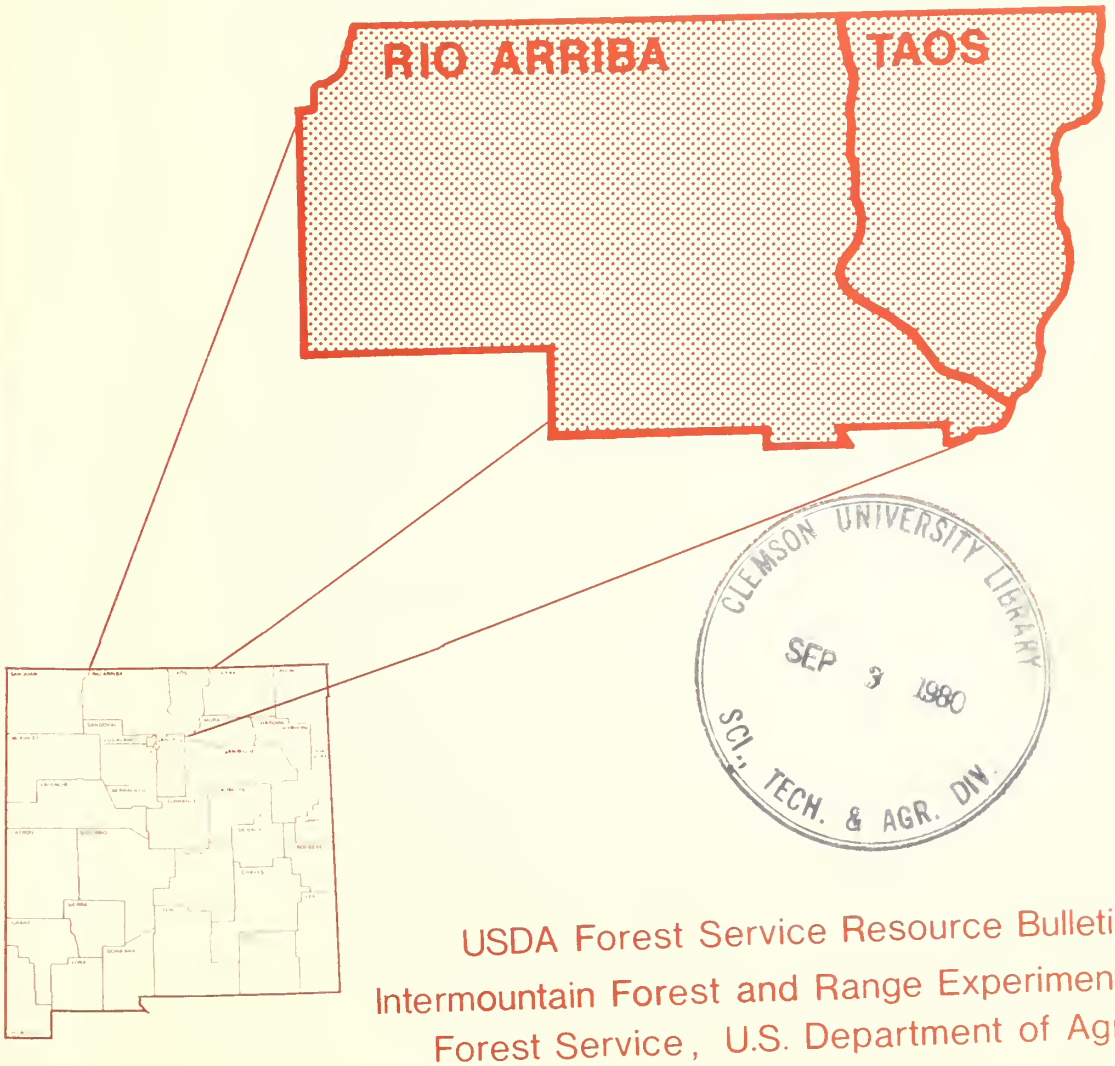
FOREST AREA AND TIMBER RESOURCE STATISTICS FOR THE TAOS-RIO ARRIBA WORKING CIRCLE, NEW MEXICO, 1977

MICHAEL K. BARRETT AND DOROTHY G. FELT



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RESEARCH SUMMARY

This bulletin presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

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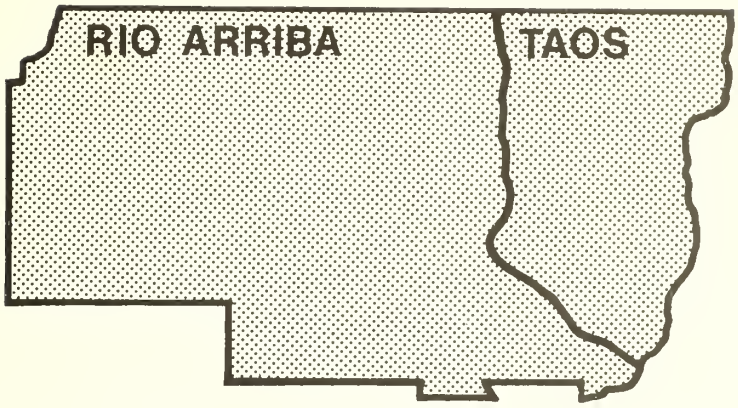

INTRODUCTION

This Resource Bulletin presents the principal findings of the second forest inventory of State and private lands in Taos and Rio Arriba Counties, New Mexico. Fieldwork began in July 1977 and was completed in November 1977. This bulletin does not note changes and trends since the statewide inventory of 1966. The 1966 inventory did not sample Taos and Rio Arriba Counties intensively and did not report findings at the working-circle level.

Originally, Resources Evaluation (formerly Forest Survey) was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978. The primary objective of Resources Evaluation, which is a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forest and rangelands. Fundamental to the accomplishment of this objective are the state by state resource inventories which are conducted periodically.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered through the Intermountain Forest and Range Experiment Station, headquartered in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and removals. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

The two-county area covered by this report is one of 11 working circles in New Mexico. Similar reports have been issued for Santa Fe, San Miguel, and Colfax County Working Circles. Comparable reports will be issued as the statewide inventory continues.

The Intermountain Station gratefully acknowledges the cooperation of the New Mexico Department of State Forestry and State and Private Forestry (USDA Forest Service, Southwestern Region). Appreciation is also expressed for the cooperation of other public agencies and private landowners in providing information and access to the sample locations.

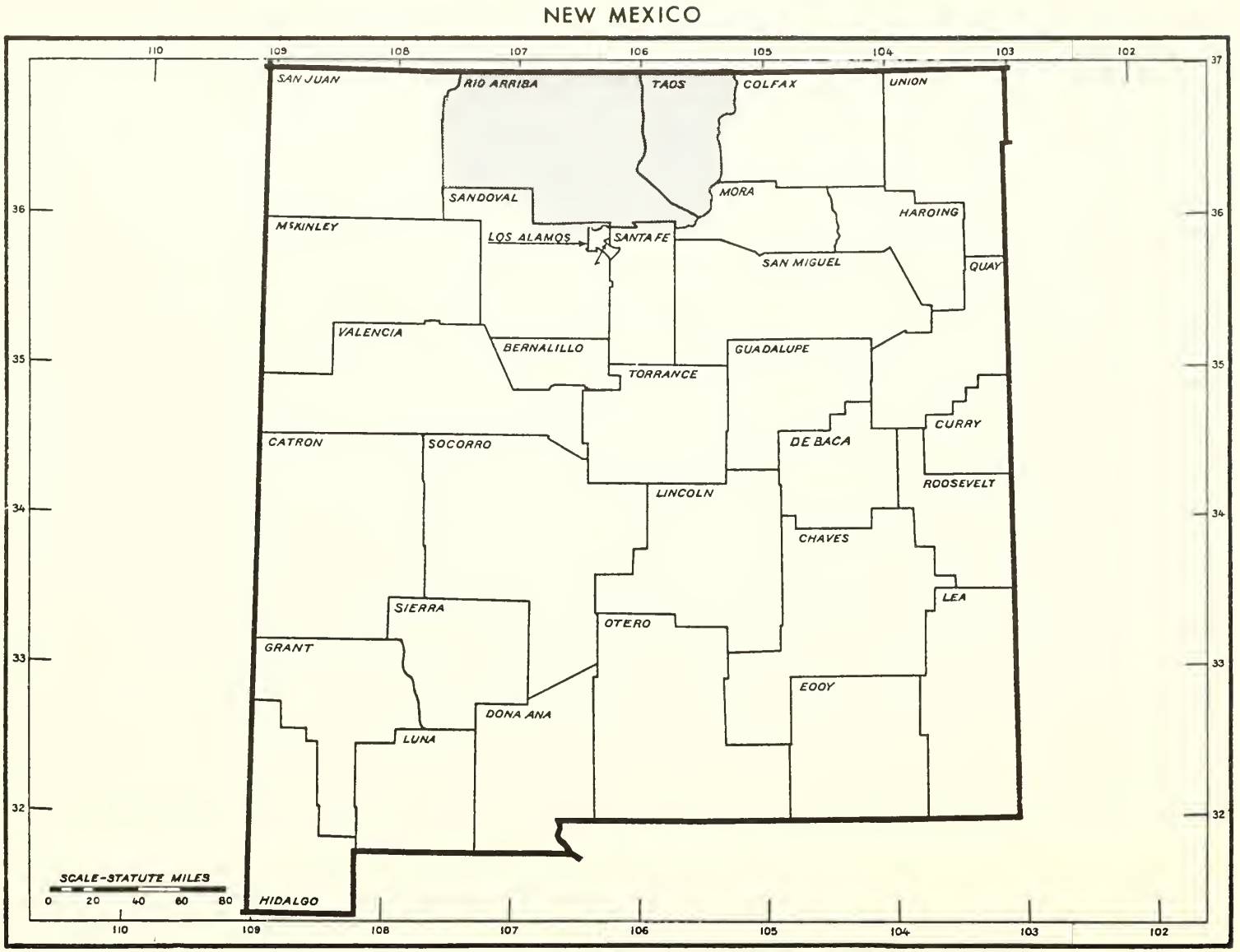

Figure 1.--Taos-Rio Arriba Working Circle, New Mexico.

HIGHLIGHTS

Area

- The forest land area is 652 thousand acres (264 thousand hectares), or 36 percent, of the total State and private land area in the Working Circle (fig. 2).

- Of the forest land, 293 thousand acres (119 thousand hectares), or 45 percent, is classified as commercial timberland.

- Private ownership accounts for 279 thousand acres (113 thousand hectares), or 95 percent, of the commercial timberland.

- The predominant forest types are spruce-subalpine fir, aspen, ponderosa pine, and Douglas-fir; they occupy 89 percent of the commercial timberland. The remaining area consists of white fir, cottonwood, and pinyon-juniper.[1]

- About half of the commercial timberland is in the 20 to 49 cubic foot productivity class, 94 percent of which is privately owned.

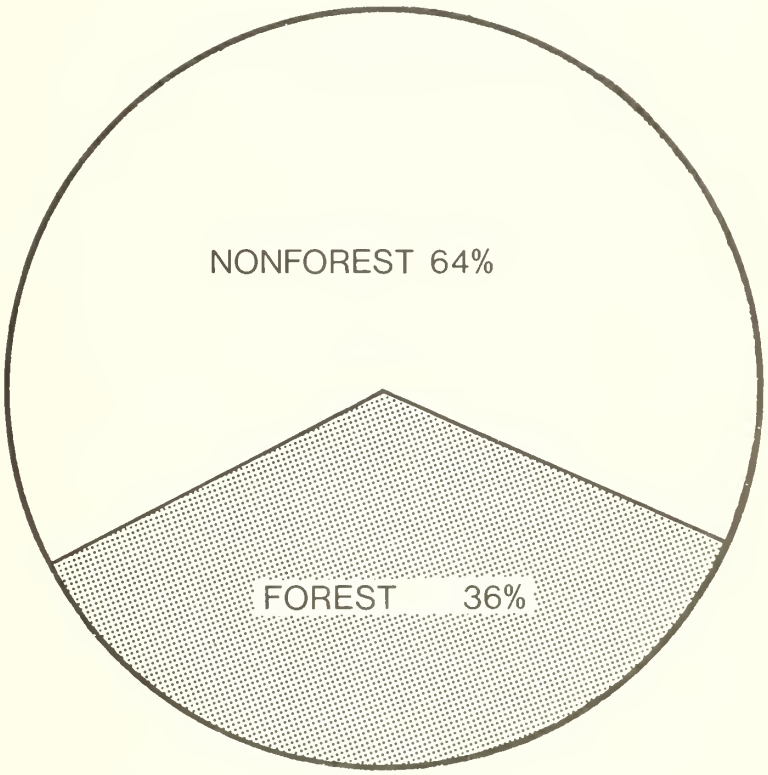

Figure 2.--Taos and Rio Arriba Counties; total land area by owner. The data presented in this report are for State and private lands only.

[1]The area occupied by pinyon-juniper forest type classified as commercial is so classified because the site index for other associated species on these stands (usually ponderosa pine or Douglas-fir) was high enough to indicate a site potential productivity level exceeding 20 cubic feet per acre per year average annual growth, and nonstockable indicators were not present in sufficient quantities to lower the yield capability below 20 cubic feet per acre per year. Although pinyon/juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

Inventory

- Growing stock volume amounts to 315 million cubic feet (9 million cubic meters) and sawtimber volume totals 1,070 million board feet.[2]

- Rough, rotten, and salvable dead trees comprise 35 million cubic feet (1 million cubic meters), or 10 percent, of the total timber volume.

- The largest share of the total growing stock volume is made up of Engelmann spruce (38 percent) and aspen (22 percent). Subalpine fir, ponderosa pine, Douglas fir, white fir, limber pine, pinyon/juniper, and cottonwood accounted for the remaining volume.

- Private owners control 96 percent of the total growing stock and sawtimber volume.

Growth and Mortality

- Net annual growth totals 8,911 thousand cubic feet (252 thousand cubic meters) Growth and mortality were not measured for pinyon and juniper trees.

- About 96 percent of the total net growth is on private lands.

- The annual mortality of 692 thousand cubic feet (20 thousand cubic meters) offsets 7 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and Working Circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 11,483 sample points systematically placed on maps and on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observation and measurements recorded at 228 ground sample locations (10-point cluster plot) distributed systematically over the land within each field stratum. Sample trees were selected on a fixed plot (1/300 acre for trees less than 5 inches d.b.h.) and with a 40 BAF variable plot for trees larger than 5 inches d.b.h.

3. Equations prepared from detailed measurements collected on standing trees throughout the Southwest were used to compute the volume and defect of individual tally trees.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

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[2]International 1/4-inch rule.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

Table 1.--*Area of forest land and percent standard error for the Taos-Rio Arriba Working Circle, 1977*

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	228,573	5.4	64,799	14.8	293,372	4.1
Other forest land:						
Unproductive reserved	--	--	--	--	--	--
Unproductive nonreserved	216,671	21.0	141,932	28.2	358,603	11.2

Table 2.--*Net volume and net annual growth and annual mortality of growing stock and sawtimber on commercial timberland, with percent standard error for the Taos-Rio Arriba Working Circle, 1977*

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	242,549	7.0	72,775	15.7	315,324	6.7
Sawtimber (M board feet[1])	921,275	7.4	148,651	23.3	1,069,926	7.0
Net annual growth:						
Growing stock (cubic feet)	6,844,938	8.0	2,066,278	18.7	8,911,216	7.9
Sawtimber (board feet[1])	31,292,661	9.6	8,206,279	32.7	39,498,940	10.5
Annual mortality:						
Growing stock (cubic feet)	423,340	25.2	268,565	52.5	691,905	27.6
Sawtimber (board feet[1])	1,416,853	28.5	516,609	60.6	1,933,462	25.5

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for the Taos-Rio Arriba Working circle, New Mexico, are displayed in tables 3 through 23.

TERMINOLOGY

Land and Water

Land area.--The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area (Bureau of the Census definition).

Census water.--As defined by the Bureau of the Census, streams, sloughs, estuaries and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.--The same as defined by the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Land Use Classes

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the forseeable future.)

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.--(1) Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; (2) unproductive-reserved forest land.

Nonforest land.--Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Ownership Classes

National Forest land.--Federal lands legally designated as National Forest or purchase units, and other lands under the administration of the Forest Service, includin experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.--Federal lands administered by the Bureau of Land Management.

Indian lands.--Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.

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

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

Forest industry lands.--Lands owned by companies or individuals operating wood-using plants.

Farmer-owned lands.--Lands owned by farm operators. (Note: These exclude lands leased by farm operators from nonfarm owners, such as railroad companies and States.)

Miscellaneous Federal lands.--Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

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

Forest Type and Tree Species

Forest types.--A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.--Tree species presently or prospectively suitable for industrial wood products.

Softwood.--Coniferous trees, usually evergreen, having needles or scalelike leaves.

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

Area Condition Classes

Stocking.--Stocking is an effort to express the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full-site occupancy. Overstocking is characterized by sites that have over 133 percent stocking.

Class 10.--Area fully stocked (100-132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.--Area fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked (60-99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and (or) inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.--Areas poorly stock (16.7-59 percent) with desirable trees, but fully stocked with growing stock trees.

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

Class 70.--Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.--Low-risk old-growth stands.

Class 90.--High-risk old-growth stands.

Nonstocked.--Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.--Growing stock trees (a) having no serious defect in quality limiting present or prospective use for timber products; (b) of relatively high vigor; and (c) containing no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.--Growing stock trees that meet specified standards of size and quality, but not qualifying as desirable trees.

Rough trees.--(1) Live trees of commercial species that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and (or) do not meet Rocky Mountain Regional specifications for freedom from defect primarily because of roughness or poor form; (2) all live trees of noncommercial species.

Rotten trees.--Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and (or) do not meet Rocky Mountain Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

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

Salvable dead trees.--Standing or down dead trees that are considered merchantable by Rocky Mountain Regional standards.

Mortality trees.--Trees formerly growing stock, dying from natural causes during a specified period, usually 1 year.

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree Size Classes

Seedlings.--Live trees less than 1.0 inch in diameter at breast height.

Saplings.--Trees 1.0-4.9 inches in diameter at breast height.

Poletimber trees.--Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.--Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches, and 11.0 inches for hardwoods.

Volume

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

Growing stock volume.--Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.--Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.--The increase in net growing stock volume of a specified size class for a specific year. (Note: Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.--Number or sound-wood volume of growing stock trees dying from natural causes during a specified period.

Site

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

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

FOREST SURVEY TABLES

Table 3.--*Total area in the Taos-Rio Arriba Working Circle by ownership class, 1977*

Ownership class	Acres	Hectares
National Forest	1,894,376	766,630
Bureau of Land Management	740,422	299,639
Indian	757,236	306,444
State	261,083	105,657
Private	1,529,987	619,166
Total land area	5,183,104	2,097,536
Census water	26,432	10,697
Gross area[1]	5,209,536	2,108,233

[1]U.S. Bureau of the Census, land and water area of the United States, 1970.

