. This was due to various federal laws and agencies controlling them. The name most commonly used was Land Utilization Projects (LUP) lands. These projects were designed to move settlers to more settled and profitable areas.

Federal purchase of submarginal agricultural lands was authorized by the National Industrial Recovery Act of June 16, 1933. Supervision of this was assigned initially to the Federal Emergency Relief Administration, which in turn assigned responsibility for the planning of agricultural demonstration projects to the Land Policy Section of the Agricultural Adjustment Administration and for the planning of wildlife projects to the Bureau of Biological Survey in the Department of Agriculture. Many changes in the administration of the program have subsequently taken place.

This included lands in Beltrami, Carlton, Koochiching, and Lake of the Woods counties. It specified that the lands must be used for public purposes, conservation, and land utilization and reserved to the United States 75 percent of the minerals and all of the fissionable materials.

Another area was in Pine County which was placed under the administration of the National Park Service. In 1943 it was deeded to the state and is now part of St. Croix State Park. It specified the lands must be used for park and recreational purposes. This land is under the jurisdiction of the Division of Parks and Recreation.

- **The Beltrami Island Project** - The Beltrami Island Development Project in Beltrami, Lake of the Woods, and Roseau counties was initiated at the request of the Minnesota Department of Conservation and the Minnesota Rural Rehabilitation Corporation, and was formally approved by the Federal Emergency Relief Administration on December 27, 1934. The lands were leased to the state in 1940, for 50 years, for use as a wildlife refuge. In 1942, Executive Order 9091 designated them as the Beltrami Wildlife Management Area under the general custody of the Fish and Wildlife Service in the Department of the Interior, but made no change in the lease to the state. Although the lands are still in federal ownership, they are generally classed as state lands because of the long-term lease to the state, and are so treated. This land is under control of the Division of Game and Fish. When timber is sold, the sale is conducted by the Division of Forestry.

- **The Pine Island Project** - The Pine Island Project consisted of approximately 20,000 acres in Koochiching and Lake of the Woods counties and was leased to the Division of Lands and Forestry by the Department of Agriculture subject to supervision and certain approval by the United States Forest Service. Later the land was deeded to the state. It is now a part of the Pine Island State Forest.

- **Other Leased Lands** - This is limited almost entirely to administrative sites such as for towers. There are very few leases of this type remaining, but there may always be some because of the division's inability to purchase the land. Such land is under the jurisdiction of the Division of Forestry but subject to the restrictions provided in the lease.