Table 4.--*Land area in the Taos-Rio Arriba Working Circle by major land class and ownership class, 1977*

Land class	Ownership class			
	State		Private	
	Acres	Hectares	Acres	Hectares
Commercial timberland	14,654	5,930	278,718	112,794
Productive reserved	--	--	--	--
Other forest land:				
Unproductive reserved	--	--	--	--
Unproductive nonreserved	64,928	26,276	293,675	118,846
Total forest land	79,582	32,206	572,393	231,640
Nonforest land	181,501	73,451	957,594	387,526
Total land area	261,083	105,657	1,529,987	619,166

Table 5.--*Area of commercial timberland in the Taos-Rio Arriba Working Circle by forest type, stand-size class, and site class; State owned, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	--	342	902	1,244
Poletimber	--	--	--	222	222
Sapling and seedling	--	--	235	109	344
Nonstocked	--	--	--	235	235
Total	--	--	577	1,468	2,045
Ponderosa pine:					
Sawtimber	--	--	1,057	2,640	3,697
Poletimber	--	--	184	--	184
Sapling and seedling	--	--	--	94	94
Nonstocked	--	--	--	614	614
Total	--	--	1,241	3,348	4,589
Spruce-subalpine fir:					
Sawtimber	--	117	874	1,425	2,416
Poletimber	--	--	333	31	364
Sapling and seedling	--	91	--	655	746
Nonstocked	--	--	--	--	--
Total	--	208	1,207	2,111	3,526
White fir:					
Sawtimber	--	11	701	245	957
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	234	234
Total	--	11	701	479	1,191
Pinyon-juniper:					
Sawtimber	--	--	--	91	91
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	91	91
Nonstocked	--	--	--	--	--
Total	--	--	--	182	182
Aspen:					
Sawtimber	--	86	1,187	421	1,694
Poletimber	--	196	173	411	780
Sapling and seedling	--	--	173	293	466
Nonstocked	--	--	--	--	--
Total	--	282	1,533	1,125	2,940
Cottonwood:					
Sawtimber	--	--	--	87	87
Poletimber	--	--	94	--	94
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	94	87	181
All types:					
Sawtimber	--	214	4,161	5,811	10,186
Poletimber	--	196	784	664	1,644
Sapling and seedling	--	91	408	1,242	1,741
Nonstocked	--	--	--	1,083	1,083
Total	--	501	5,353	8,800	14,654

Table 6.--*Area of commercial timberland in the Taos-Rio Arriba Working Circle by forest type, stand-size class, and site class; private owned, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	--	7,432	16,682	24,114
Poletimber	--	--	--	1,849	1,849
Sapling and seedling	--	--	1,736	3,722	5,458
Nonstocked	--	--	--	1,736	1,736
Total	--	--	9,168	23,989	33,157
Ponderosa pine:					
Sawtimber	--	--	8,563	27,415	35,978
Poletimber	--	--	1,742	--	1,742
Sapling and seedling	--	--	--	1,789	1,789
Nonstocked	--	--	--	5,349	5,349
Total	--	--	10,305	34,553	44,858
Spruce-subalpine fir:					
Sawtimber	--	5,458	46,662	38,744	90,864
Poletimber	--	--	9,324	1,872	11,196
Sapling and seedling	--	1,715	--	8,615	10,330
Nonstocked	--	--	--	--	--
Total	--	7,173	55,986	49,231	112,390
White fir:					
Sawtimber	--	1,809	16,114	3,546	21,469
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	1,736	1,736
Total	--	1,809	16,114	5,282	23,205
Pinyon-juniper:					
Sawtimber	--	--	--	1,715	1,715
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	1,715	1,715
Nonstocked	--	--	--	--	--
Total	--	--	--	3,430	3,430
Aspen:					
Sawtimber	--	2,077	21,549	11,445	35,071
Poletimber	--	5,313	4,153	5,426	14,892
Sapling and seedling	--	--	4,154	3,696	7,850
Nonstocked	--	--	--	--	--
Total	--	7,390	29,856	20,567	57,813
Cottonwood:					
Sawtimber	--	--	--	2,077	2,077
Poletimber	--	--	1,788	--	1,788
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	1,788	2,077	3,865
All types:					
Sawtimber	--	9,344	100,320	101,624	211,288
Poletimber	--	5,313	17,007	9,147	31,467
Sapling and seedling	--	1,715	5,890	19,537	27,142
Nonstocked	--	--	--	8,821	8,821
Total	--	16,372	123,217	139,129	278,718

Table 7.--*Area of commercial timberland in the Taos-Rio Arriba Working Circle by forest type, stand-size class, and site class; summary--State and private, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	--	7,774	17,584	25,358
Poletimber	--	--	--	2,071	2,071
Sapling and seedling	--	--	1,971	3,831	5,802
Nonstocked	--	--	--	1,971	1,971
Total	--	--	9,745	25,457	35,202
Ponderosa pine:					
Sawtimber	--	--	9,620	30,055	39,675
Poletimber	--	--	1,926	--	1,926
Sapling and seedling	--	--	--	1,883	1,883
Nonstocked	--	--	--	5,963	5,963
Total	--	--	11,546	37,901	49,447
Spruce-subalpine fir:					
Sawtimber	--	5,575	47,536	40,169	93,280
Poletimber	--	--	9,657	1,903	11,560
Sapling and seedling	--	1,806	--	9,270	11,076
Nonstocked	--	--	--	--	--
Total	--	7,381	57,193	51,342	115,916
White fir:					
Sawtimber	--	1,820	16,815	3,791	22,426
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	1,970	1,970
Total	--	1,820	16,815	5,761	24,396
Pinyon-juniper:					
Sawtimber	--	--	--	1,806	1,806
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	1,806	1,806
Nonstocked	--	--	--	--	--
Total	--	--	--	3,612	3,612
Aspen:					
Sawtimber	--	2,163	22,736	11,866	36,765
Poletimber	--	5,509	4,326	5,837	15,672
Sapling and seedling	--	--	4,327	3,989	8,316
Nonstocked	--	--	--	--	--
Total	--	7,672	31,389	21,692	60,753
Cottonwood:					
Sawtimber	--	--	--	2,164	2,164
Poletimber	--	--	1,882	--	1,882
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	1,882	2,164	4,046
All types:					
Sawtimber	--	9,558	104,481	107,435	221,474
Poletimber	--	5,509	17,791	9,811	33,111
Sapling and seedling	--	1,806	6,298	20,779	28,883
Nonstocked	--	--	--	9,904	9,904
Total	--	16,873	128,570	147,929	293,372

Table 8.--*Area of commercial timberland in the Taos-Rio Arriba Working Circle by stand volume and ownership classes, 1977*

Stand volume per acre[1]	Ownership class		
	State	Private	State and private
	Acres		
Less than 1,500 board feet	5,243	72,592	77,835
1,500 to 4,999 board feet	7,034	130,662	137,696
5,000 to 9,999 board feet	2,111	64,141	66,252
10,000 board feet or more	266	11,323	11,589
All classes	14,654	278,718	293,372

[1]International 1/4-inch rule.

Table 9.--*Area of commercial timberland in the Taos-Rio Arriba Working Circle by forest type and area condition class; State and private, 1977*

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	--	4,042	7,720	6,000	1,820	5,954	1,971	3,821	1,903	1,971	35,202	14,246
Ponderosa pine	--	--	--	2,231	4,234	5,780	17,535	1,806	11,898	5,963	49,447	20,010
Spruce-subalpine fir	3,822	5,969	13,162	21,435	1,820	24,462	27,880	15,561	1,805	--	115,916	46,910
White fir	--	--	--	3,640	3,791	7,494	7,501	--	--	1,970	24,396	9,873
Pinyon-juniper	--	--	--	--	--	--	3,612	--	--	--	3,612	1,462
Aspen	2,163	6,245	4,394	4,326	7,735	22,015	10,136	--	3,739	--	60,753	24,586
Cottonwood	--	--	--	--	--	--	4,046	--	--	--	4,046	1,637
All types	5,985	16,256	25,276	37,632	19,400	65,705	72,681	21,188	19,345	9,904	293,372	118,724

Table 10.--*Area of unproductive nonreserved forest land in the Taos-Rio Arriba Working Circle by forest type and ownership class, 1977*

Forest type	State		Private		State and private	
	Acres	Hectares	Acres	Hectares	Acres	Hectares
Douglas-fir	222	90	1,849	748	2,071	838
Ponderosa pine	94	38	1,789	724	1,883	762
Limber pine	271	110	3,819	1,545	4,090	1,655
Spruce-subalpine fir	335	136	9,129	3,694	9,464	3,830
Pinyon-juniper	40,498	16,389	158,665	64,210	199,163	80,599
Aspen	932	377	17,450	7,062	18,382	7,439
Cottonwood	181	73	3,865	1,564	4,046	1,637
Mixed hardwoods	22,395	9,063	97,109	39,299	119,504	48,362
All types	64,928	26,276	293,675	118,846	358,603	145,122

Table 11.--*Number of growing stock trees on commercial timberland in the Taos-Rio Arriba Working Circle by species and diameter class; State and private, 1977*

Species	Diameter class (inches at breast height)															
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand trees															
Douglas-fir	2,098	1,696	854	863	708	445	210	86	55	19	12	7	9	7	12	7,081
Ponderosa pine	1,106	1,957	1,272	818	551	390	213	119	78	62	30	27	8	6	5	6,642
Limber pine	309	185	46	114	39	43	--	--	5	3	3	2	--	--	--	749
Subalpine fir	8,564	5,007	2,055	1,239	751	407	165	95	53	19	19	7	2	3	2	18,388
White fir	4,365	1,659	1,105	685	616	384	223	147	55	39	15	12	4	--	5	9,314
Engelmann spruce	8,749	5,865	4,025	2,902	2,230	1,338	778	441	260	68	51	38	17	16	5	26,783
Pinyon/juniper	246	535	119	211	28	21	21	6	9	--	--	--	--	--	--	1,196
Total softwoods	25,437	16,904	9,476	6,832	4,923	3,028	1,610	894	515	210	130	93	40	32	29	70,153
Aspen	11,400	10,904	4,711	3,046	1,185	691	307	176	29	4	--	--	--	--	--	32,453
Cottonwood	54	251	38	239	80	--	--	30	23	--	3	3	--	--	--	721
Total hardwoods	11,454	11,155	4,749	3,285	1,265	691	307	206	52	4	3	3	--	--	--	33,174
All species	36,891	28,059	14,225	10,117	6,188	3,719	1,917	1,100	567	214	133	96	40	32	29	103,327

Table 12.--*Number of cull and salvable dead trees on commercial timberland in the Taos-Rio Arriba Working Circle by ownership class, and softwoods and hardwoods, 1977*

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
State:				
Softwoods	528	62	590	31
Hardwoods	144	214	358	26
Total	672	276	948	57
Private:				
Softwoods	10,838	1,485	12,323	881
Hardwoods	3,581	4,828	8,409	665
Total	14,419	6,313	20,732	1,546
State and private:				
Softwoods	11,366	1,547	12,913	912
Hardwoods	3,725	5,042	8,767	691
Total	15,091	6,589	21,680	1,603

Table 13.--*Net volume of growing stock on commercial timberland in the Taos-Rio Arriba Working Circle by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					*Thousand cubic meters*
State:							
	Douglas-fir	1,262	123	119	42	1,546	44
	Ponderosa pine	2,322	53	17	87	2,479	70
	Spruce-subalpine fir	3,468	382	211	--	4,061	115
	White fir	709	--	--	45	754	21
	Pinyon-juniper	23	--	14	--	37	1
	Aspen	2,427	839	98	--	3,364	95
	Cottonwood	86	77	--	--	163	5
	All types	10,297	1,474	459	174	12,404	351
Private:							
	Douglas-fir	29,112	1,025	1,857	312	32,306	915
	Ponderosa pine	23,376	506	326	642	24,850	704
	Spruce-subalpine fir	129,216	12,082	2,776	--	144,074	4,080
	White fir	21,855	--	--	334	22,189	629
	Pinyon-juniper	434	--	271	--	705	20
	Aspen	55,617	17,530	2,123	--	75,270	2,131
	Cottonwood	2,068	1,458	--	--	3,526	99
	All types	261,678	32,601	7,353	1,288	302,920	8,578
State and private:							
	Douglas-fir	30,374	1,148	1,976	354	33,852	959
	Ponderosa pine	25,698	559	343	729	27,329	774
	Spruce-subalpine fir	132,684	12,464	2,987	--	148,135	4,195
	White fir	22,564	--	--	379	22,943	650
	Pinyon-juniper	457	--	285	--	742	21
	Aspen	58,044	18,369	2,221	--	78,634	2,226
	Cottonwood	2,154	1,535	--	--	3,689	104
	All types	271,975	34,075	7,812	1,462	315,324	8,929

Table 14.--*Net volume of sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
State:						
	Douglas-fir	4,192	286	406	181	5,065
	Ponderosa pine	9,338	132	40	438	9,948
	Spruce-subalpine fir	12,408	621	785	--	13,814
	White fir	2,574	--	--	192	2,766
	Pinyon-juniper	106	--	68	--	174
	Aspen	8,125	1,158	282	--	9,565
	Cottonwood	451	20	--	--	471
	All types	37,194	2,217	1,581	811	41,803
Private:						
	Douglas-fir	99,419	2,372	7,109	1,339	110,239
	Ponderosa pine	96,160	1,253	776	3,214	101,403
	Spruce-subalpine fir	479,929	19,973	9,937	--	509,839
	White fir	73,486	--	--	1,422	74,908
	Pinyon-juniper	2,000	--	1,288	--	3,288
	Aspen	187,275	23,222	6,770	--	217,267
	Cottonwood	10,796	383	--	--	11,179
	All types	949,065	47,203	25,880	5,975	1,028,123
State and private:						
	Douglas-fir	103,611	2,658	7,515	1,520	115,304
	Ponderosa pine	105,498	1,385	816	3,652	111,351
	Spruce-subalpine fir	492,337	20,594	10,722	--	523,653
	White fir	76,060	--	--	1,614	77,674
	Pinyon-juniper	2,106	--	1,356	--	3,462
	Aspen	195,400	24,380	7,052	--	226,832
	Cottonwood	11,247	403	--	--	11,650
	All types	986,259	49,420	27,461	6,786	1,069,926

[1]International 1/4-inch rule.

Table 15.--*Net volume of growing stock on commercial timberland in the Taos-Rio Arriba Working Circle by species and diameter class; State and private, 1977*

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	1,142	3,739	5,653	5,631	3,835	2,311	1,760	727	554	359	526	501	1,511	28,249
Ponderosa pine	1,702	3,144	4,003	4,505	3,546	2,814	2,891	2,694	1,755	1,686	712	570	800	30,822
Limber pine	36	308	266	411	--	--	142	104	109	103	--	--	--	1,479
Subalpine fir	4,238	6,188	7,751	6,720	3,619	2,931	1,895	783	1,103	547	248	208	161	36,392
White fir	1,378	2,393	4,294	4,605	4,042	3,639	1,892	1,615	822	781	299	--	608	26,368
Engelmann spruce	8,023	14,607	20,527	20,204	17,380	13,829	10,702	3,901	3,219	2,843	1,469	1,626	886	119,216
Pinyon/juniper	1	7	3	2	5	1	4	--	--	--	--	--	--	23
Total softwoods	16,520	30,386	42,497	42,078	32,427	25,525	19,286	9,824	7,562	6,319	3,254	2,905	3,966	242,549
Aspen	11,304	19,380	12,823	11,233	7,078	5,156	1,170	253	--	--	--	--	--	68,397
Cottonwood	173	1,057	758	--	--	962	1,077	--	201	150	--	--	--	4,378
Total hardwoods	11,477	20,437	13,581	11,233	7,078	6,118	2,247	253	201	150	--	--	--	72,775
All species	27,997	50,823	56,078	53,311	39,505	31,643	21,533	10,077	7,763	6,469	3,254	2,905	3,966	315,324

Table 16.--*Net volume of sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by species and diameter class; State and private, 1977*

Species	Diameter class (inches at breast height)													
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	18,217	23,695	18,351	11,966	9,498	4,025	3,144	2,069	3,035	2,903	8,822	105,725
Ponderosa pine	13,644	20,438	18,017	15,352	16,781	15,466	9,328	9,213	4,316	3,623	4,882	131,060
Limber pine	914	1,657	--	--	715	533	574	568	--	--	--	4,961
Subalpine fir	29,657	33,039	18,529	15,100	9,736	4,020	5,694	2,855	1,307	1,112	876	121,925
White fir	15,138	20,372	18,476	16,499	8,242	6,807	3,318	3,079	1,169	--	2,432	95,532
Englemann spruce	73,613	99,250	89,326	71,784	55,416	20,136	16,644	14,804	7,702	8,614	4,740	462,029
Pinyon/juniper	8	6	15	4	10	--	--	--	--	--	--	43
Total softwoods	151,191	198,457	162,714	130,705	100,398	50,987	38,702	32,588	17,529	16,252	21,752	921,275
Aspen	0	59,101	39,476	28,992	6,503	1,387	--	--	--	--	--	135,459
Cottonwood	0	--	--	5,400	5,938	--	1,070	784	--	--	--	13,192
Total hardwoods	0	59,101	39,476	34,392	12,441	1,387	1,070	784	--	--	--	148,651
All species	151,191	257,558	202,190	165,097	112,839	52,374	39,772	33,372	17,529	16,252	21,752	1,069,926

Table 17.--*Net volume of growing stock and sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by ownership class and species, 1977*

Ownership class	Species											All species
	Douglas-fir	Ponderosa pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	GROWING STOCK *Thousand cubic feet*											
State	1,319	2,706	84	1,059	1,074	3,216	2	9,460	2,753	191	2,944	12,404
Private	26,930	28,116	1,395	35,333	25,294	116,000	21	233,089	65,644	4,187	69,831	302,920
Total	28,249	30,822	1,479	36,392	26,368	119,216	23	242,549	68,397	4,378	72,775	315,324
	GROWING STOCK *Thousand cubic meters*											
State	37	77	2	30	31	91	([1])	268	78	5	83	351
Private	763	796	40	1,000	716	3,284	1	6,600	1,859	119	1,978	8,578
Total	800	873	42	1,030	747	3,375	1	6,868	1,937	124	2,061	8,929
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*											
State	4,784	11,241	236	3,311	3,752	12,448	3	35,775	5,493	535	6,028	41,803
Private	100,941	119,819	4,725	118,614	91,780	449,581	40	885,500	129,966	12,657	142,623	1,028,123
Total	105,725	131,060	4,961	121,925	95,532	462,029	43	921,275	135,459	13,192	148,651	1,069,926

[1]Less than 0.5 thousand cubic meters.

Table 18.--*Net volume of timber on commercial timberland in the Taos-Rio Arriba Working Circle by class of timber, and softwoods and hardwoods; State and private, 1977*

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw-log portion	182,799	25,962	208,761
Upper-stem portion	12,844	1,318	14,162
Total	195,643	27,280	222,923
Poletimber trees	46,906	45,495	92,401
All growing stock trees	242,549	72,775	315,324
Sound cull trees	8,259	1,196	9,455
Rotten cull trees	5,973	8,422	14,395
Salvable dead trees	7,483	3,967	11,450
All timber	264,264	86,360	350,624

Table 19.--*Net volume of growing stock on commercial timberland in the Taos-Rio Arriba Working Circle by forest type and species; State and private, 1977*

Forest type	Species												All species
	Douglas-fir	Ponderosa pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods		
	Thousand cubic feet												*Thousand cubic meters*
Douglas-fir	19,801	3,004	444	527	6,695	811	1	31,283	2,569	--	2,569	33,852	959
Ponderosa pine	678	25,694	192	62	564	--	14	27,204	125	--	125	27,329	774
Spruce-subalpine fir	3,312	--	458	28,269	557	105,755	--	138,351	9,609	175	9,784	148,135	4,195
White fir	1,966	923	213	306	13,840	--	--	17,248	5,695	--	5,695	22,943	650
Pinyon-juniper	--	735	--	--	--	--	7	742	--	--	--	742	21
Aspen	2,492	466	172	7,228	4,712	12,445	1	27,516	50,399	719	51,118	78,634	2,226
Cottonwood	--	--	--	--	--	205	--	205	--	3,484	3,484	3,689	104
All types	28,249	30,822	1,479	36,392	26,368	119,216	23	242,549	68,397	4,378	72,775	315,324	8,929
	Thousand cubic meters												
All types	800	873	42	1,030	747	3,375	1	6,868	1,937	124	2,061		8,929

Table 20.--*Net volume of sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by forest type and species; State and private, 1977*

Forest type	Species											All species
	Douglas-fir	Ponderosa pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	69,378	14,688	1,553	850	23,516	2,540	2	112,527	2,777	--	2,777	115,304
Ponderosa pine	3,284	106,333	--	--	1,710	--	24	111,351	--	--	--	111,351
Spruce-subalpine fir	14,694	--	1,733	89,366	2,503	408,030	--	516,326	6,732	595	7,327	523,653
White fir	8,474	4,078	1,107	1,563	51,509	--	--	66,731	10,943	--	10,943	77,674
Pinyon-juniper	--	3,445	--	--	--	--	17	3,462	--	--	--	3,462
Aspen	9,895	2,516	568	30,146	16,294	51,056	--	110,475	115,007	1,350	116,357	226,832
Cottonwood	--	--	--	--	--	403	--	403	--	11,247	11,247	11,650
All types	105,725	131,060	4,961	121,925	95,532	462,029	43	921,275	135,459	13,192	148,651	1,069,926

Table 21.--*Net annual growth of growing stock and sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by ownership class and species, 1977*

Ownership class	Species										All species
	Douglas-fir	Ponderosa pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	GROWING STOCK *Cubic feet*										
State	29,869	74,669	1,290	30,441	32,540	92,715	261,524	75,714	5,952	81,666	343,190
Private	541,217	758,117	21,714	898,086	661,135	3,703,145	6,583,414	1,860,804	123,808	1,984,612	8,568,026
Total	571,086	832,786	23,004	928,527	693,675	3,795,860	6,844,938	1,936,518	129,760	2,066,278	8,911,216
	GROWING STOCK *Cubic meters*										
State	846	2,114	36	862	922	2,625	7,405	2,144	169	2,313	9,718
Private	15,325	21,468	615	25,431	18,721	104,862	186,422	52,692	3,506	56,198	242,620
Total	16,171	23,582	651	26,293	19,643	107,487	193,827	54,836	3,675	58,511	252,338
	SAWTIMBER *Board feet, International 1/4-inch rule*										
State	159,268	365,370	2,884	106,997	109,308	460,621	1,204,448	327,836	7,613	335,449	1,539,897
Private	3,353,572	3,448,693	74,606	3,577,293	2,418,808	17,215,241	30,088,213	7,690,790	180,040	7,870,830	37,959,043
Total	3,512,840	3,814,063	77,490	3,684,290	2,528,116	17,675,862	31,292,661	8,018,626	187,653	8,206,279	39,498,940

Table 22.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by ownership class, and softwoods and hardwoods, 1977*

Species group and ownership class	Growing stock		Sawtimber
	- Cubic feet -	*- Cubic meters -*	*- Board feet*[1] *-*
Softwoods:			
State	11,666	330	40,037
Private	411,674	11,658	1,376,816
Total	423,340	11,988	1,416,853
Hardwoods:			
State	9,728	276	14,894
Private	258,837	7,329	501,715
Total	268,565	7,605	516,609

[1]International 1/4-inch rule.

Table 23.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Taos-Rio Arriba Working Circle by cause of death and species; State and private, 1977*

Cause of death	Species						All species
	Douglas-fir	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	
	GROWING STOCK						
	Cubic feet						
Insects	--	28,287	22,764	58,309	109,360	59,520	168,880
Disease	--	--	56,043	--	56,043	49,954	105,997
Fire	--	--	--	--	--	--	--
Animal	--	--	--	--	--	--	--
Weather	--	--	--	--	--	--	--
Suppression	--	--	--	--	--	--	--
Unknown	20,817	82,300	127,446	--	230,563	95,019	325,582
Logging	--	--	27,374	--	27,374	64,072	91,446
Total	20,817	110,587	233,627	58,309	423,340	268,565	691,905
	GROWING STOCK						
	Cubic meters						
Insects	--	801	645	1,651	3,097	1,685	4,782
Disease	--	--	1,587	--	1,587	1,415	3,002
Fire	--	--	--	--	--	--	--
Animal	--	--	--	--	--	--	--
Weather	--	--	--	--	--	--	--
Suppression	--	--	--	--	--	--	--
Unknown	589	2,331	3,609	--	6,529	2,691	9,220
Logging	--	--	775	--	775	1,814	2,589
Total	589	3,132	6,616	1,651	11,988	7,605	19,593
	SAWTIMBER						
	Board feet, International 1/4-inch rule						
Insects	--	137,324	95,837	274,236	507,397	--	507,397
Disease	--	--	196,689	--	196,689	--	196,689
Fire	--	--	--	--	--	--	--
Animal	--	--	--	--	--	--	--
Weather	--	--	--	--	--	--	--
Suppression	--	--	--	--	--	--	--
Unknown	--	191,678	404,861	--	596,539	516,609	1,113,148
Logging	--	--	116,228	--	116,228	--	116,228
Total	--	329,002	813,615	274,236	1,416,853	516,609	1,933,462

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Barrett, Michael K., and Dorothy G. Felt.
1980. Forest area and timber resource statistics for the Taos-Rio Arriba Working Circle, New Mexico, 1977. USDA Forest Serv. Resour. Bull. INT-21, 24 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

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The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

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FOREST AREA AND TIMBER RESOURCE STATISTICS FOR THE BEAR RIVER AND WASATCH FRONT WORKING CIRCLES, UTAH, 1976-1977

DOROTHY G. FELT

USDA Forest Service Resource Bulletin INT-22
Intermountain Forest and Range Experiment Station
U.S. Department of Agriculture, Forest Service

THE AUTHOR

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August 1980

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DOROTHY G. FELT

INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
U.S. Department of Agriculture
Forest Service
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RESEARCH SUMMARY

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

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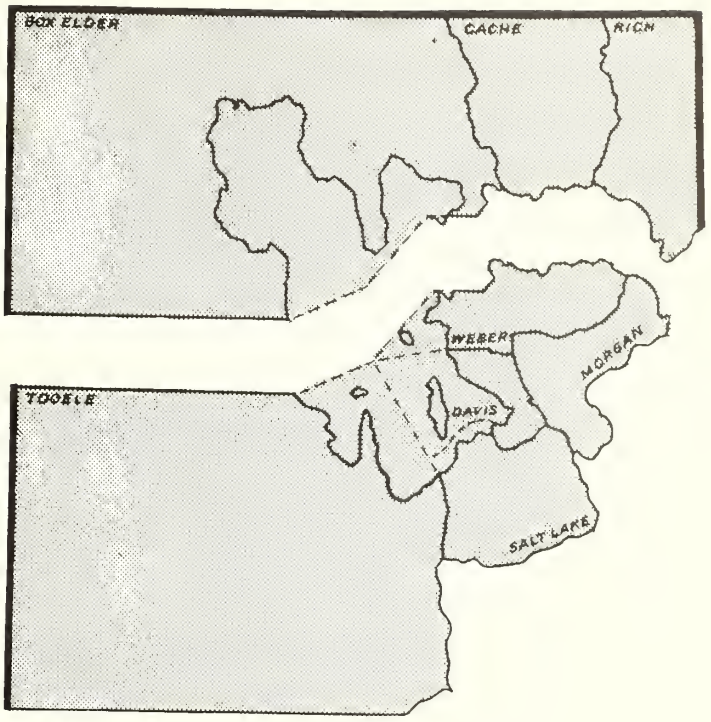
FOREST SURVEY TABLES

BEAR RIVER AND

WASATCH FRONT



INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of public and private lands, excluding National Forest ownership, in the eight county area making up the Bear River and Wasatch Front Working Circles (fig. 1; additional information for ownership by land classes is presented in figures 2-5). Fieldwork began in September 1976 and was completed in November 1977. This bulletin does not note changes and trends since the statewide inventory of 1961, nor does it contain estimates of timber removals. These items will be included in the State Analytical Report to be published in the near future.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forests and rangelands. Fundamental to the accomplishment of this objective are the periodic state-by-state resource inventories. Originally, Resources Evaluation--formerly Forest Survey--was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station, with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of publicly and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

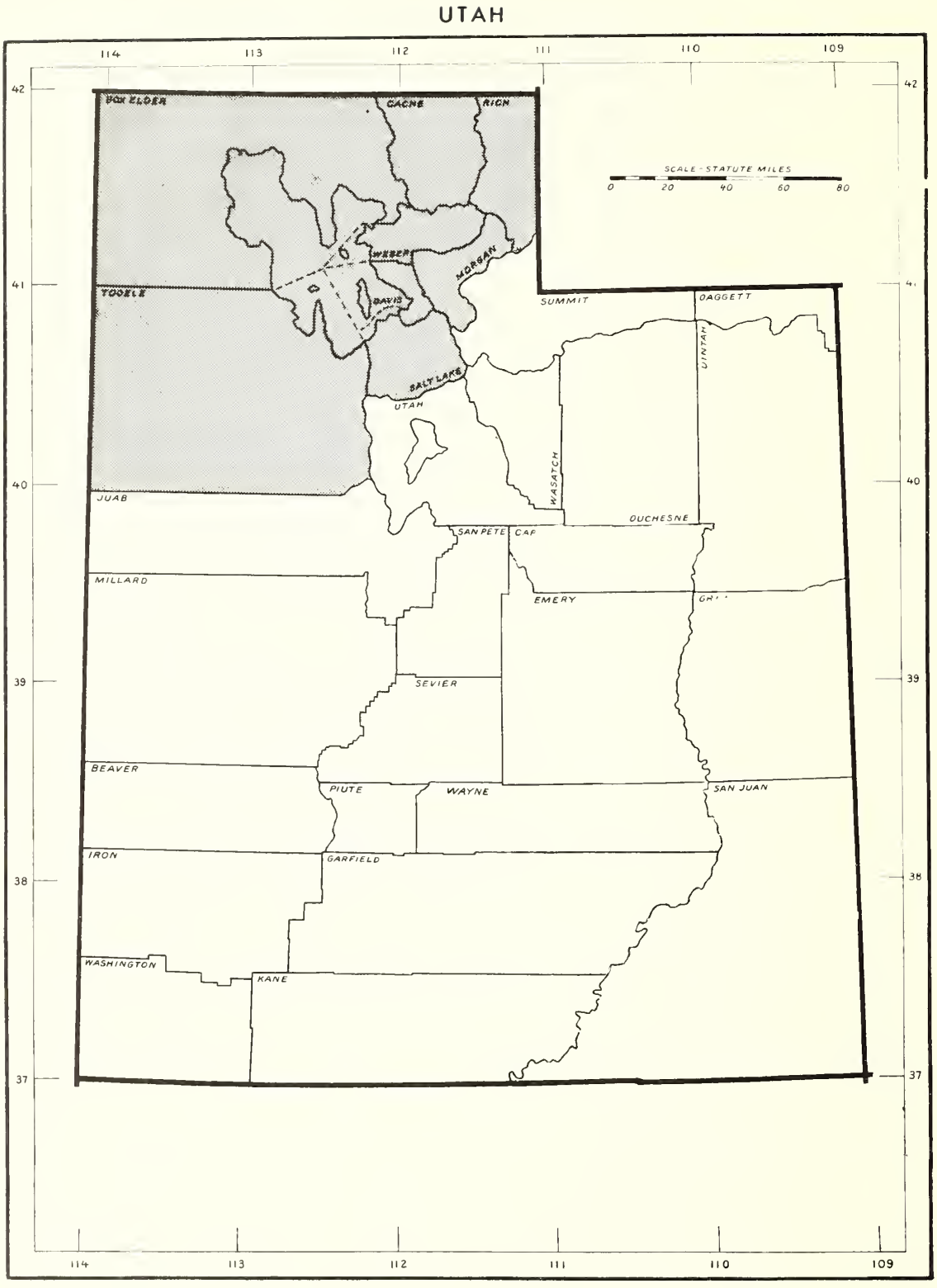


Figure 1.--Bear River and Wasatch Front Working Circles, Utah.

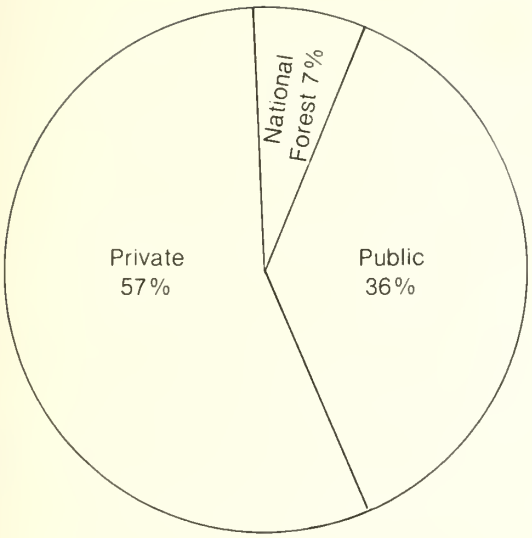


Figure 2.--Total land area for the Bear River and Wasatch Front Working Circles, by ownership.

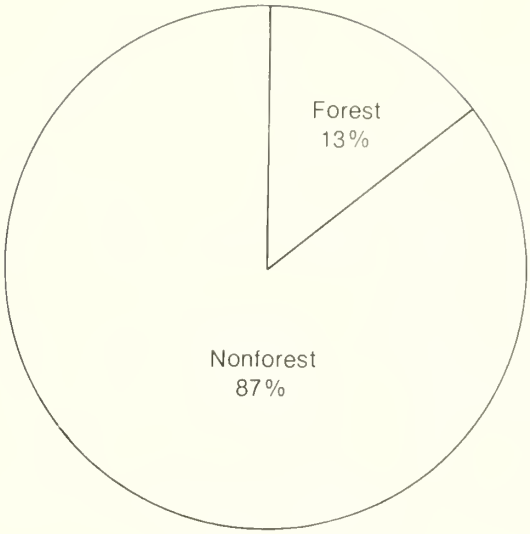


Figure 3.--Total land area for the Bear River and Wasatch Front Working Circles, by land class.

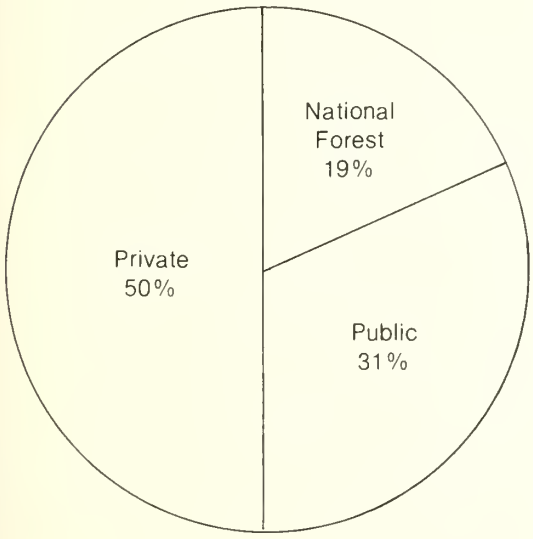


Figure 4.--Total area of forest land for the Bear River and Wasatch Front Working Circles, by ownership.

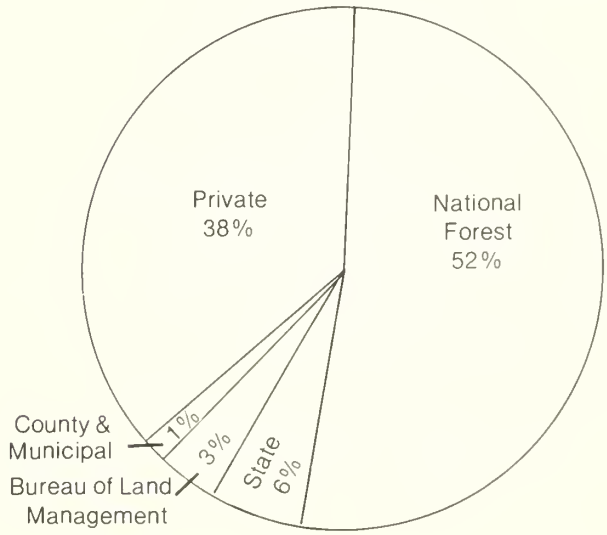


Figure 5.--Area of productive timberland for the Bear River and Wasatch Front Working Circles, by ownership.

HIGHLIGHTS

Area

- Forests occupy 1,162 thousand acres (470 thousand hectares), or 12 percent of the total public and private land area in the working circles.

- Of the forest land, 159 thousand acres (64 thousand hectares), almost 14 percent, is classified as commercial timberland.

- Private ownership accounts for 126 thousand acres (51 thousand hectares), nearly four-fifths of the commercial timberland (fig. 6).

- Fir-spruce, Douglas-fir, and aspen are the predominant forest types and occupy 95 percent of the commercial timberland. Lodgepole pine and cottonwood forest types cover the remaining area.

- Forest land, with the potential to produce from 50 to 84 cubic feet per acre per year, accounts for more than half of the commercial timberland, and nearly 80 percent of such land is privately owned.

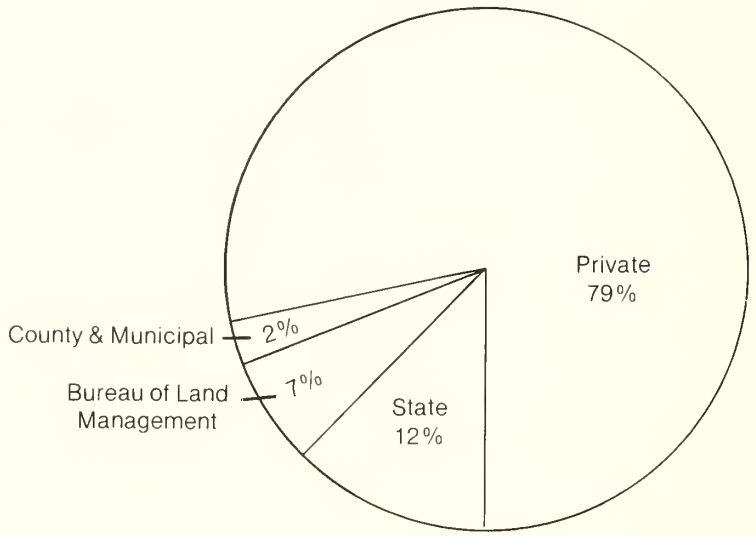


Figure 6.--Area of commercial timberland for the Bear River and Wasatch Front Working Circles, by ownership (excluding National Forest).

Inventory

- Growing stock volume amounts to 201 million cubic feet (5.7 million cubic meters) and sawtimber volume totals 656 million board feet.[1]

- Rough, rotten, and salvable dead trees comprise 14 million cubic feet (405 thousand cubic meters), 7 percent of the total timber volume.

[1] International 1/4-inch rule.

- The largest share of the total growing stock volume is made up of Douglas-fir (34 percent) and subalpine fir (27 percent). White fir, Engelmann spruce, limber pine, lodgepole pine, pinyon/juniper,[2] aspen, and cottonwood account for the remaining volume.

- Private owners control 77 percent of both the total growing stock and the sawtimber volume.

Growth and Mortality

- Net annual growth totals 4,076 thousand cubic feet (115 thousand cubic meters). Growth and mortality were not measured for pinyon and juniper trees.

- Seventy-eight percent of the total net growth is on private lands.

- The annual mortality of 1,540 thousand cubic feet (44 thousand cubic meters) offsets 27 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the state and working circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 40,400 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 117 ground sample locations. Sample trees were selected using a 10-point cluster which includes fixed plots (1/300 acre) for trees less than 5.0 inches d.b.h. and variable plots (40 BAF) for trees 5.0 inches d.b.h. or larger.

3. For most species, volume and defect were computed using equations developed for the Ashley National Forest. For other species, Kemp's equations were used.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

---

[2]Although pinyon/juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

Table 1.--*Area of forest land and percent standard error for the Bear River and Wasatch Front Working Circles, 1977*

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	98,115	10.9	60,715	18.9	158,830	7.9
Other forest land:						
Unproductive nonreserved	534,576	1.6	455,721	2.8	990,297	1.5

Table 2.--*Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland, with percent standard error for the Bear River and Wasatch Front Working Circles, 1977*

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	176,219	11.9	25,074	23.7	201,293	10.8
Sawtimber (M board feet[1])	642,064	12.3	13,457	48.8	655,521	12.1
Net annual growth:						
Growing stock (cubic feet)	2,803,836	21.2	1,271,879	30.5	4,075,715	17.8
Sawtimber (board feet[1])	13,277,412	21.7	426,932	53.0	13,704,344	21.1
Annual mortality:						
Growing stock (cubic feet)	1,283,515	35.4	256,655	50.1	1,540,170	31.1
Sawtimber (board feet[1])	4,544,500	39.1	56,345	70.7	4,600,845	38.8

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resour data presented in this resource bulletin. Forest area and timber resource data for th Bear River and Wasatch Front Working Circles, Utah, are displayed in tables 3 through 23.

TERMINOLOGY

Land

Bureau of the Census.--Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, a canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. Includes noncensus water. See definition below.

Water

Census water.--As defined by the Bureau of the Census, streams, sloughs, estuaries, and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.--The same as defined by the Bureau of the Census, except minimum width of streams, sloughs, estuaries, and canals is 120 feet and minimum size of lakes, reservoirs, and ponds is 1 acre.

Land Use Classes

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.--Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.--Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.--Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.--Federal lands administered by the Bureau of Land Management.

Indian lands.--Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.

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

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

Private Ownership Classes

Forest industry lands.--Lands owned by companies or individuals operating wood-processing plants.

Farmer-owned lands.--Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Miscellaneous Federal lands.--Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

Other private lands.--Privately owned lands other than forest industry and farmer-owned lands.

Forest Type and Tree Species

Forest types.--A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.--Tree species presently or prospectively suitable for industrial wood products.

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

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

Area Condition Classes

Stocking.--Stocking is an effort to express the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and mea ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establis the lower limit of this range which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full-site occupancy. Overstocking is characterized by sites with over 133 percent stocking.

Class 10.--Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.--Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

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

Class 70.--Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.--Low-risk old-growth stands.

Class 90.--High-risk old-growth stands.

Nonstocked.--Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.--Growing stock trees (a) having no serious defect in quality limiting present or prospective use for timber products; (b) of relatively high vigor; and (c) containing no pathogens that may result in death or serious deterioration before rotation age.

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

Rough trees.--(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain Regional specifications for freedom from defect primarily because of roughness or poor form; (2) all live trees of noncommercial species.

Rotten trees.--Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

Salvable dead trees.--Standing or down dead trees that are considered merchantable by Rocky Mountain Regional standards.

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree Size Classes

Seedlings.--Live trees less than 1.0 inch in diameter at breast height.

Saplings.--Trees 1.0 to 4.9 inches in diameter at breast height.

Poletimber trees.--Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.--Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwood, 11.0 inches.

Volume

Cull volume.--Portions of a tree's volume that are not usable for industrial wood products because of rot, form, or other defect.

Net volume.--Gross volume less deductions for cull.

Growing stock volume.--Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.--Net volume in board feet of sawtimber trees of commercial species Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.--The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus net volume of trees reaching the size class during the year, minus the net volume of tree that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.--Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

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

Table 3.--*Total land and water area in the Bear River and Wasatch Front Working Circles by ownership class, 1977*

Ownership class	Acres	Hectares
National Forest	786,167	318,152
Bureau of Land Management	3,173,581	1,284,308
Indian	19,132	7,742
Miscellaneous Federal	68,376	27,671
State	569,773	230,580
County and municipal	26,584	10,758
Private	6,216,419	2,515,706
Total land area	10,860,032	4,394,917
Census water	1,295,360	524,216
Gross area[1]	12,155,392	4,919,133

[1]U.S. Bureau of the Census, land and water area of the United States, 1970.

Table 4.--*Total land area in the Bear River and Wasatch Front Working Circles by major land class and ownership class, 1977*

Land class	Ownership class			
	Public		Private	
	Acres	Hectares	Acres	Hectares
Commercial timberland	32,684	13,227	126,146	51,049
Productive reserved	0	0	0	0
Other forest land:				
Unproductive reserved	13,208	5,345	0	0
Unproductive nonreserved	398,488	161,263	591,809	239,498
Total forest land	444,380	179,835	717,955	290,547
Nonforest land	3,413,066	1,381,224	5,498,464	2,225,159
Total land area	3,857,446	1,561,059	6,216,419	2,515,706

Table 5.--*Area of commercial timberland in the Bear River and Wasatch Front Working Circles by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	2,779	16,799	17,183	36,761
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	2,755	--	--	2,755
Total	--	5,534	16,799	17,183	39,516
Fir-spruce:					
Sawtimber	--	8,128	30,608	11,314	50,050
Poletimber	--	--	--	2,878	2,878
Sapling and seedling	--	--	2,892	--	2,892
Nonstocked	--	--	--	--	--
Total	--	8,128	33,500	14,192	55,820
Lodgepole pine:					
Sawtimber	--	--	--	2,779	2,779
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	2,779	2,779
Aspen:					
Sawtimber	--	--	5,602	--	5,602
Poletimber	--	--	16,779	11,078	27,857
Sapling and seedling	--	--	8,118	13,775	21,893
Nonstocked	--	--	--	--	--
Total	--	--	30,499	24,853	55,352
Cottonwood:					
Sawtimber	--	--	--	5,363	5,363
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	5,363	5,363
All types:					
Sawtimber	--	10,907	53,009	36,639	100,555
Poletimber	--	--	16,779	13,956	30,735
Sapling and seedling	--	--	11,010	13,775	24,785
Nonstocked	--	2,755	--	-	2,755
Total	--	13,662	80,798	64,370	158,830

Table 6.--*Area of publicly owned commercial timberland in the Bear River and Wasatch Front Working Circles by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	747	3,911	4,085	8,743
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	545	--	--	545
Total	--	1,292	3,911	4,085	9,288
Fir-spruce:					
Sawtimber	--	1,886	7,513	3,026	12,425
Poletimber	--	--	--	765	765
Sapling and seedling	--	--	276	--	276
Nonstocked	--	--	--	--	--
Total	--	1,886	7,789	3,791	13,466
Lodgepole pine:					
Sawtimber	--	--	--	747	747
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	747	747
Aspen:					
Sawtimber	--	--	1,064	--	1,064
Poletimber	--	--	2,325	1,243	3,568
Sapling and seedling	--	--	1,194	2,707	3,901
Nonstocked	--	--	--	--	--
Total	--	--	4,583	3,950	8,533
Cottonwood:					
Sawtimber	--	--	--	650	650
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	650	650
All types:					
Sawtimber	--	2,633	12,488	8,508	23,629
Poletimber	--	--	2,325	2,008	4,333
Sapling and seedling	--	--	1,470	2,707	4,177
Nonstocked	--	545	--	--	545
Total	--	3,178	16,283	13,223	32,684

Table 7.--*Area of privately owned commercial timberland in the Bear River and Wasatch Front Working Circles by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	2,032	12,888	13,098	28,018
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	2,210	--	--	2,210
Total	--	4,242	12,888	13,098	30,228
Fir-spruce:					
Sawtimber	--	6,242	23,095	8,288	37,625
Poletimber	--	--	--	2,113	2,113
Sapling and seedling	--	--	2,616	--	2,616
Nonstocked	--	--	--	--	--
Total	--	6,242	25,711	10,401	42,354
Lodgepole pine:					
Sawtimber	--	--	--	2,032	2,032
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	2,032	2,032
Aspen:					
Sawtimber	--	--	4,538	--	4,538
Poletimber	--	--	14,454	9,835	24,289
Sapling and seedling	--	--	6,924	11,068	17,992
Nonstocked	--	--	--	--	--
Total	--	--	25,916	20,903	46,819
Cottonwood:					
Sawtimber	--	--	--	4,713	4,713
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	4,713	4,713
All types:					
Sawtimber	--	8,274	40,521	28,131	76,926
Poletimber	--	--	14,454	11,948	26,402
Sapling and seedling	--	--	9,540	11,068	20,608
Nonstocked	--	2,210	--	--	2,210
Total	--	10,484	64,515	51,147	126,146

Table 8.--*Area of commercial timberland in the Bear River and Wasatch Front Working Circles by stand volume and ownership class, 1977*

Stand volume per acre[1]	Ownership class		
	Public	Private	Public and private
	Acres		
Less than 1,500 board feet	9,317	49,013	58,330
1,500 to 4,999 board feet	8,972	33,104	42,076
5,000 board feet or more	14,395	44,029	58,424
All classes	32,684	126,146	158,830

[1]International 1/4-inch rule.

Table 9.--*Area of commercial timberland in the Bear River and Wasatch Front Working Circles by forest type and area condition class, 1977*

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	--	--	--	--	--	8,549	11,413	8,511	8,288	2,755	39,516	15,992
Fir-spruce	2,779	--	--	7,721	2,878	17,084	5,756	8,387	11,215	--	55,820	22,589
Lodgepole pine	--	--	--	--	--	2,779	--	--	--	--	2,779	1,125
Aspen	--	4,942	--	24,740	11,362	5,770	8,538	--	--	--	55,352	22,400
Cottonwood	--	--	--	--	--	--	5,363	--	--	--	5,363	2,170
All types	2,779	4,942	--	32,461	14,240	34,182	31,070	16,898	19,503	2,755	158,830	64,276

Table 10.--*Area of productive reserved and other forest land in the Bear River and Wasatch Front Working Circles by land class, ownership class, and forest type, 1977*

Land class	Forest type						All types	
	Douglas-fir	Limber pine	Fir-spruce	Pinyon-juniper	Aspen	Mixed hardwoods		
	Acres							*Hectares*
Productive reserved area:								
Public	--	--	--	--	--	--	--	--
Private	0	0	0	0	0	0	0	0
Other forest land area:								
Unproductive nonreserved:								
Public	544	765	766	319,750	7,516	69,147	398,488	161,263
Private	2,210	2,112	2,112	206,317	56,821	322,237	591,809	239,498
Unproductive reserved:								
Public	--	--	--	13,208	--	--	13,208	5,345
Private	0	0	0	0	0	0	0	0
All areas:								
Public	544	765	766	332,958	7,516	69,147	411,696	166,608
Private	2,210	2,112	2,112	206,317	56,821	322,237	591,809	239,498
Total acres	2,754	2,877	2,878	539,275	64,337	391,384	1,003,505	--
Total hectares	1,115	1,164	1,165	218,238	26,036	158,388	--	406,106

Table 11.--*Number of growing stock trees on commercial timberland in the Bear River and Wasatch Front Working Circles by species and diameter class, 1977*

Species	Diameter class (inches at breast height)															
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand trees															
Douglas-fir	594	754	520	889	615	518	294	270	156	87	84	61	24	3	38	4,907
Lodgepole pine	--	--	--	26	--	30	24	18	--	20	--	--	--	--	--	118
Limber pine	83	--	--	--	56	55	31	8	38	15	9	11	6	3	--	315
Subalpine fir	2,086	1,946	2,055	1,108	658	495	213	191	154	62	38	22	12	10	4	9,054
White fir	1,194	592	739	544	295	127	144	79	99	27	41	14	9	3	7	3,914
Engelmann spruce	--	165	267	186	163	72	74	34	39	27	13	11	6	2	4	1,063
Pinyon/juniper	--	--	--	--	26	--	--	--	--	--	--	--	--	--	--	26
Total softwoods	3,957	3,457	3,581	2,753	1,813	1,297	780	600	486	238	185	119	57	21	53	19,397
Aspen	13,098	6,113	5,089	2,185	917	144	75	16	--	--	--	--	--	--	--	27,637
Cottonwood	--	74	--	24	71	39	30	17	--	9	4	--	--	--	--	268
Total hardwoods	13,098	6,187	5,089	2,209	988	183	105	33	--	9	4	--	--	--	--	27,905
All species	17,055	9,644	8,670	4,962	2,801	1,480	885	633	486	247	189	119	57	21	53	47,302

Table 12.--*Number of cull and salvable dead trees on commercial timberland in the Bear River and Wasatch Front Working Circles by ownership class, and softwoods and hardwoods, 1977*

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
Public:				
Softwoods	533	133	666	143
Hardwoods	296	179	475	134
Total	829	312	1,141	277
Private:				
Softwoods	1,671	443	2,114	447
Hardwoods	1,329	990	2,319	786
Total	3,000	1,433	4,433	1,233
Public and private:				
Softwoods	2,204	576	2,780	590
Hardwoods	1,625	1,169	2,794	920
Total	3,829	1,745	5,574	1,510

Table 13.--*Net volume of growing stock on commercial timberland in the Bear River and Wasatch Front Working Circles by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					*Thousand cubic meters*
Public:							
	Douglas-fir	14,249	--	--	151	14,400	407
	Fir-spruce	24,924	455	99	--	25,478	722
	Lodgepole pine	755	--	--	--	755	22
	Aspen	1,176	2,406	1,214	--	4,796	136
	Cottonwood	296	--	--	--	296	8
	All types	41,400	2,861	1,313	151	45,725	1,295
Private:							
	Douglas-fir	45,700	--	--	613	46,313	1,312
	Fir-spruce	76,567	1,254	943	--	78,764	2,230
	Lodgepole pine	2,054	--	--	--	2,054	58
	Aspen	3,849	16,386	5,978	--	26,213	742
	Cottonwood	2,224	--	--	--	2,224	63
	All types	130,394	17,640	6,921	613	155,568	4,405
Public and private:							
	Douglas-fir	59,949	--	--	764	60,713	1,719
	Fir-spruce	101,491	1,709	1,042	--	104,242	2,952
	Lodgepole pine	2,809	--	--	--	2,809	80
	Aspen	5,025	18,792	7,192	--	31,009	878
	Cottonwood	2,520	--	--	--	2,520	71
	All types	171,794	20,501	8,234	764	201,293	5,700

Table 14.--*Net volume of sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
Public:						
	Douglas-fir	52,936	--	--	90	53,026
	Fir-spruce	90,611	997	136	--	91,744
	Lodgepole pine	2,980	--	--	--	2,980
	Aspen	2,233	2,079	2,183	--	6,495
	Cottonwood	1,106	--	--	--	1,106
	All types	149,866	3,076	2,319	90	155,351
Private:						
	Douglas-fir	170,696	--	--	367	171,063
	Fir-spruce	275,072	2,752	1,287	--	279,111
	Lodgepole pine	8,103	--	--	--	8,103
	Aspen	7,776	15,375	10,675	--	33,826
	Cottonwood	8,067	--	--	--	8,067
	All types	469,714	18,127	11,962	367	500,170
Public and private:						
	Douglas-fir	223,632	--	--	457	224,089
	Fir-spruce	365,683	3,749	1,423	--	370,855
	Lodgepole pine	11,083	--	--	--	11,083
	Aspen	10,009	17,454	12,858	--	40,321
	Cottonwood	9,173	--	--	--	9,173
	All types	619,580	21,203	14,281	457	655,521

[1]International 1/4-inch rule.

Table 15.--*Net volume of growing stock on commercial timberland in the Bear River and Wasatch Front Working Circles by species and diameter class, 1977*

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	1,028	4,797	6,920	8,585	7,021	8,637	6,245	4,612	6,635	5,263	2,595	197	6,718	69,253
Lodgepole pine	--	177	--	392	410	453	--	1,044	--	--	--	--	--	2,476
Limber pine	--	--	652	842	849	195	1,294	708	382	828	528	322	--	6,600
Subalpine fir	4,311	6,197	6,602	7,712	5,355	6,603	6,258	3,450	2,671	1,850	931	1,151	497	53,588
White fir	6,216	5,378	3,581	2,022	3,162	2,006	3,356	1,027	1,935	725	487	208	740	30,843
Engelmann spruce	623	795	1,560	1,162	1,653	1,081	1,410	1,526	763	1,050	797	349	688	13,457
Pinyon/juniper	--	--	2	--	--	--	--	--	--	--	--	--	--	2
Total softwoods	12,178	17,344	19,317	20,715	18,450	18,975	18,563	12,367	12,386	9,716	5,338	2,227	8,643	176,219
Aspen	7,201	6,821	5,507	1,417	1,048	309	--	--	--	--	--	--	--	22,303
Cottonwood	--	153	515	549	540	468	--	422	124	--	--	--	--	2,771
Total hardwoods	7,201	6,974	6,022	1,966	1,588	777	--	422	124	--	--	--	--	25,074
All species	19,379	24,318	25,339	22,681	20,038	19,752	18,563	12,789	12,510	9,716	5,338	2,227	8,643	201,293

Table 16.--*Net volume of sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by species and diameter class, 1977*

Species	Diameter class (inches at breast height)												
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	26,862	35,404	30,552	39,189	29,220	22,204	32,753	26,404	13,222	1,017	35,621	292,448
Lodgepole pine	--	1,732	1,880	2,162	--	5,309	--	--	--	--	--	11,083
Limber pine	2,687	3,766	3,930	950	6,441	3,605	1,998	4,311	2,802	1,705	--	32,195
Subalpine fir	23,685	29,604	21,788	27,944	27,183	15,387	12,137	8,508	4,363	5,450	2,387	178,436
White fir	8,079	6,633	12,871	8,464	14,869	4,500	8,333	3,089	2,071	914	3,381	73,204
Engelmann spruce	5,892	4,727	7,143	4,827	6,604	7,239	3,749	5,184	3,967	1,773	3,587	54,692
Pinyon/juniper	6	--	--	--	--	--	--	--	--	--	--	6
Total softwoods	67,211	81,866	78,164	83,536	84,317	58,244	58,970	47,496	26,425	10,859	44,976	642,064
Aspen	XXXXX	1,531	1,196	366	--	--	--	--	--	--	--	3,093
Cottonwood	XXXXX	2,799	2,711	2,321	--	1,972	561	--	--	--	--	10,364
Total hardwoods	XXXXX	4,330	3,907	2,687	--	1,972	561	--	--	--	--	13,457
All species	67,211	86,196	82,071	86,223	84,317	60,216	59,531	47,496	26,425	10,859	44,976	655,521

Table 17.--*Net volume of growing stock and sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by ownership class and species, 1977*

Ownership class	Species											All species
	Douglas-fir	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/ juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	GROWING STOCK *Thousand cubic feet*											
Public	16,232	666	1,634	13,436	6,942	3,017	([1])	41,927	3,464	334	3,798	45,725
Private	53,021	1,810	4,966	40,152	23,901	10,440	2	134,292	18,839	2,437	21,276	155,568
Total	69,253	2,476	6,600	53,588	30,843	13,457	2	176,219	22,303	2,771	25,074	201,293
	GROWING STOCK *Thousand cubic meters*											
Public	460	19	46	380	197	85	([2])	1,187	98	10	108	1,295
Private	1,501	51	141	1,137	677	296	([2])	3,803	533	69	602	4,405
Total	1,961	70	187	1,517	874	381	([2])	4,990	631	79	710	5,700
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*											
Public	69,041	2,980	8,035	44,941	16,318	12,268	1	153,584	481	1,286	1,767	155,351
Private	223,407	8,103	24,160	133,495	56,886	42,424	5	488,480	2,612	9,078	11,690	500,170
Total	292,448	11,083	32,195	178,436	73,204	54,692	6	642,064	3,093	10,364	13,457	655,521

[1]Less than 0.5 thousand cubic feet.
[2]Less than 0.5 thousand cubic meters.

Table 18.--*Net volume of timber on commercial timberland in the Bear River and Wasatch Front Working Circles by class of timber, and softwoods and hardwoods, 1977*

Class of timber	Softwoods	Hardwoods	All classes
		Thousand cubic feet	
Sawtimber trees:			
Saw-log portion	138,963	4,142	143,105
Upper-stem portion	7,734	735	8,469
Total	146,697	4,877	151,574
Poletimber trees	29,522	20,197	49,719
All growing stock trees	176,219	25,074	201,293
Sound cull trees	3,873	250	4,123
Rotten cull trees	507	932	1,439
Salvable dead trees	5,087	3,647	8,734
All timber	185,686	29,903	215,589

Table 19.--*Net volume of growing stock on commercial timberland in the Bear River and Wasatch Front Working Circles by forest type and species, 1977*

Forest type	Species											
	Douglas-fir	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/ juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	Thousand cubic feet											
Douglas-fir	51,561	--	--	933	7,090	--	--	59,584	1,129	--	1,129	60,713
Fir-spruce	14,556	--	6,600	48,595	17,915	13,232	--	100,898	3,093	251	3,344	104,242
Lodgepole pine	--	2,476	--	--	--	--	--	2,476	333	--	333	2,809
Aspen	3,136	--	--	4,060	5,838	225	2	13,261	17,748	--	17,748	31,009
Cottonwood	--	--	--	--	--	--	--	--	--	2,520	2,520	2,520
All types	69,253	2,476	6,600	53,588	30,843	13,457	2	176,219	22,303	2,771	25,074	201,293
	Thousand cubic meters											
All types	1,961	70	187	1,517	874	381	([1])	4,990	631	79	710	5,700

[1]Less than 0.5 thousand cubic meters.

Table 20.--*Net volume of sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by forest type and species, 1977*

Forest type	Species											All species
	Douglas-fir	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/ juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	208,521	--	--	2,409	12,717	--	--	223,647	442	--	442	224,089
Fir-spruce	70,087	--	32,195	163,846	49,648	53,689	--	369,465	199	1,191	1,390	370,855
Lodgepole pine	--	11,083	--	--	--	--	--	11,083	--	--	--	11,083
Aspen	13,840	--	--	12,181	10,839	1,003	6	37,869	2,452	--	2,452	40,321
Cottonwood	--	--	--	--	--	--	--	--	--	9,173	9,173	9,173
All types	292,448	11,083	32,195	178,436	73,204	54,692	6	642,064	3,093	10,364	13,457	655,521

Table 21.--*Net annual growth of growing stock and sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by ownership class and species, 1977*

Ownership class	Species											All species
	Douglas-fir	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods		
	GROWING STOCK *Cubic feet*											
Public	309,712	19,524	21,740	224,830	35,348	66,614	677,768	199,683	11,101	210,784		888,552
Private	988,902	53,090	73,280	687,773	96,910	226,113	2,126,068	976,520	84,575	1,061,095		3,187,163
Total	1,298,614	72,614	95,020	912,603	132,258	292,727	2,803,836	1,176,203	95,676	1,271,879		4,075,715
	GROWING STOCK *Cubic meters*											
Public	8,770	553	616	6,366	1,001	1,886	19,192	5,654	315	5,969		25,161
Private	28,003	1,503	2,075	19,476	2,744	6,403	60,204	27,652	2,394	30,046		90,250
Total	36,773	2,056	2,691	25,842	3,745	8,289	79,396	33,306	2,709	36,015		115,411
	SAWTIMBER *Board feet, International 1/4-inch rule*											
Public	1,647,450	85,782	113,207	841,969	349,086	275,762	3,313,256	26,434	31,716	58,150		3,371,406
Private	5,035,950	233,255	377,256	2,330,337	1,051,815	935,543	9,964,156	137,894	230,888	368,782		10,332,938
Total	6,683,400	319,037	490,463	3,172,306	1,400,901	1,211,305	13,277,412	164,328	262,604	426,932		13,704,344

Table 22.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by ownership class, and softwoods and hardwoods, 1977*

Species group and ownership class	Growing stock		Sawtimber
	- Cubic feet -	*- Cubic meters -*	*- Board feet*[1] *-*
Softwoods:			
Public	277,877	7,869	976,472
Private	1,005,638	28,476	3,568,028
Total	1,283,515	36,345	4,544,500
Hardwoods:			
Public	37,419	1,060	7,435
Private	219,236	6,208	48,910
Total	256,655	7,268	56,345

[1]International 1/4-inch rule.

Table 23.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Bear River and Wasatch Front Working Circles by cause of death and species, 1977*

Cause of death	Species					All species
	Douglas-fir	Subalpine fir	White fir	Total softwoods	Aspen	
	GROWING STOCK					
	Cubic feet					
Insects	--	260,124	168,555	428,679	--	428,679
Disease	--	--	--	--	103,342	103,342
Fire	140,634	--	--	140,634	--	140,634
Weather	8,099	--	57,667	65,766	--	65,766
Suppression	--	--	113,881	113,881	--	113,881
Unknown	112,968	348,085	73,502	534,555	153,313	687,868
Total	261,701	608,209	413,605	1,283,515	256,655	1,540,170
	GROWING STOCK					
	Cubic meters					
Insects	--	7,366	4,773	12,139	--	12,139
Disease	--	--	--	--	2,926	2,926
Fire	3,982	--	--	3,982	--	3,982
Weather	229	--	1,633	1,862	--	1,862
Suppression	--	--	3,225	3,225	--	3,225
Unknown	3,199	9,857	2,081	15,137	4,342	19,479
Total	7,410	17,223	11,712	36,345	7,268	43,613
	SAWTIMBER					
	Board feet, International 1/4-inch rule					
Insects	--	1,125,688	739,230	1,864,918	--	1,864,918
Disease	--	--	--	--	28,492	28,492
Fire	628,582	--	--	628,582	--	628,582
Weather	--	--	158,826	158,826	--	158,826
Suppression	--	--	152,895	152,895	--	152,895
Unknown	509,486	905,756	324,037	1,739,279	27,853	1,767,132
Total	1,138,068	2,031,444	1,374,988	4,544,500	56,345	4,600,845

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Felt, Dorothy G.
1980. Forest area and timber resource statistics for the Bear River and Wasatch Front Working Circles, Utah, 1976-1977. USDA For. Serv. Resour. Bull. INT-22, 25 p. Intermt. For. and Ranger Exp. Stn., Ogden, Utah 84401.

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The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

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FOREST AREA AND TIMBER RESOURCE STATISTICS FOR THE MOUNTAIN LANDS AND UINTA BASIN WORKING CIRCLES, UTAH, 1977-1978

DOROTHY G. FELT

USDA Forest Service Resource Bulletin INT-23
Intermountain Forest and Range Experiment Station
U.S. Department of Agriculture, Forest Service

THE AUTHOR

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ACKNOWLEDGMENTS

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RESEARCH SUMMARY

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USDA Forest Service
Resource Bulletin INT-23
August 1980

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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
U.S. Department of Agriculture
Forest Service
Ogden, Utah 84401

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FOREST SURVEY TABLES

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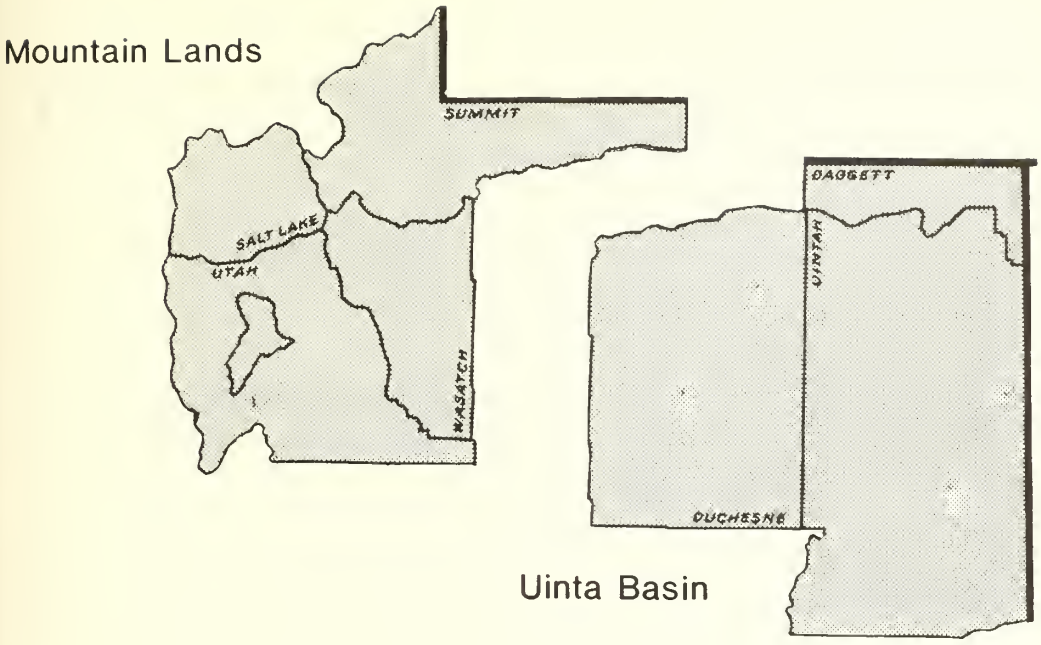

INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of public and private lands, excluding National Forest ownership, in the six county area making up the Mountain Lands and Uinta Basin Working Circles (fig. 1; additional information for ownership by land classes is presented in figures 2-5). Fieldwork began in June 1977 and was completed in November 1978. This bulletin does not note changes and trends since the statewide inventory of 1961, nor does it contain estimates of timber removals. These items will be included in the State analytical report to be published in the near future.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forest and rangelands. Fundamental to the accomplishment of this objective are the periodic state-by-state resource inventories. Orginally, Resources Evaluation--formerly Forest Survey--was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station, with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of publicly and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

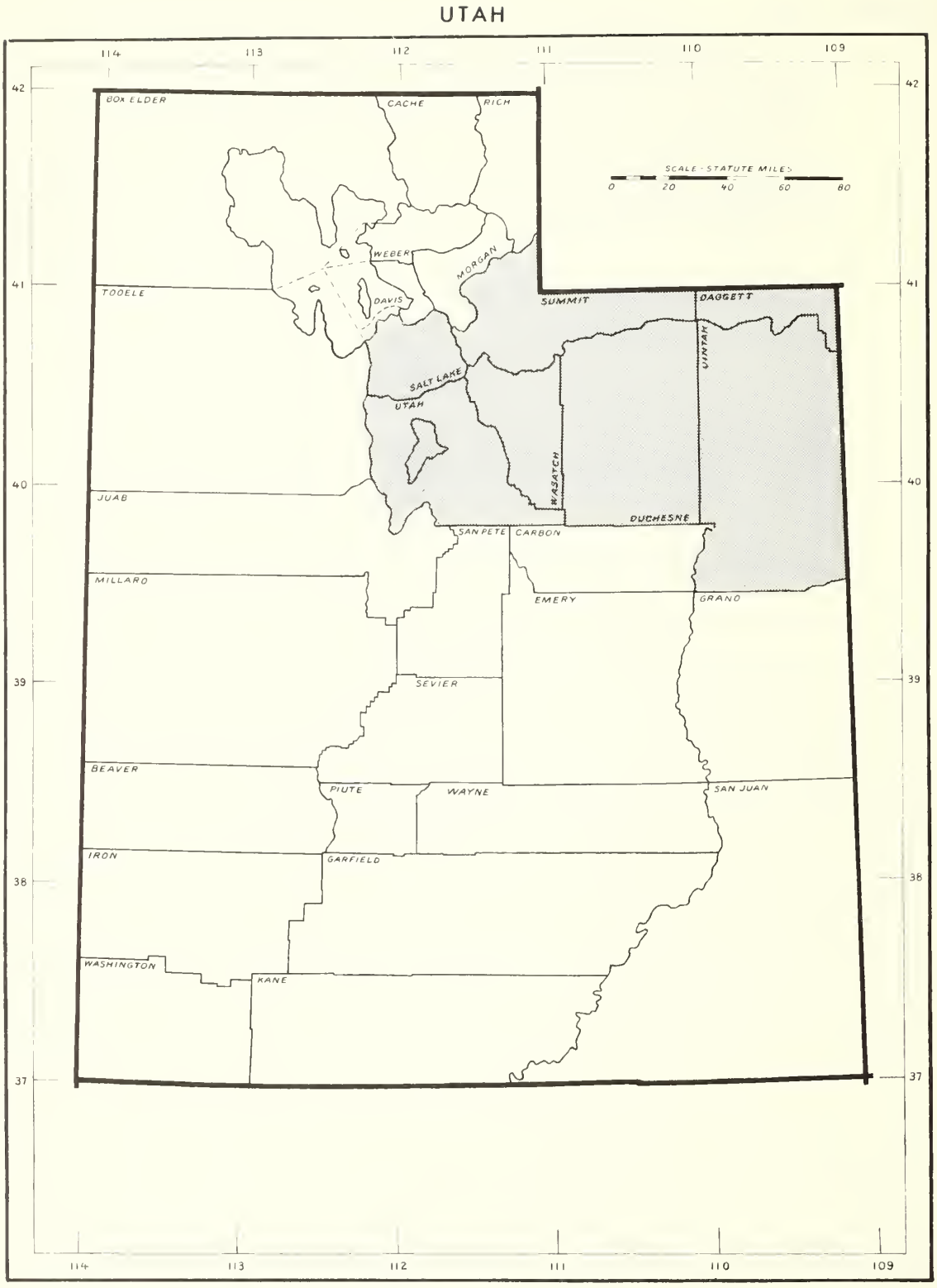

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Figure 1.--Mountain Lands and Uinta Basin Working Circles, Utah.

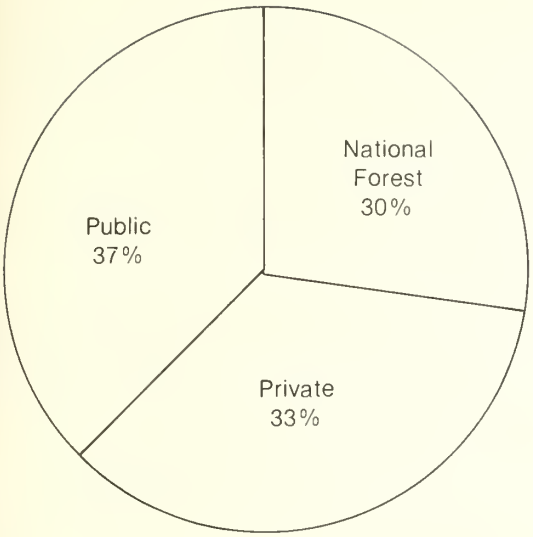

Figure 2.--Total land area for the Mountain Lands and Uinta Basin Working Circles, by ownership.

Figure 3.--Total land area for the Mountain Lands and Uinta Basin Working Circles, by land class.

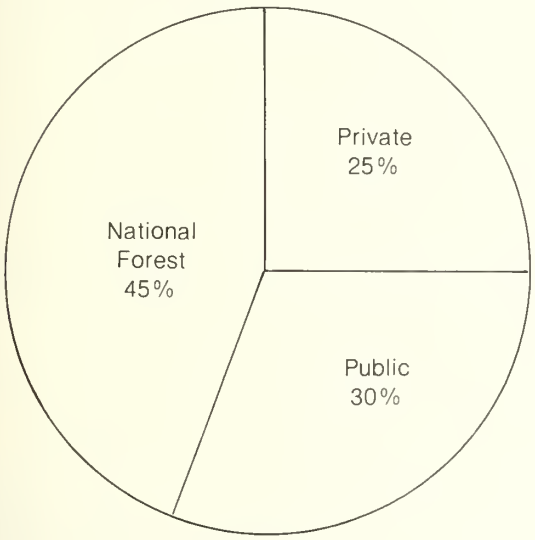

Figure 4.--Total area of forest land for the Mountain Lands and Uinta Basin Working circles, by ownership.

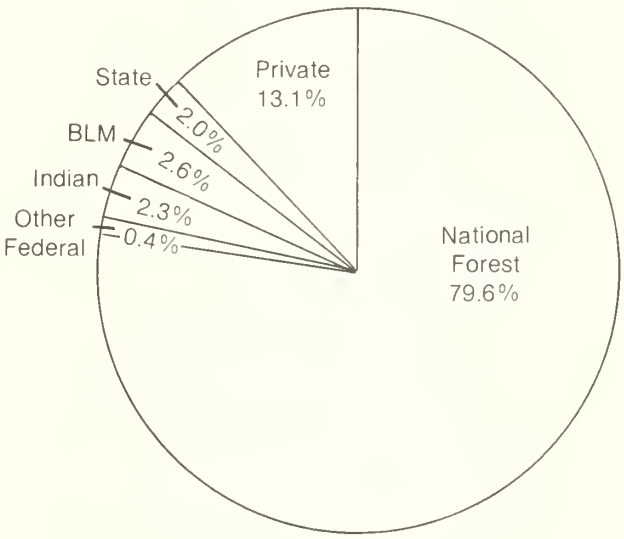

Figure 5.--Area of productive timberland for the Mountain Lands and Uinta Basin Working Circles, by ownership.

HIGHLIGHTS

Area

- Forests occupy 2,024 thousand acres (819 thousand hectares), or 34 percent of the total public and private land area in the working circles.

- Of the forest land, 302 thousand acres (122 thousand hectares), almost 15 percent, is classified as commercial timberland.

- Private ownership accounts for 193 thousand acres (78 thousand hectares), 64 percent of the commercial timberland (fig. 6).

- Aspen, Douglas-fir, fir-spruce, and lodgepole pine are the predominant forest types and occupy 85 percent of the commercial timberland. Pinyon-juniper, white fir, ponderosa pine, limber pine, and cottonwood forest types cover the remaining area.

- Over two-thirds of the commercial timberland is in the 20 to 49 cubic foot productivity class, and nearly 60 percent of such land is privately owned.

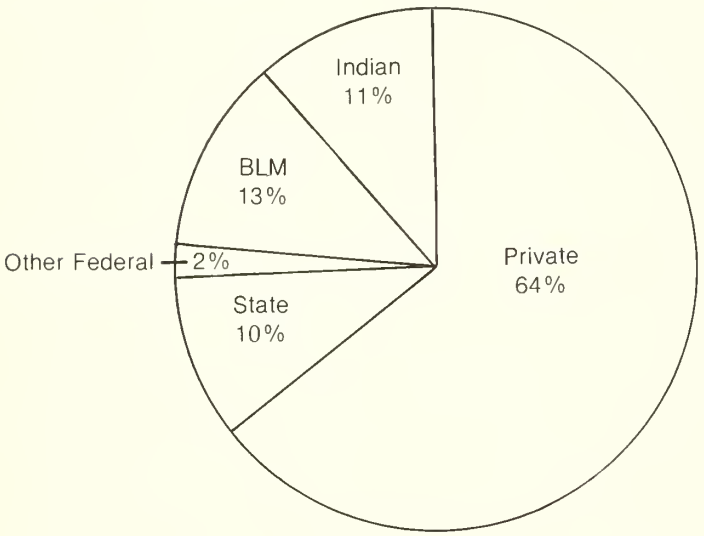

Figure 6.--Area of commercial timberland for the Mountain Lands and Uinta Basin Working Circles, by ownership (excluding National Forest).

Inventory

- Growing stock volume amounts to 318 million cubic feet (9 million cubic meters) and sawtimber volume totals 924 million board feet.[1]

- Rough, rotten, and salvable dead trees comprise 44 million cubic feet (1,259 thousand cubic meters), 12 percent of the total timber volume.

[1] International 1/4-inch rule.

- The largest share of the total growing stock volume is made up of Douglas-fir (25 percent), subalpine fir (22 percent), and aspen (18 percent). Lodgepole pine, Engelmann spruce, white fir, ponderosa pine, pinyon/juniper,[2] limber pine, cottonwood, and other hardwoods account for the remaining volume.

- Private owners control 68 percent of the total growing stock volume and two-thirds of the sawtimber.

Growth and Mortality

- Net annual growth totals 5,877 thousand cubic feet (166 thousand cubic meters). Growth and mortality were not measured for pinyon and juniper trees.

- Seventy-nine percent of the total net growth is on private lands.

- The annual mortality of 3,444 thousand cubic feet (97 thousand cubic meters) offsets 37 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the state and working circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 54,971 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 235 ground sample locations. Sample trees were selected using a 10-point cluster which includes fixed plots (1/300 acre) for trees less than 5.0 inches d.b.h. and variable plots (40 BAF) for trees 5.0 inches d.b.h. or larger.

3. For most species, volume and defect were computed using equations developed for the Ashley National Forest. For other species, Kemp's equations were used.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

---

[2]The area occupied by pinyon-juniper forest type classified as commercial is so classified because the site index for other associated species on these stands (usually ponderosa pine or Douglas-fir) was high enough to indicate a site potential productivity level exceeding 20 cubic feet per acre per year average annual growth, and nonstockable indicators were not present in sufficient quantities to lower the yield capability below 20 cubic feet per acre per year.

Although pinyon/juniper usually occurs on upproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

Table 1.--*Area of forest land and percent standard error for the Mountain Lands and Uinta Basin Working Circles, 1978*

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	204,018	7.4	97,618	13.6	301,636	5.4
Other forest land:						
Unproductive nonreserved	1,181,270	4.4	498,731	10.5	1,680,001	1.1

Table 2.--*Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland, with percent standard error for the Mountain Lands and Uinta Basin Working Circles, 1978*

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	252,040	10.0	66,438	16.1	318,478	8.5
Sawtimber (M board feet[1])	870,645	10.1	53,683	49.0	924,328	9.8
Net annual growth:						
Growing stock (cubic feet)	3,650,348	34.7	2,226,492	20.9	5,876,840	23.1
Sawtimber (board feet[1])	16,763,861	26.9	2,500,670	64.7	19,264,531	24.8
Annual mortality:						
Growing stock (cubic feet)	2,875,698	36.9	568,354	35.0	3,444,052	31.5
Sawtimber (board feet[1])	9,272,328	36.8	234,744	51.5	9,507,072	35.9

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for the Mountain Lands and Uinta Basin Working Circles, Utah, are displayed in tables 3 through 23.

TERMINOLOGY

Land

Bureau of the Census.--Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. Includes noncensus water. See definition below.

Water

Census water.--As defined by the Bureau of the Census, streams, sloughs, estuaries, and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.--The same as defined by the Bureau of the Census, except minimum width of streams, sloughs, estuaries, and canals is 120 feet and minimum size of lakes, reservoirs, and ponds is 1 acre.

Land Use Classes

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.--Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.--Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.--Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.--Federal lands administered by the Bureau of Land Management.

Indian lands.--Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.

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

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

Private Ownership Classes

Forest industry lands.--Lands owned by companies or individuals operating wood-processing plants.

Farmer-owned lands.--Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Miscellaneous Federal lands.--Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

Other private lands.--Privately owned lands other than forest industry and farmer-owned lands.

Forest Type and Tree Species

Forest types.--A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.--Tree species presently or prospectively suitable for industria wood products.

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

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

Area Condition Classes

Stocking.--Stocking is an effort to express the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full-site occupancy. Overstocking is characterized by sites with over 133 percent stocking.

Class 10.--Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.--Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

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

Class 70.--Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.--Low-risk old-growth stands.

Class 90.--High-risk old-growth stands.

Nonstocked.--Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.--Growing stock trees (a) having no serious defect in quality limiting present or prospective use for timber products; (b) of relatively high vigor; and (c) containing no pathogens that may result in death or serious deterioration before rotation age.

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

Rough trees.--(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain Regional specifications for freedom from defect primarily because of roughness or poor form; (2) all live trees of noncommercial species.

Rotten trees.--Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

Salvable dead trees.--Standing or down dead trees that are considered merchantable by Rocky Mountain Regional standards.

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree Size Classes

Seedlings.--Live trees less than 1.0 inch in diameter at breast height.

Saplings.--Trees 1.0 to 4.9 inches in diameter at breast height.

Poletimber trees.--Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.--Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwood 11.0 inches.

Volume

Cull volume.--Portions of a tree's volume that are not usuable for industrial wood products because of rot, form, or other defect.

Net volume.--Gross volume less deductions for cull.

Growing stock volume.--Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.--Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.--The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.--Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

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

FOREST SURVEY TABLES

Table 3.--*Total land and water area in the Mountain Lands and Uinta Basin Working Circles by ownership class, 1978*

Ownership class	Acres	Hectares
National Forest	2,625,517	1,062,513
Bureau of Land Management	1,778,446	719,715
Indian	811,618	328,451
Miscellaneous Federal	76,606	31,001
State	503,227	203,650
County and municipal	512	207
Private	2,829,738	1,145,159
Total land area	8,625,664	3,490,696
Census water	132,608	53,665
Gross area[1]	8,758,272	3,544,361

[1]U.S. Bureau of the Census, land and water area of the United States, 1970.

Table 4.--*Total land area in the Mountain Lands and Uinta Basin Working Circles by major land class and ownership class, 1978*

Land class	Ownership class					
	Public		Private		Total	
	Acres	Hectares	Acres	Hectares	Acres	Hectares
Commercial timberland	108,576	43,939	193,060	78,129	301,636	122,068
Productive reserved	3,458	1,399	88	36	3,546	1,435
Other forest land:						
Unproductive reserved	38,901	15,743	--	--	38,901	15,743
Unproductive nonreserved	960,449	388,682	719,552	291,193	1,680,001	679,875
Total forest land	1,111,384	449,763	912,700	369,358	2,024,084	819,121
Nonforest land	2,059,025	833,261	1,917,038	775,801	3,976,063	1,609,062
Total land area	3,170,409	1,283,024	2,829,738	1,145,159	6,000,147	2,428,183

Table 5.--*Area of commercial timberland in the Mountain Lands and Uinta Basin Working Circles by forest type, stand-size class, and site class, 1978*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
	Acres				
Douglas-fir:					
Sawtimber	--	2,380	7,243	53,886	63,509
Poletimber	--	--	--	5,118	5,118
Sapling and seedling	--	--	--	12,138	12,138
Nonstocked	--	--	2,557	--	2,557
Total	--	2,380	9,800	71,142	83,322
Ponderosa pine:					
Sawtimber	--	--	--	4,819	4,819
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	2,365	2,365
Nonstocked	--	--	--	2,451	2,451
Total	--	--	--	9,635	9,635
Lodgepole pine:					
Sawtimber	--	--	--	17,611	17,611
Poletimber	--	--	--	10,184	10,184
Sapling and seedling	--	--	--	2,589	2,589
Nonstocked	--	--	--	2,562	2,562
Total	--	--	--	32,946	32,946
Limber pine:					
Sawtimber	--	--	--	2,365	2,365
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	2,365	2,365
Fir-spruce:					
Sawtimber	2,556	4,831	17,104	14,796	39,287
Poletimber	--	--	7,299	--	7,299
Sapling and seedling	--	--	2,365	--	2,365
Nonstocked	--	--	--	--	--
Total	2,556	4,831	26,768	14,796	48,951
White fir:					
Sawtimber	--	5,113	2,556	4,761	12,430
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	5,113	2,556	4,761	12,430
Pinyon-juniper:					
Sawtimber	--	--	--	12,004	12,004
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	2,365	2,365
Total	--	--	--	14,369	14,369
Aspen:					
Sawtimber	--	4,965	12,543	2,455	19,963
Poletimber	--	2,589	15,107	32,600	50,296
Sapling and seedling	--	--	9,887	12,507	22,394
Nonstocked	--	--	--	--	--
Total	--	7,554	37,537	47,562	92,653
Cottonwood:					
Sawtimber	--	--	--	4,965	4,965
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	4,965	4,965
All types:					
Sawtimber	2,556	17,289	39,446	117,662	176,953
Poletimber	--	2,589	22,406	47,902	72,897
Sapling and seedling	--	--	12,252	29,599	41,851
Nonstocked	--	--	2,557	7,378	9,935
Total	2,556	19,878	76,661	202,541	301,636

Table 6.--*Area of publicly owned commercial timberland in the Mountain Lands and Uinta Basin Working Circles by forest type, stand-size class, and site class, 1978*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
	Acres				
Douglas-fir:					
Sawtimber	--	308	1,086	31,555	32,949
Poletimber	--	--	--	2,108	2,108
Sapling and seedling	--	--	--	6,470	6,470
Nonstocked	--	--	435	--	435
Total	--	308	1,521	40,133	41,962
Ponderosa pine:					
Sawtimber	--	--	--	3,114	3,114
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	1,393	1,393
Nonstocked	--	--	--	535	535
Total	--	--	--	5,042	5,042
Lodgepole pine:					
Sawtimber	--	--	--	5,861	5,861
Poletimber	--	--	--	2,109	2,109
Sapling and seedling	--	--	--	570	570
Nonstocked	--	--	--	1,674	1,674
Total	--	--	--	10,214	10,214
Limber pine:					
Sawtimber	--	--	--	1,393	1,393
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	1,393	1,393
Fir-spruce:					
Sawtimber	434	843	5,962	3,313	10,552
Poletimber	--	--	2,398	--	2,398
Sapling and seedling	--	--	1,393	--	1,393
Nonstocked	--	--	--	--	--
Total	434	843	9,753	3,313	14,343
White fir:					
Sawtimber	--	869	434	617	1,920
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	869	434	617	1,920
Pinyon-juniper:					
Sawtimber	--	--	--	7,622	7,622
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	1,393	1,393
Total	--	--	--	9,015	9,015
Aspen:					
Sawtimber	--	939	4,560	1,722	7,221
Poletimber	--	570	3,018	6,500	10,088
Sapling and seedling	--	--	2,967	3,472	6,439
Nonstocked	--	--	--	--	--
Total	--	1,509	10,545	11,694	23,748
Cottonwood:					
Sawtimber	--	--	--	939	939
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	939	939
All types:					
Sawtimber	434	2,959	12,042	56,136	71,571
Poletimber	--	570	5,416	10,717	16,703
Sapling and seedling	--	--	4,360	11,905	16,265
Nonstocked	--	--	435	3,602	4,037
Total	434	3,529	22,253	82,360	108,576

Table 7.--*Area of privately owned commercial timberland in the Mountain Lands and Uinta Basin Working Circles by forest type, stand-size class, and site class, 1978*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	2,072	6,157	22,331	30,560
Poletimber	--	--	--	3,010	3,010
Sapling and seedling	--	--	--	5,668	5,668
Nonstocked	--	--	2,122	--	2,122
Total	--	2,072	8,279	31,009	41,360
Ponderosa pine:					
Sawtimber	--	--	--	1,705	1,705
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	972	972
Nonstocked	--	--	--	1,916	1,916
Total	--	--	--	4,593	4,593
Lodgepole pine:					
Sawtimber	--	--	--	11,750	11,750
Poletimber	--	--	--	8,075	8,075
Sapling and seedling	--	--	--	2,019	2,019
Nonstocked	--	--	--	888	888
Total	--	--	--	22,732	22,732
Limber pine:					
Sawtimber	--	--	--	972	972
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	972	972
Fir-spruce:					
Sawtimber	2,122	3,988	11,142	11,483	28,735
Poletimber	--	--	4,901	--	4,901
Sapling and seedling	--	--	972	--	972
Nonstocked	--	--	--	--	--
Total	2,122	3,988	17,015	11,483	34,608
White fir:					
Sawtimber	--	4,244	2,122	4,144	10,510
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	4,244	2,122	4,144	10,510
Pinyon-juniper:					
Sawtimber	--	--	--	4,382	4,382
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	972	972
Total	--	--	--	5,354	5,354
Aspen:					
Sawtimber	--	4,026	7,983	733	12,742
Poletimber	--	2,019	12,089	26,100	40,208
Sapling and seedling	--	--	6,920	9,035	15,955
Nonstocked	--	--	--	--	--
Total	--	6,045	26,992	35,868	68,905
Cottonwood:					
Sawtimber	--	--	--	4,026	4,026
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	4,026	4,026
All types:					
Sawtimber	2,122	14,330	27,404	61,526	105,382
Poletimber	--	2,019	16,990	37,185	56,194
Sapling and seedling	--	--	7,892	17,694	25,586
Nonstocked	--	--	2,122	3,776	5,898
Total	2,122	16,349	54,408	120,181	193,060

Table 8.--*Area of commercial timberland in the Mountain Lands and Uinta Basin Working Circles by stand volume and ownership class, 1978*

Stand volume per acre[1]	Ownership class		
	Public	Private	Public and private
	Acres		
Less than 1,500 board feet	32,947	75,879	108,826
1,500 to 4,999 board feet	60,323	76,031	136,354
5,000 to 9,999 board feet	11,256	28,041	39,297
10,000 board feet or more	4,050	13,109	17,159
All classes	108,576	193,060	301,636

[1]International 1/4-inch rule.

Table 9.--*Area of commercial timberland in the Mountain Lands and Uinta Basin Working Circles by forest type and area condition class, 1978*

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	--	--	2,381	12,223	10,274	9,777	17,141	12,127	16,842	2,557	83,322	33,719
Ponderosa pine	--	--	--	2,454	--	2,365	2,365	--	--	2,451	9,635	3,899
Lodgepole pine	--	7,633	--	--	10,296	7,384	5,071	--	--	2,562	32,946	13,333
Limber pine	--	--	--	--	--	--	--	--	2,365	--	2,365	957
Fir-spruce	--	2,380	2,556	7,458	12,373	12,135	4,922	2,381	4,746	--	48,951	19,810
White fir	--	--	--	--	2,556	5,113	--	--	4,761	--	12,430	5,030
Pinyon-juniper	--	--	--	--	--	2,454	--	7,184	2,366	2,365	14,369	5,815
Aspen	2,588	7,660	--	22,347	15,217	39,802	5,039	--	--	--	92,653	37,496
Cottonwood	--	--	--	--	--	2,483	--	--	2,482	--	4,965	2,009
All types	2,588	17,673	4,937	44,482	50,716	81,513	34,538	21,692	33,562	9,935	301,636	122,068

Table 10.--*Area of productive reserved and other forest land in the Mountain Lands and Uinta Basin Working Circles by land class, ownership class, and forest type, 1978*

Land class	Forest type										All types	
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Pinyon-juniper	Total softwoods	Other hardwoods	Aspen	Cottonwood	Total hardwoods		
	Acres											*Hectares*
Productive reserved area:												
Public	822	--	--	--	--	822	--	2,636	--	2,636	3,458	1,399
Private	--	--	--	--	--	--	--	88	--	88	88	36
Other forest land area:												
Unproductive nonreserved:												
Public	6,134	1,674	570	3,067	843,087	854,532	45,176	48,199	12,542	105,917	960,449	388,682
Private	3,721	888	2,018	1,860	318,251	326,738	171,839	173,107	47,868	392,814	719,552	291,193
Unproductive reserved:												
Public	2,514	--	10,942	1,331	21,566	36,353	790	1,478	280	2,548	38,901	15,743
Private	--	--	--	--	--	--	--	--	--	--	--	--
All areas:												
Public	9,470	1,674	11,512	4,398	864,653	891,707	45,966	52,313	12,822	111,101	1,002,808	405,824
Private	3,721	888	2,018	1,860	318,251	326,738	171,839	173,195	47,868	392,902	719,640	291,229
Total acres	13,191	2,562	13,530	6,258	1,182,904	1,218,445	217,805	225,508	60,690	504,003	1,722,448	--
Total hectares	5,338	1,037	5,476	2,533	478,706	493,090	88,143	91,260	24,560	203,963	--	697,053

Table 11.--*Number of growing stock trees on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by species and diameter class, 1978*

Species	Diameter class (inches at breast height)															All classes
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand trees															
Douglas-fir	5,224	3,607	2,727	1,584	1,260	831	605	319	187	123	103	41	21	19	16	16,667
Ponderosa pine	512	147	70	35	145	89	46	78	33	27	14	9	5	--	9	1,219
Lodgepole pine	5,125	2,129	1,547	1,096	865	442	167	52	7	--	4	--	--	--	--	11,434
Limber pine	--	223	161	86	39	64	26	35	16	--	4	10	3	--	--	667
Subalpine fir	8,874	3,947	3,510	2,291	936	728	353	213	168	65	43	6	--	2	2	21,138
White fir	971	685	270	129	236	146	114	45	50	44	19	22	--	14	18	2,763
Engelmann spruce	824	522	281	215	197	164	120	135	28	33	42	16	20	5	6	2,608
Pinyon/juniper	931	794	233	117	189	141	47	57	39	36	7	6	2	--	2	2,601
Total softwoods	22,461	12,054	8,799	5,553	3,867	2,605	1,478	934	528	328	236	110	51	40	53	59,097
Aspen	23,143	19,021	10,103	5,100	1,751	748	286	53	17	--	4	--	--	--	--	60,226
Cottonwood	155	223	63	29	18	90	63	44	51	15	26	3	6	9	6	801
Other hardwoods	--	--	138	30	--	--	--	--	--	--	--	--	--	--	--	168
Total hardwoods	23,298	19,244	10,304	5,159	1,769	838	349	97	68	15	30	3	6	9	6	61,195
All species	45,759	31,298	19,103	10,712	5,636	3,443	1,827	1,031	596	343	266	113	57	49	59	120,292

Table 12.--*Number of cull and salvable dead trees on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by ownership class, and softwoods and hardwoods, 1978*

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
Public:				
Softwoods	3,506	78	3,584	1,359
Hardwoods	1,570	1,088	2,658	577
Total	5,076	1,166	6,242	1,936
Private:				
Softwoods	7,019	138	7,157	1,963
Hardwoods	4,378	2,426	6,804	1,794
Total	11,397	2,564	13,961	3,757
Public and private:				
Softwoods	10,525	216	10,741	3,322
Hardwoods	5,948	3,514	9,462	2,371
Total	16,473	3,730	20,203	5,693

Table 13.--*Net volume of growing stock on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by ownership class, forest type, and stand-size class, 1978*

Ownership class	Forest type	Stand-size class: Sawtimber	Poletimber	Sapling/seedling	Nonstocked	All classes	All classes
		Thousand cubic feet					*Thousand cubic meters*
Public:							
	Douglas-fir	30,294	1,989	2,474	125	34,882	988
	Ponderosa pine	2,891	--	1,110	62	4,063	115
	Lodgepole pine	7,514	2,631	120	--	10,265	291
	Limber pine	858	--	--	--	858	24
	Fir-spruce	19,231	4,536	995	--	24,762	701
	White fir	2,501	--	--	--	2,501	71
	Pinyon-juniper	4,133	--	--	202	4,335	123
	Aspen	7,341	8,561	1,567	--	17,469	494
	Cottonwood	1,520	--	--	--	1,520	43
	All types	76,283	17,717	6,266	389	100,655	2,850
Private:							
	Douglas-fir	34,685	1,700	2,477	611	39,473	1,118
	Ponderosa pine	1,344	--	775	221	2,340	66
	Lodgepole pine	12,473	9,995	423	--	22,891	648
	Limber pine	598	--	--	--	598	17
	Fir-spruce	65,047	9,177	694	--	74,918	2,122
	White fir	14,279	--	--	--	14,279	404
	Pinyon-juniper	2,375	--	--	141	2,516	71
	Aspen	16,875	33,954	3,465	--	54,294	1,538
	Cottonwood	6,514	--	--	--	6,514	184
	All types	154,190	54,826	7,834	973	217,823	6,168
Public and private:							
	Douglas-fir	64,979	3,689	4,951	736	74,355	2,106
	Ponderosa pine	4,235	--	1,885	283	6,403	181
	Lodgepole pine	19,987	12,626	543	--	33,156	939
	Limber pine	1,456	--	--	--	1,456	41
	Fir-spruce	84,278	13,713	1,689	--	99,680	2,823
	White fir	16,780	--	--	--	16,780	475
	Pinyon-juniper	6,508	--	--	343	6,851	194
	Aspen	24,216	42,515	5,032	--	71,763	2,032
	Cottonwood	8,034	--	--	--	8,034	227
	All types	230,473	72,543	14,100	1,362	318,478	9,018

Table 14.--*Net volume of sawtimber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by ownership class, forest type, and stand-size class, 1978*

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
Public:						
	Douglas-fir	113,742	4,354	7,571	620	126,287
	Ponderosa pine	12,618	--	5,713	347	18,678
	Lodgepole pine	23,616	3,997	389	--	28,002
	Limber pine	3,642	--	--	--	3,642
	Fir-spruce	68,193	10,372	2,620	--	81,185
	White fir	6,853	--	--	--	6,853
	Pinyon-juniper	14,339	--	--	819	15,158
	Aspen	16,664	6,706	5,490	--	28,860
	Cottonwood	6,869	--	--	--	6,869
	All types	266,536	25,429	21,783	1,786	315,534
Private:						
	Douglas-fir	128,749	3,378	7,340	3,027	142,494
	Ponderosa pine	5,883	--	3,986	1,245	11,114
	Lodgepole pine	40,399	14,970	1,378	--	56,747
	Limber pine	2,542	--	--	--	2,542
	Fir-spruce	226,225	20,203	1,829	--	248,257
	White fir	40,052	--	--	--	40,052
	Pinyon-juniper	8,505	--	--	572	9,077
	Aspen	32,452	26,050	10,572	--	69,074
	Cottonwood	29,437	--	--	--	29,437
	All types	514,244	64,601	25,105	4,844	608,794
Public and private:						
	Douglas-fir	242,491	7,732	14,911	3,647	268,781
	Ponderosa pine	18,501	--	9,699	1,592	29,792
	Lodgepole pine	64,015	18,967	1,767	--	84,749
	Limber pine	6,184	--	--	--	6,184
	Fir-spruce	294,418	30,575	4,449	--	329,442
	White fir	46,905	--	--	--	46,905
	Pinyon-juniper	22,844	--	--	1,391	24,235
	Aspen	49,116	32,756	16,062	--	97,934
	Cottonwood	36,306	--	--	--	36,306
	All types	780,780	90,030	46,888	6,630	924,328

[1]International 1/4-inch rule.

Table 15.--*Net volume of growing stock on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by species and diameter class, 1978*

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	4,781	6,583	10,579	11,400	11,986	8,046	6,708	5,420	5,517	3,322	1,624	1,781	2,827	80,574
Ponderosa pine	42	131	947	1,042	800	1,927	1,107	1,251	789	601	361	--	1,276	10,274
Lodgepole pine	3,719	7,340	9,897	8,106	4,423	2,055	343	--	296	--	--	--	--	36,179
Limber pine	227	303	216	736	427	879	535	--	190	701	182	--	--	4,396
Subalpine fir	7,339	11,983	8,873	12,151	8,275	6,795	7,033	3,615	2,920	459	--	153	261	69,857
White fir	2,080	1,202	2,768	2,257	2,023	1,050	1,534	1,650	749	902	--	805	1,549	18,569
Engelmann spruce	888	1,521	1,974	2,648	3,255	5,047	1,527	2,198	2,874	1,536	2,386	646	1,250	27,750
Pinyon/juniper	209	260	616	727	362	632	579	680	136	124	55	--	61	4,441
Total softwoods	19,285	29,323	35,870	39,067	31,551	26,431	19,366	14,814	13,471	7,645	4,608	3,385	7,224	252,040
Aspen	13,886	18,896	11,681	7,539	4,193	903	550	--	149	--	--	--	--	57,797
Cottonwood	64	213	92	1,106	1,207	1,145	1,483	520	1,190	206	329	447	468	8,470
Other hardwoods	130	41	--	--	--	--	--	--	--	--	--	--	--	171
Total hardwoods	14,080	19,150	11,773	8,645	5,400	2,048	2,033	520	1,339	206	329	447	468	66,438
All species	33,365	48,473	47,643	47,712	36,951	28,479	21,399	15,334	14,810	7,851	4,937	3,832	7,692	318,478

Table 16.--*Net volume of sawtimber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by species and diameter class, 1978*

Species	Diameter class (inches at breast height)												
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	39,702	46,420	51,753	36,086	31,259	26,030	26,985	16,699	8,252	9,169	15,004	307,359
Ponderosa pine	3,248	4,081	3,420	8,707	5,235	6,147	4,011	3,122	1,913	--	7,076	46,960
Lodgepole pine	40,692	35,906	20,460	9,835	1,670	--	1,511	--	--	--	--	110,074
Limber pine	859	3,261	2,021	4,269	2,673	--	984	3,671	974	--	--	18,712
Subalpine fir	31,810	46,944	33,521	28,660	30,597	16,065	13,223	2,111	--	727	1,238	204,896
White fir	5,888	7,197	7,191	4,312	6,585	7,101	3,154	3,717	--	3,452	6,936	55,533
Engelmann spruce	7,438	10,794	14,063	22,670	7,091	10,440	13,956	7,591	11,891	3,262	6,560	115,756
Pinyon/juniper	1,849	2,166	1,059	1,797	1,595	1,851	371	342	154	--	171	11,355
Total softwoods	131,486	156,769	133,488	116,336	86,705	67,634	64,195	37,253	23,184	16,610	36,985	870,645
Aspen	XXXXX	8,194	4,796	1,072	664	--	189	--	--	--	--	14,915
Cottonwood	XXXXX	5,591	6,076	5,692	7,081	2,431	5,396	933	1,465	1,988	2,115	38,768
Other hardwoods	XXXXX	--	--	--	--	--	--	--	--	--	--	--
Total hardwoods	XXXXX	13,785	10,872	6,764	7,745	2,431	5,585	933	1,465	1,988	2,115	53,683
All species	131,486	170,554	144,360	123,100	94,450	70,065	69,780	38,186	24,649	18,598	39,100	924,328

Table 17.--*Net volume of growing stock and sawtimber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by ownership class and species, 1978*

Ownership class	Species													All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White-fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	GROWING STOCK *Thousand cubic feet*													
Public	35,193	5,861	11,119	2,578	19,979	3,898	5,407	2,850	86,885	12,118	1,619	33	13,770	100,655
Private	45,381	4,413	25,060	1,818	49,878	14,671	22,343	1,591	165,155	45,679	6,851	138	52,668	217,823
Total	80,574	10,274	36,179	4,396	69,857	18,569	27,750	4,441	252,040	57,797	8,470	171	66,438	318,478
	GROWING STOCK *Thousand cubic meters*													
Public	996	166	315	73	566	110	153	81	2,460	343	46	1	390	2,850
Private	1,285	125	709	51	1,412	416	633	45	4,676	1,294	194	4	1,492	6,168
Total	2,281	291	1,024	124	1,978	526	786	126	7,136	1,637	240	5	1,882	9,018
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*													
Public	132,021	27,050	34,780	11,019	60,209	10,339	22,590	7,298	305,306	2,814	7,414	--	10,228	315,534
Private	175,338	19,910	75,294	7,693	144,687	45,194	93,166	4,057	565,339	12,101	31,354	--	43,455	608,794
Total	307,359	46,960	110,074	18,712	204,896	55,533	115,756	11,355	870,645	14,915	38,768	--	53,683	924,328

Table 18.--*Net volume of timber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by class of timber, and softwoods and hardwoods, 1978*

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw-log portion	190,859	18,619	209,478
Upper-stem portion	12,573	2,816	15,389
Total	203,432	21,435	224,867
Poletimber trees	48,608	45,003	93,611
All growing stock trees	252,040	66,438	318,478
Sound cull trees	9,837	545	10,382
Rotten cull trees	1,968	2,714	4,682
Salvable dead trees	23,489	5,918	29,407
All timber	287,334	75,615	362,949

Table 19.--*Net volume of growing stock on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by forest type and species, 1978*

Forest type	Species													All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White-fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	Thousand cubic feet													
Douglas-fir	61,886	794	--	2,608	3,610	1,378	--	1,439	71,715	2,640	--	--	2,640	74,355
Ponderosa pine	--	6,351	--	--	--	--	--	--	6,351	52	--	--	52	6,403
Lodgepole pine	--	534	28,285	--	277	--	444	--	29,540	3,616	--	--	3,616	33,156
Limber pine	378	--	--	1,078	--	--	--	--	1,456	--	--	--	--	1,456
Fir-spruce	10,673	--	5,071	176	55,257	--	25,652	--	96,829	2,851	--	--	2,851	99,680
White fir	231	--	--	--	397	13,317	--	--	13,945	2,835	--	--	2,835	16,780
Pinyon-juniper	3,453	--	--	446	--	--	--	2,952	6,851	--	--	--	--	6,851
Aspen	3,953	2,595	2,823	88	10,316	3,874	1,654	50	25,353	45,701	538	171	46,410	71,763
Cottonwood	--	--	--	--	--	--	--	--	--	102	7,932	--	8,034	8,034
All types	80,574	10,274	36,179	4,396	69,857	18,569	27,750	4,441	252,040	57,797	8,470	171	66,438	318,478

Table 20.--*Net volume of sawtimber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by forest type and species, 1978*

Forest type	Species													All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White-fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	Thousand board-feet, International 1/4-inch rule													
Douglas-fir	235,760	4,019	--	12,293	9,573	3,779	--	3,134	268,558	223	--	--	223	268,781
Ponderosa pine	--	29,792	--	--	--	--	--	--	29,792	--	--	--	--	29,792
Lodgepole pine	--	2,332	79,603	--	378	--	1,541	--	83,854	895	--	--	895	84,749
Limber pine	1,459	--	--	4,725	--	--	--	--	6,184	--	--	--	--	6,184
Fir-spruce	39,590	--	19,892	934	160,113	--	107,956	--	328,485	957	--	--	957	329,442
White fir	1,019	--	--	--	--	45,120	--	--	46,139	766	--	--	766	46,905
Pinyon-juniper	15,404	--	--	760	--	--	--	8,071	24,235	--	--	--	--	24,235
Aspen	14,127	10,817	10,579	--	34,832	6,634	6,259	150	83,398	11,957	2,579	--	14,536	97,934
Cottonwood	--	--	--	--	--	--	--	--	--	117	36,189	--	36,306	36,306
All types	307,359	46,960	110,074	18,712	204,896	55,533	115,756	11,355	870,645	14,915	38,768	--	53,683	924,328

Ownership class	Species												All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White-fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	GROWING STOCK - *Cubic feet*												
Public	539,183	99,834	-441,596	37,590	322,396	143,808	83,794	785,009	400,442	42,874	1,717	445,033	1,230,042
Private	690,358	70,175	253,592	27,681	877,566	621,419	324,548	2,865,339	1,592,081	182,154	7,224	1,781,459	4,646,798
Total	1,229,541	170,009	-188,004	65,271	1,199,962	765,227	408,342	3,650,348	1,992,523	225,028	8,941	2,226,492	5,876,840
	GROWING STOCK - *Cubic meters*												
Public	15,268	2,827	-12,504	1,064	9,129	4,072	2,373	22,229	11,339	1,214	49	12,602	34,831
Private	19,549	1,987	7,181	784	24,850	17,597	9,190	81,138	45,083	5,158	204	50,445	131,583
Total	34,817	4,814	-5,323	1,848	33,979	21,669	11,563	103,367	56,422	6,372	253	63,047	166,414
	SAWTIMBER - *Board feet, International 1/4-inch rule*												
Public	2,732,611	505,154	-335,857	356,774	1,182,644	463,352	365,132	5,269,810	46,376	402,362	--	448,738	5,718,548
Private	3,578,497	336,550	1,960,616	245,753	1,789,073	2,102,280	1,481,282	11,494,051	334,710	1,717,222	--	2,051,932	13,545,983
Total	6,311,108	841,704	1,624,759	602,527	2,971,717	2,565,632	1,846,414	16,763,861	381,086	2,119,584	--	2,500,670	19,264,531

Table 22.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by ownership class, and softwoods and hardwoods, 1978*

Species group and ownership class	Growing stock		Sawtimber
	- *Cubic feet* -	- *Cubic meters* -	- *Board feet*[1] -
Softwoods:			
Public	1,192,428	33,766	3,664,531
Private	1,683,270	47,665	5,607,797
Total	2,875,698	81,431	9,272,328
Hardwoods:			
Public	136,240	3,858	70,319
Private	432,114	12,236	164,425
Total	568,354	16,094	234,744

[1]International 1/4-inch rule.

Table 23.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Mountain Lands and Uinta Basin Working Circles by cause of death and species, 1978*

Cause of death	Species						All species
	Douglas-fir	Lodgepole pine	Subalpine fir	Engelmann spruce	Total softwoods	Aspen	
	GROWING STOCK *Cubic feet*						
Insects	104,986	92,969	261,502	--	459,457	35,697	495,154
Disease	121,546	--	106,485	18,784	246,815	142,409	389,224
Fire	99,756	887,966	--	--	987,722	--	987,722
Animal	--	33,202	--	--	33,202	105,620	138,822
Weather	22,255	69,643	403,319	77,220	572,437	--	572,437
Suppression	--	--	25,543	--	25,543	9,319	34,862
Unknown	232,356	127,783	152,026	--	512,165	275,309	787,474
Logging	38,357	--	--	--	38,357	--	38,357
Total	619,256	1,211,563	948,875	96,004	2,875,698	568,354	3,444,052
	GROWING STOCK *Cubic meters*						
Insects	2,972	2,633	7,405	--	13,010	1,011	14,021
Disease	3,442	--	3,015	532	6,989	4,033	11,022
Fire	2,825	25,144	--	--	27,969	--	27,969
Animal	--	940	--	--	940	2,991	3,931
Weather	630	1,972	11,421	2,187	16,210	--	16,210
Suppression	--	--	723	--	723	264	987
Unknown	6,580	3,619	4,305	--	14,504	7,795	22,299
Logging	1,086	--	--	--	1,086	--	1,086
Total	17,535	34,308	26,869	2,719	81,431	16,094	97,525
	SAWTIMBER *Board feet, International 1/4-inch rule*						
Insects	428,699	439,106	595,200	--	1,463,005	40,781	1,503,786
Disease	571,640	--	445,069	--	1,016,709	55,006	1,071,715
Fire	485,804	2,708,366	--	--	3,194,170	--	3,194,170
Animal	--	130,968	--	--	130,968	40,538	171,506
Weather	84,526	352,495	1,160,653	169,065	1,766,739	--	1,766,739
Suppression	--	--	--	--	--	--	--
Unknown	954,161	197,550	383,712	--	1,535,423	98,419	1,633,842
Logging	165,314	--	--	--	165,314	--	165,314

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1980. Forest area and timber resource statistics for the Mountain Lands and Uinta Basin Working Circles, Utah, 1977-1978. USDA For. Serv. Resour. Bull. INT-23, 24 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

KEYWORDS: forest surveys (regional), forest area classification, stand volume

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The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

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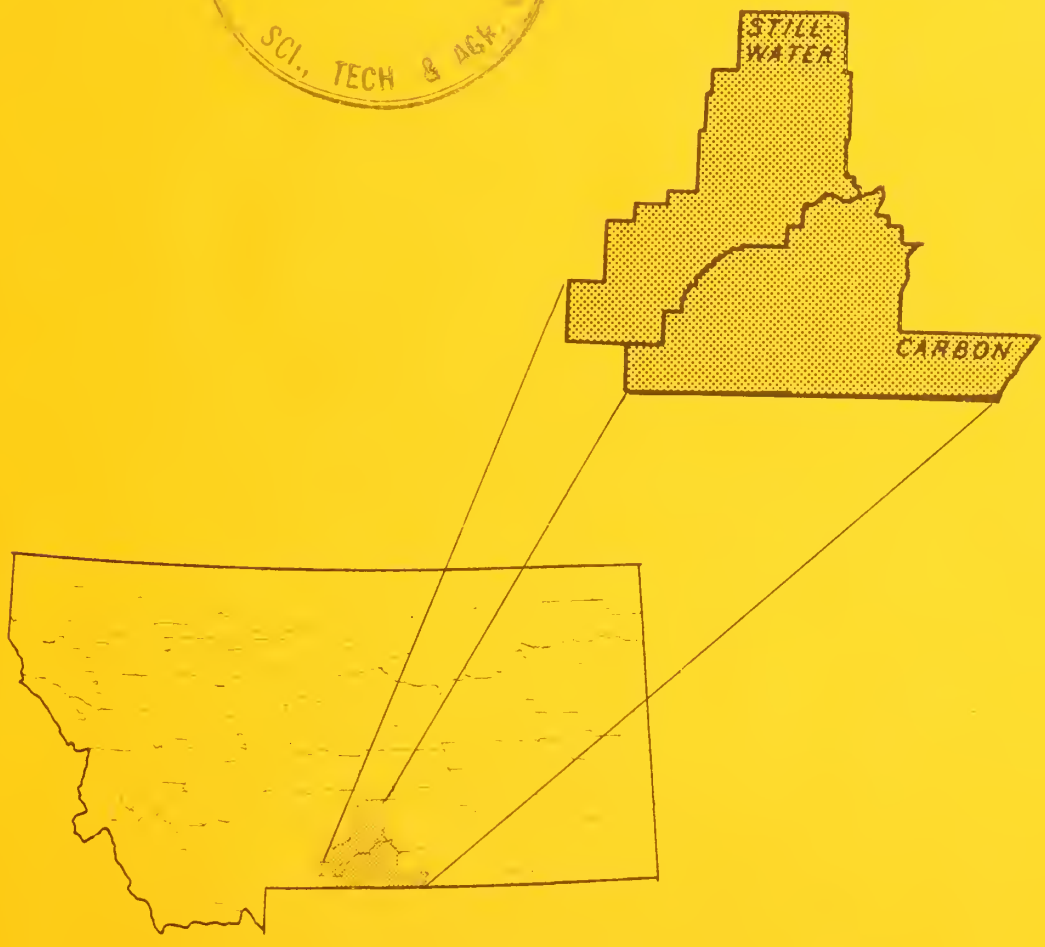
FOREST AREA AND TIMBER RESOURCE STATISTICS FOR THE BEARTOOTH WORKING CIRCLE, MONTANA, 1977

Dorothy G. Felt



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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION
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FOREST AREA AND TIMBER RESOURCE STATISTICS FOR THE BEARTOOTH WORKING CIRCLE, MONTANA, 1977

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ACKNOWLEDGMENTS

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RESEARCH SUMMARY

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

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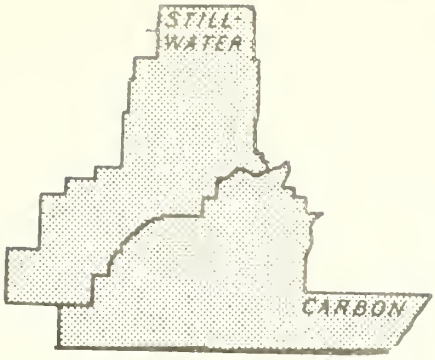
BEARTOOTH



INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of State and private lands in the two county area making up the Beartooth Working Circle (fig. 1). Data collection began in January 1977 and was completed in October 1977. This bulletin does not note changes and trends since the inventory of eastern Montana in 1966, nor does it contain estimates of timber removals. These items will be included in the State Analytical Report to be published in the near future.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forest and rangelands. Fundamental to the accomplishment of this objective are the periodic State-by-State resource inventories. Originally, Resources Evaluation--formerly Forest Survey--was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station, with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

HIGHLIGHTS

Area

- State and private lands account for 1,724 thousand acres (698 thousand hectares), 70 percent of the total land area in the working circle.
- Forests occupy 112 thousand acres (45 thousand hectares), 7 percent of the total State and private land area in the working circle.
- Of the forest land, 68 thousand acres (27 thousand hectares), almost 54 percent, are classified as commercial timberland.
- Private ownership accounts for 61 thousand acres (25 thousand hectares), 90 percent of the commercial timberland.

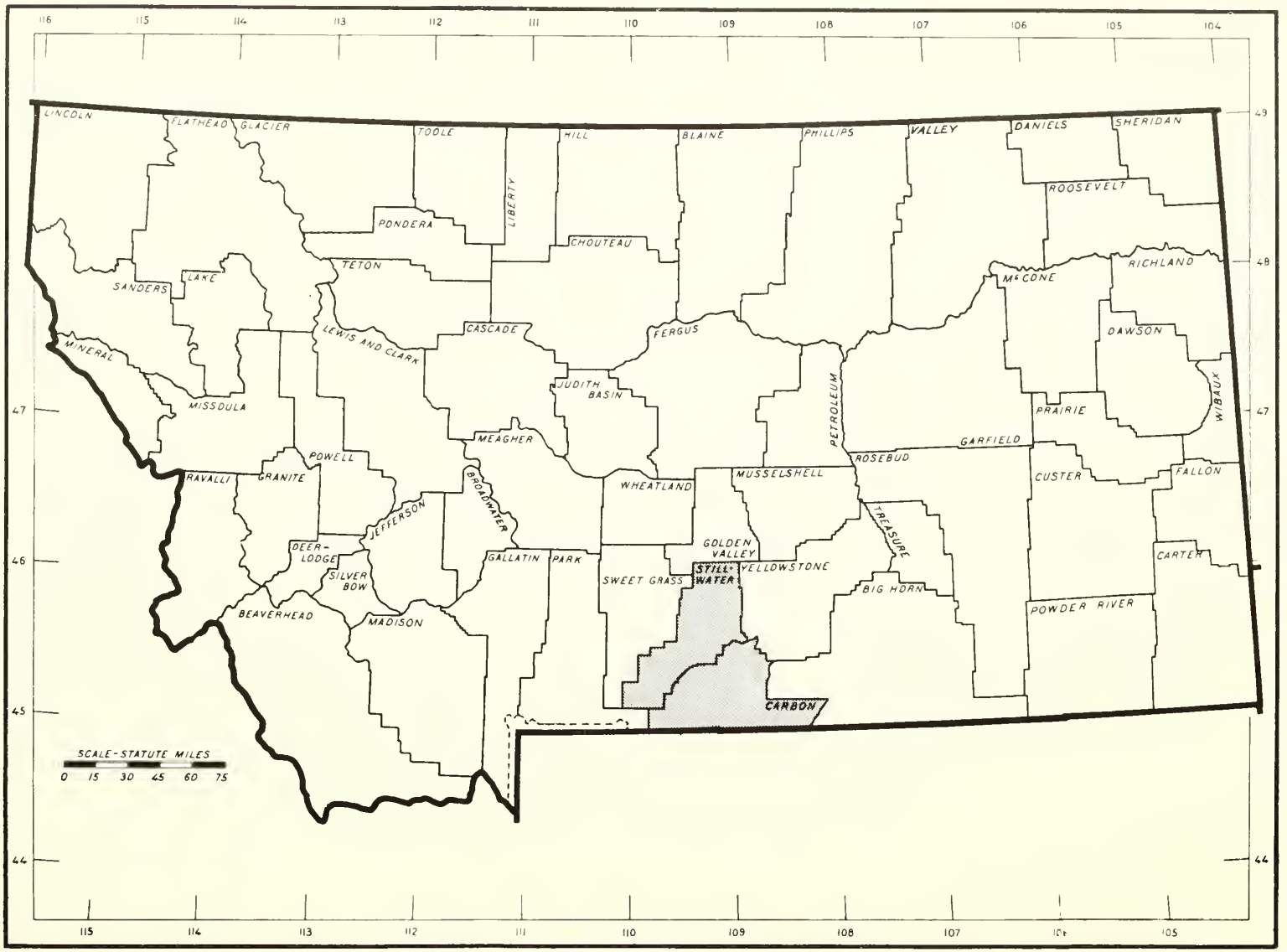


Figure 1.--Beartooth Working Circle, Montana.

- Ponderosa pine, cottonwood, and Douglas-fir are the predominant forest types and occupy 88 percent of the commercial timberland. Aspen, lodgepole pine, and limber pine forest types cover the remaining area.

- Nearly all of the commercial timberland is in the 20 to 49 cubic foot productivity class, and nearly 90 percent of such land is privately owned.

Inventory

- Growing stock volume amounts to 66 million cubic feet (1.9 million cubic meters) and sawtimber volume totals 218 million board feet.[1]

- Rough, rotten, and salvable dead trees comprise 2.9 million cubic feet (82 thousand cubic meters), 4 percent of the total sound wood volume.

- The largest share of the total growing stock volume is made up of ponderosa pine (43 percent), Douglas-fir (22 percent), and cottonwood (21 percent). Aspen, lodgepole pine, limber pine, Engelmann spruce, and juniper,[2] account for the remaining volume.

- Private owners control almost 90 percent of both the total growing stock and the sawtimber volume.

Growth and Mortality

- Net annual growth totals 1,335 thousand cubic feet (38 thousand cubic meters). Growth and mortality are not measured for juniper trees.

- Eighty-nine percent of the total net growth is on private lands.

- The annual mortality of 334 thousand cubic feet (9.5 thousand cubic meters) offsets 20 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and working circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 16,083 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 118 ground sample locations. Sample trees were selected using a 10-point cluster which includes fixed plots (1/300 acre) for trees less than 5.0 inches d.b.h. and variable plots (40 BAF) for trees 5.0 inches d.b.h. or larger.

3. For most species, volume and defect were computed using Kemp's equations. Juniper volumes were computed using Clendenen's pinyon/juniper equations and ponderosa pine was computed using equations developed for ponderosa pine in eastern Montana.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

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[1] International 1/4-inch rule.

[2] Although juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

Table 1.--*Area of forest land and percent standard error for the Beartooth Working Circle, 1977*

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	51,297	11.0	16,341	20.8	67,638	8.4
Other forest land:						
Unproductive nonreserved	32,679	15.2	11,476	26.5	44,155	12.5

Table 2.--*Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland, with percent standard error for the Beartooth Working Circle, 1977*

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	46,961	16.8	19,453	24.3	66,414	12.6
Sawtimber (M board feet[1])	155,309	16.4	62,490	29.4	217,799	13.6
Net annual growth:						
Growing stock (cubic feet)	737,068	20.8	597,556	34.1	1,334,624	18.0
Sawtimber (board feet[1])	4,654,092	24.3	1,259,669	39.0	5,913,761	20.4
Annual mortality:						
Growing stock (cubic feet)	280,921	27.8	53,340	44.0	334,261	24.4
Sawtimber (board feet[1])	813,444	36.7	151,155	51.8	964,599	32.0

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for the Beartooth Working Circle, Montana, are displayed in tables 3 through 23.

TERMINOLOGY

Land

Bureau of the Census.--Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. Includes noncensus water. See definition below.

Water

Census water.--As defined by the Bureau of the Census, streams, sloughs, estuaries, and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.--The same as defined by the Bureau of the Census, except minimum width f streams, sloughs, estuaries, and canals is 120 feet and minimum size of lakes, reservoirs, nd ponds is 1 acre.

Land Use Classes

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly aving had such tree cover, and not currently developed for nonforest use.

Commercial timberland.--Forest land producing or capable of producing crops of industrial ood and not withdrawn from timber utilization. (Areas qualifying have the capability of roducing in excess of 20 cubic feet per acre per year of industrial wood under management. urrently inaccessible and inoperable areas are included, except when the areas involved are mall and unlikely to become suitable for production of industrial wood in the foreseeable uture.)

Productive-reserved forest land.--Forest land sufficiently productive to qualify as ommercial timberland, but withdrawn from timber utilization through statute, administrative esignation, or exclusive use for Christmas tree production.

Other forest land.--Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; includes both reserved and onreserved forest land.

Nonforest land.--Land that has never supported forests and lands formerly forested where se for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.--Federal lands legally designated as National Forest or purchase nits and other lands under the administration of the Forest Service, including experimental reas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.--Federal lands administered by the Bureau of Land anagement.

Indian lands.--Tribal lands held in fee by the Federal Government, but administered for ndian tribal groups and Indian trust allotments.

State lands.--Lands owned by States, or lands leased to these governmental units for 50 ears or more.

Private and Other

County and municipal lands.--Lands owned by counties and local public agencies or unicipalities, or lands leased to these governmental units for 50 years or more.

Forest industry lands.--Lands owned by companies or by individuals operating wood-rocessing plants.

Farmer-owned lands.--Lands owned by farm operators. (These exclude lands leased by arm operators from such nonfarm owners as railroad companies and States.)

Miscellaneous Federal lands.--Federal lands other than the following: (1) National Forest ands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

Miscellaneous private lands.--Privately owned lands other than forest industry and armer-owned lands.

Forest Type and Tree Species

Forest types.--A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.--Tree species presently or prospectively suitable for industrial wood products.

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

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

Area Condition Classes

Stocking.--Stocking is an effort to express the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range, which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full-site occupancy. Overstocking is characterized by sites with over 133-percent stocking.

Class 10.--Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees

CLass 30.--Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.--Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

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

Class 70.--Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.--Low-risk old-growth stands.

Class 90.--High-risk old-growth stands.

Nonstocked.--Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.--Growing stock trees (1) having no serious defect in quality limiting :esent or prospective use for timber products; (2) of relatively high vigor; and (3) contain-ıg no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.--Growing stock trees meeting specified standards of size and quality, ıt not qualifying as desirable trees.

Rough trees.--(1) Live trees that do not contain at least one 12-foot saw log or two)ncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet)cky Mountain Regional specifications for freedom from defect primarily because of roughness poor form; and (2) all live trees of noncommercial species.

Rotten trees.--Live trees that do not contain at least one 12-foot saw log or two non-)ntiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet)cky Mountain Regional specifications for freedom from defect primarily because of rot; that ;, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

Salvable dead trees.--Standing or down dead trees that are considered merchantable by)cky Mountain Regional standards.

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the aw-log top. A 1-foot stump is used.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw-log top to a inimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks ıto limbs, whichever occurs first.

Tree Size Classes

Seedlings.--Live trees less than 1.0 inch in diameter at breast height.

Saplings.--Trees 1.0 to 4.9 inches in diameter at breast height.

Poletimber trees.--Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.--Trees exceeding poletimber size. In the Intermountain States, the inimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwoods, 11.0 inches.

Volume

Cull volume.--Portions of a tree's volume that are not usable for industrial wood products ecause of rot, form, or other defect.

Net volume.--Gross volume less deductions for cull.

Growing stock volume.--Net volume in cubic feet of live sawtimber trees and live pole-imber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume ıuals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.--Net volume in board feet of sawtimber trees of commercial species. et volume equals gross volume less deduction for rot, sweep, crook, and other defects that ffect use for lumber.

Growth and Mortality

Net annual growth.--The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year and surviving to its end, plus the net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.--Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

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

FOREST SURVEY TABLES

Table 3.--*Total land and water area in the Beartooth Working Circle by ownership class, 1977*

Ownership class	Acres	Hectares
National Forest	510,195	206 470
Bureau of Land Management	208,456	84 359
National Park Service[1]	28,035	11 345
State	96,395	39 010
Private and other	1,627,511	658 633
Total land area	2,470,592	999 817
Census water	9,408	3 807
Gross area[2]	2,480,000	1 003 624

[1]Not included with miscellaneous Federal ownership (a category of private and other) for purposes of clarity.

[2]U.S. Bureau of the Census, land and water area of the United States, 1970.

Table 4.--*Total land area in the Beartooth Working Circle by major land class and ownership class, 1977*

Land class	Ownership class					
	State		Private[1]		Total	
	Acres	Hectares	Acres	Hectares	Acres	Hectares
Commercial timberland	6,812	2 757	60,826	24 615	67,638	27 372
Productive reserved	72	29	329	133	401	162
Other forest land:						
Unproductive reserved	--	--	--	--	--	--
Unproductive nonreserved	3,428	1 387	40,727	16 482	44,155	17 869
Total forest land	10,312	4 173	101,882	41 230	112,194	45 403
Nonforest land	86,083	34 837	1,525,629	617 403	1,611,712	652 240
Total land area	96,395	39 010	1,627,511	658 633	1,723,906	697 643

[1]On this and all following tables, the private ownership category includes a small portion of miscellaneous Federal, and county and municipal ownership.

Table 5.--*Area of commercial timberland in the Beartooth Working Circle by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	--	--	7,386	7,386
Poletimber	--	--	--	2,569	2,569
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	9,955	9,955
Ponderosa pine:					
Sawtimber	--	--	1,285	25,316	26,601
Poletimber	--	--	--	3,761	3,761
Sapling and seedling	--	--	--	6,772	6,772
Nonstocked	--	--	--	1,326	1,326
Total	--	--	1,285	37,175	38,460
Lodgepole pine:					
Sawtimber	--	--	--	1,732	1,732
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	1,732	1,732
Limber pine:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	1,150	1,150
Total	--	--	--	1,150	1,150
Aspen:					
Sawtimber	--	--	--	447	447
Poletimber	--	--	--	2,625	2,625
Sapling and seedling	--	--	--	2,125	2,125
Nonstocked	--	--	--	--	--
Total	--	--	--	5,197	5,197
Cottonwood:					
Sawtimber	--	--	--	6,812	6,812
Poletimber	--	--	--	1,680	1,680
Sapling and seedling	--	--	1,326	1,326	2,652
Nonstocked	--	--	--	--	--
Total	--	--	1,326	9,818	11,144
All types:					
Sawtimber	--	--	1,285	41,693	42,978
Poletimber	--	--	--	10,635	10,635
Sapling and seedling	--	--	1,326	10,223	11,549
Nonstocked	--	--	--	2,476	2,476
Total	--	--	2,611	65,027	67,638

Table 6.--*Area of State-owned commercial timberland in the Beartooth Working Circle by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	--	--	652	652
Poletimber	--	--	--	326	326
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	978	978
Ponderosa pine:					
Sawtimber	--	--	163	2,294	2,457
Poletimber	--	--	--	373	373
Sapling and seedling	--	--	--	456	456
Nonstocked	--	--	--	141	141
Total	--	--	163	3,264	3,427
Lodgepole pine:					
Sawtimber	--	--	--	282	282
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	282	282
Limber pine:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	69	69
Total	--	--	--	69	69
Aspen:					
Sawtimber	--	--	--	118	118
Poletimber	--	--	--	518	518
Sapling and seedling	--	--	--	247	247
Nonstocked	--	--	--	--	--
Total	--	--	--	883	883
Cottonwood:					
Sawtimber	--	--	--	724	724
Poletimber	--	--	--	168	168
Sapling and seedling	--	--	141	140	281
Nonstocked	--	--	--	--	--
Total	--	--	141	1,032	1,173
All types:					
Sawtimber	--	--	163	4,070	4,233
Poletimber	--	--	--	1,385	1,385
Sapling and seedling	--	--	141	843	984
Nonstocked	--	--	--	210	210
Total	--	--	304	6,508	6,812

Table 7.--*Area of privately owned commercial timberland in the Beartooth Working Circle by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	--	--	6,734	6,734
Poletimber	--	--	--	2,243	2,243
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	8,977	8,977
Ponderosa pine:					
Sawtimber	--	--	1,122	23,022	24,144
Poletimber	--	--	--	3,388	3,388
Sapling and seedling	--	--	--	6,316	6,316
Nonstocked	--	--	--	1,185	1,185
Total	--	--	1,122	33,911	35,033
Lodgepole pine:					
Sawtimber	--	--	--	1,450	1,450
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	1,450	1,450
Limber pine:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	1,081	1,081
Total	--	--	--	1,081	1,081
Aspen:					
Sawtimber	--	--	--	329	329
Poletimber	--	--	--	2,107	2,107
Sapling and seedling	--	--	--	1,878	1,878
Nonstocked	--	--	--	--	--
Total	--	--	--	4,314	4,314
Cottonwood:					
Sawtimber	--	--	--	6,088	6,088
Poletimber	--	--	--	1,512	1,512
Sapling and seedling	--	--	1,185	1,186	2,371
Nonstocked	--	--	--	--	--
Total	--	--	1,185	8,786	9,971
All types:					
Sawtimber	--	--	1,122	37,623	38,745
Poletimber	--	--	--	9,250	9,250
Sapling and seedling	--	--	1,185	9,380	10,565
Nonstocked	--	--	--	2,266	2,266
Total	--	--	2,307	58,519	60,826

Table 8.--*Area of commercial timberland in the Beartooth Working Circle by stand volume and ownership class, 1977*

Stand volume per acre[1]	Ownership class		
	State	Private	State and private
	Acres		
Less than 1,500 board feet	2,135	18,589	20,724
1,500 to 4,999 board feet	3,339	29,026	32,365
5,000 to 9,999 board feet	1,091	11,333	12,424
10,000 board feet or more	247	1,878	2,125
All classes	6,812	60,826	67,638

[1]International 1/4-inch rule.

Table 9.--*Area of commercial timberland in the Beartooth Working Circle by forest type and area condition class, 1977*

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	--	--	--	--	1,284	3,937	1,285	--	3,449	--	9,955	4 029
Ponderosa pine	--	--	--	2,434	6,060	5,624	16,645	--	6,371	1,326	38,460	15 564
Lodgepole pine	--	--	--	--	1,732	--	--	--	--	--	1,732	701
Limber pine	--	--	--	--	--	--	--	--	--	1,150	1,150	465
Aspen	--	--	--	--	4,303	894	--	--	--	--	5,197	2 103
Cottonwood	--	--	--	--	3,493	5,971	1,680	--	--	--	11,144	4 510
All types	--	--	--	2,434	16,872	16,426	19,610	--	9,820	2,476	67,638	27 372

Table 10.--*Area of productive reserved and other forest land in the Beartooth Working Circle by land class, ownership class, and forest type, 1977*

Land class	Forest type										All types	
	Ponderosa pine	Lodgepole pine	Limber pine	Juniper	Other softwoods	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods		
	Acres											*-Hectares-*
Productive reserved area:												
State	--	--	--	72	--	72	--	--	--	--	72	29
Private	--	--	--	329	--	329	--	--	--	--	329	133
Other forest land area:												
Unproductive nonreserved:												
State	768	326	138	414	676	2,322	751	163	192	1,106	3,428	1 387
Private	8,960	2,243	2,161	7,822	9,171	30,357	4,309	1,122	4,939	10,370	40,727	16 482
Unproductive reserved:												
State	--	--	--	--	--	--	--	--	--	--	--	--
Private	--	--	--	--	--	--	--	--	--	--	--	--
All areas:												
State	768	326	138	486	676	2,394	751	163	192	1,106	3,500	1 416
Private	8,960	2,243	2,161	8,151	9,171	30,686	4,309	1,122	4,939	10,370	41,056	16 615
Total acres	9,728	2,569	2,299	8,637	9,847	33,080	5,060	1,285	5,131	11,476	44,556	--
Total hectares	3 937	1 040	930	3 495	3 985	13 387	2 048	520	2 076	4 644	--	18 031

Table 11.--*Number of growing stock trees on commercial timberland in the Beartooth Working Circle by species and diameter class, 1977*

Species	Diameter class (inches at breast height)															All classes
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand trees															
Douglas-fir	425	884	851	795	279	199	51	46	14	7	8	5	4	1	1	3,570
Ponderosa pine	2,169	1,262	1,024	774	734	364	270	122	50	35	29	6	7	2	3	6,851
Lodgepole pine	27	67	49	41	66	39	25	8	--	--	--	--	--	--	--	322
Limber pine	87	69	59	25	34	22	12	3	3	--	--	--	--	--	--	314
Subalpine fir	92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	92
Engelmann spruce	40	--	--	14	--	8	--	--	--	--	--	--	--	1	--	63
Juniper	2,956	583	231	46	21	6	--	4	--	--	--	--	--	--	--	3,847
Total softwoods	5,796	2,865	2,214	1,695	1,134	638	358	183	67	42	37	11	11	4	4	15,059
Aspen	1,925	703	471	348	185	40	12	--	--	--	--	--	--	--	--	3,684
Cottonwood	395	381	146	91	71	85	68	106	82	35	24	9	7	3	4	1,507
Total hardwoods	2,320	1,084	617	439	256	125	80	106	82	35	24	9	7	3	4	5,191
All species	8,116	3,949	2,831	2,134	1,390	763	438	289	149	77	61	20	18	7	8	20,250

Table 12.--*Number of cull and salvable dead trees on commercial timberland in the Beartooth Working Circle by ownership class, and softwoods and hardwoods, 1977*

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
State:				
Softwoods	151	([1])	151	40
Hardwoods	23	([1])	23	12
Total	174	([1])	174	52
Private:				
Softwoods	1,384	1	1,385	376
Hardwoods	137	1	138	63
Total	1,521	2	1,523	439
State and private:				
Softwoods	1,535	1	1,536	416
Hardwoods	160	1	161	75
Total	1,695	2	1,697	491

[1]Less than 0.5 thousand trees.

Table 13.--*Net volume of growing stock on commercial timberland in the Beartooth Working Circle by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					*Thousand cubic meters*
State:							
	Douglas-fir	875	645	--	--	1,520	43
	Ponderosa pine	2,298	245	143	25	2,711	77
	Lodgepole pine	279	--	--	--	279	8
	Limber pine	--	--	--	9	9	([1])
	Aspen	120	561	224	--	905	26
	Cottonwood	1,112	122	321	--	1,555	44
	All types	4,684	1,573	688	34	6,979	198
Private:							
	Douglas-fir	9,406	4,434	--	--	13,840	392
	Ponderosa pine	22,260	1,762	1,935	214	26,171	741
	Lodgepole pine	1,449	--	--	--	1,449	41
	Limber pine	--	--	--	139	139	4
	Aspen	334	2,546	1,654	--	4,534	128
	Cottonwood	9,496	1,102	2,704	--	13,302	377
	All types	42,945	9,844	6,293	353	59,435	1 683
State and private:							
	Douglas-fir	10,281	5,079	--	--	15,360	435
	Ponderosa pine	24,558	2,007	2,078	239	28,882	818
	Lodgepole pine	1,728	--	--	--	1,728	49
	Limber pine	--	--	--	148	148	4
	Aspen	454	3,107	1,878	--	5,439	154
	Cottonwood	10,608	1,224	3,025	--	14,857	421
	All types	47,629	11,417	6,981	387	66,414	1 881

[1]Less than 0.5 thousand cubic meters.

Table 14.--*Net volume of sawtimber on commercial timberland in the Beartooth Working Circle by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
State:						
	Douglas-fir	2,953	790	--	--	3,743
	Ponderosa pine	8,428	576	397	109	9,510
	Lodgepole pine	1,155	--	--	--	1,155
	Limber pine	--	--	--	26	26
	Aspen	530	178	174	--	882
	Cottonwood	4,989	229	1,263	--	6,481
	All types	18,055	1,773	1,834	135	21,797
Private:						
	Douglas-fir	32,616	5,437	--	--	38,053
	Ponderosa pine	81,872	4,226	5,834	924	92,856
	Lodgepole pine	6,145	--	--	--	6,145
	Limber pine	--	--	--	403	403
	Aspen	1,472	493	1,372	--	3,337
	Cottonwood	42,507	2,062	10,639	--	55,208
	All types	164,612	12,218	17,845	1,327	196,002
State and private:						
	Douglas-fir	35,569	6,227	--	--	41,796
	Ponderosa pine	90,300	4,802	6,231	1,033	102,366
	Lodgepole pine	7,300	--	--	--	7,300
	Limber pine	--	--	--	429	429
	Aspen	2,002	671	1,546	--	4,219
	Cottonwood	47,496	2,291	11,902	--	61,689
	All types	182,667	13,991	19,679	1,462	217,799

[1]International 1/4-inch rule.

Table 15.--*Net volume of growing stock on commercial timberland in the Beartooth Working Circle by species and diameter class, 1977*

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	2,330	3,817	2,244	2,401	892	1,098	416	215	304	226	258	78	107	14,386
Ponderosa pine	1,818	3,201	5,275	4,477	4,496	2,933	1,704	1,440	1,577	381	529	202	405	28,438
Lodgepole pine	201	274	682	609	476	207	--	--	--	--	--	--	--	2,449
Limber pine	182	121	266	267	217	64	77	--	--	--	--	--	--	1,194
Engelmann spruce	--	54	--	107	--	--	--	--	--	--	--	114	--	275
Juniper	73	83	21	16	--	26	--	--	--	--	--	--	--	219
Total softwoods	4,604	7,550	8,488	7,877	6,081	4,328	2,197	1,655	1,881	607	787	394	512	46,961
Aspen	1,320	2,024	1,611	529	206	--	--	--	--	--	--	--	--	5,690
Cottonwood	357	491	735	1,301	1,459	2,640	2,636	1,333	1,181	557	459	221	393	13,763
Total hardwoods	1,677	2,515	2,346	1,830	1,665	2,640	2,636	1,333	1,181	557	459	221	393	19,453
All species	6,281	10,065	10,834	9,707	7,746	6,968	4,833	2,988	3,062	1,164	1,246	615	905	66,414

Table 16.--*Net volume of sawtimber on commercial timberland in the Beartooth Working Circle by species and diameter class, 1977*

Species	Diameter class (inches at breast height)													
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	7,519	10,721	4,417	5,744	2,234	1,161	1,678	1,251	1,449	440	629	37,243
Ponderosa pine	13,434	17,800	21,499	15,297	9,195	7,899	8,523	2,092	2,840	1,069	2,025	101,673
Lodgepole pine	3,172	3,500	2,700	1,145	--	--	--	--	--	--	--	10,517
Limber pine	974	1,519	1,226	349	419	--	--	--	--	--	--	4,487
Engelmann spruce	--	579	--	--	--	--	--	--	--	624	--	1,203
Juniper	63	49	--	74	--	--	--	--	--	--	--	186
Total softwoods	25,162	34,168	29,842	22,609	11,848	9,060	10,201	3,343	4,289	2,133	2,654	155,309
Aspen	XXXXX	2,689	1,054	--	--	--	--	--	--	--	--	3,743
Cottonwood	XXXXX	6,670	7,384	13,070	12,677	6,217	5,365	2,502	2,067	997	1,798	58,747
Total hardwoods	XXXXX	9,359	8,438	13,070	12,677	6,217	5,365	2,502	2,067	997	1,798	62,490
All species	25,162	43,527	38,280	35,679	24,525	15,277	15,566	5,845	6,356	3,130	4,452	217,799

Table 17.--*Net volume of growing stock and sawtimber on commercial timberland in the Beartooth Working Circle by ownership class and species, 1977*

Ownership class	Species										
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Engelmann spruce	Juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	GROWING STOCK *Thousand cubic feet*										
State	1,461	2,682	434	71	29	22	4,699	837	1,443	2,280	6,979
Private	12,925	25,756	2,015	1,123	246	197	42,262	4,853	12,320	17,173	59,435
Total	14,386	28,438	2,449	1,194	275	219	46,961	5,690	13,763	19,453	66,414
	GROWING STOCK *Thousand cubic meters*										
State	42	76	12	2	1	1	134	23	41	64	198
Private	366	729	57	32	7	5	1 196	138	349	487	1 683
Total	408	805	69	34	8	6	1 330	161	390	551	1 881
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*										
State	3,445	9,484	1,802	270	127	20	15,148	469	6,180	6,649	21,797
Private	33,798	92,189	8,715	4,217	1,076	166	140,161	3,274	52,567	55,841	196,002
Total	37,243	101,673	10,517	4,487	1,203	186	155,309	3,743	58,747	62,490	217,799

Table 18.--*Net volume of timber on commercial timberland in the Beartooth Working Circle by class of timber, and softwoods and hardwoods, 1977*

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw log portion	29,834	10,023	39,857
Upper-stem portion	4,973	2,892	7,865
Total	34,807	12,915	47,722
Poletimber trees	12,154	6,538	18,692
All growing stock trees	46,961	19,453	66,414
Sound cull trees	386	246	632
Rotten cull trees	30	30	60
Salvable dead trees	1,614	596	2,210
All timber	48,991	20,325	69,316

Table 19.--*Net volume of growing stock on commercial timberland in the Beartooth Working Circle by forest type and species, 1977*

Forest type	Species										
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Engelmann spruce	Juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	Thousand cubic feet										
Douglas-fir	14,269	63	83	945	--	--	15,360	--	--	--	15,360
Ponderosa pine	94	28,375	93	101	--	219	28,882	--	--	--	28,882
Lodgepole pine	23	--	1,705	--	--	--	1,728	--	--	--	1,728
Limber pine	--	--	--	148	--	--	148	--	--	--	148
Aspen	--	--	568	--	--	--	568	4,815	56	4,871	5,439
Cottonwood	--	--	--	--	275	-	275	875	13,707	14,582	14,857
All types	14,386	28,438	2,449	1,194	275	219	46,961	5,690	13,763	19,453	66,414
	Thousand cubic meters										
All types	408	805	69	34	8	6	1 330	161	390	551	1 881

Table 20.--*Net volume of sawtimber on commercial timberland in the Beartooth Working Circle by forest type and species, 1977*

Forest type	Species										
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Engelmann spruce	Juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	Thousand board feet, International 1/4-inch rule										
Douglas-fir	36,952	313	473	4,058	--	--	41,796	--	--	--	41,796
Ponderosa pine	291	101,360	529	--	--	186	102,366	--	--	--	102,366
Lodgepole pine	--	--	7,300	--	--	--	7,300	--	--	--	7,300
Limber pine	--	--	--	429	--	--	429	--	--	--	429
Aspen	--	--	2,215	--	--	--	2,215	1,721	283	2,004	4,219
Cottonwood	--	--	--	--	1,203	--	1,203	2,022	58,464	60,486	61,689
All types	37,243	101,673	10,517	4,487	1,203	186	155,309	3,743	58,747	62,490	217,799

Table 21.--*Net annual growth of growing stock and sawtimber on commercial timberland in the Beartooth Working Circle by ownership class and species, 1977*

Ownership class	Species									
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	GROWING STOCK *Cubic feet*									
State	22,960	44,062	1,073	-721	661	68,035	44,144	28,966	73,110	141,145
Private	208,825	458,988	6,508	-10,857	5,569	669,033	275,254	249,192	524,446	1,193,479
Total	231,785	503,050	7,581	-11,578	6,230	737,068	319,398	278,158	597,556	1,334,624
	GROWING STOCK *Cubic meters*									
State	650	1 248	30	-21	19	1 926	1 250	820	2 070	3 996
Private	5 913	12 997	185	-307	157	18 945	7 794	7 057	14 851	33 796
Total	6 563	14 245	215	-328	176	20 871	9 044	7 877	16 921	37 792
	SAWTIMBER *Board feet, International 1/4-inch rule*									
State	91,686	329,118	31,650	-6,782	3,396	449,068	17,337	116,013	133,350	582,418
Private	816,037	3,220,673	245,799	-106,094	28,609	4,205,024	126,970	999,349	1,126,319	5,331,343
Total	907,723	3,549,791	277,449	-112,876	32,005	4,654,092	144,307	1,115,362	1,259,669	5,913,761

Table 22.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Beartooth Working Circle by ownership class, and softwoods and hardwoods, 1977*

Species group and ownership class	Growing stock		Sawtimber
	- Cubic feet -	*- Cubic meters -*	*- Board feet*[1] *-*
Softwoods:			
State	30,557	865	88,425
Private	250,364	7 090	725,019
Total	280,921	7 955	813,444
Hardwoods:			
State	5,804	164	15,106
Private	47,536	1 346	136,049
Total	53,340	1 510	151,155

[1] *International 1/4-inch rule.*

Table 23.--*Annual mortality of growing stock and sawtimber on commercial timberland in the Beartooth Working Circle by cause of death and species, 1977*

Cause of Death	Species								
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	GROWING STOCK *Cubic feet*								
Fire	--	27,228	--	--	27,228	--	--	--	27,228
Animal	--	27,267	--	--	27,267	8,639	--	8,639	35,906
Weather	51,905	110,062	31,276	25,791	219,034	--	19,487	19,487	238,521
Unknown	--	--	7,392	--	7,392	2,871	22,343	25,214	32,606
Total	51,905	164,557	38,668	25,791	280,921	11,510	41,830	53,340	334,261
	GROWING STOCK *Cubic meters*								
Fire	--	771	--	--	771	--	--	--	771
Animal	--	772	--	--	772	245	--	245	1 017
Weather	1 470	3 117	886	730	6 203	--	551	551	6 754
Unknown	--	--	209	--	209	81	633	714	923
Total	1 470	4 660	1 095	730	7 955	326	1 184	1 510	9 465
	SAWTIMBER *Board feet, International 1/4-inch rule*								
Fire	--	152,040	--	--	152,040	--	--	--	152,040
Animal	--	40,645	--	--	40,645	--	--	--	40,645
Weather	143,949	110,459	177,882	146,054	578,344	--	97,766	97,766	676,110
Unknown	--	--	42,415	--	42,415	--	53,389	53,389	95,804
Total	143,949	303,144	220,297	146,054	813,444	--	151,155	151,155	964,599

Felt, Dorothy G.
1980. Forest area and timber resource statistics for the Beartooth Working Circle, Montana, 1977. USDA For. Serv. Resour. Bull. INT-24, 22 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

This bulletin presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

KEYWORDS: Forest surveys (regional), forest area classification, stand volume.

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The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

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**Intermountain
Forest and Range
Experiment Station**

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Forest Area and Timber Resource Statistics for State and Private Lands in Bernalillo, Sandoval, and Torrance Counties, New Mexico, 1978

Dorothy G. Felt

THE AUTHOR

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RESEARCH SUMMARY

Presents land area, commercial timberland area, timber inventory, growth, and mortality data based on Resources Evaluation standards.

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Forest Area and Timber Resource Statistics for State and Private Lands in Bernalillo, Sandoval, and Torrance Counties, New Mexico, 1978

Dorothy G. Felt

INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of State and private lands in Bernalillo, Sandoval, and Torrance Counties, New Mexico (fig. 1). Fieldwork began in September 1977 and was completed in November 1978. This bulletin does not note changes and trends since the Statewide inventory in 1966. The 1966 inventory did not sample these counties intensively and did not report findings at the working circle level.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forest and range lands. Fundamental to the accomplishment of this objective are the periodic State-by-State resource inventories. Originally, Resources Evaluation--formerly Forest Survey--was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

The three-county area covered by this report is one of 11 working circles in New Mexico. Similar reports have been issued for Colfax, Santa Fe, San Miguel, and Taos-Rio Arriba Working Circles. Comparable reports will be issued as the State-wide inventory continues.

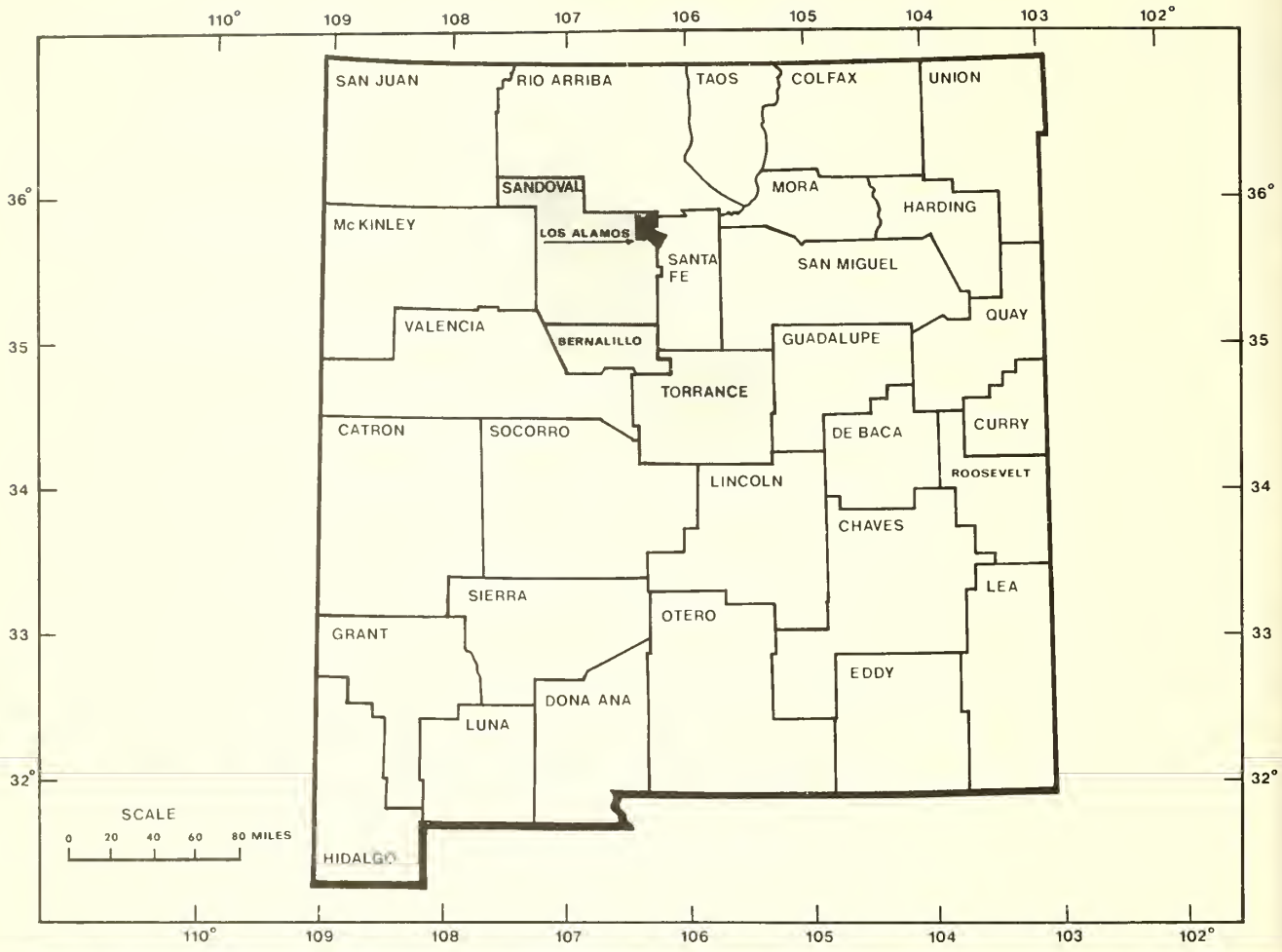

Figure 1.--Bernalillo, Sandoval, and Torrance Counties, New Mexico.

The total land area in Bernalillo, Sandoval, and Torrance Counties is 5,266,560 acres (2 131 310 hectares). The Forest Service, Bureau of Land Management, Bureau of Indian Affairs, and the National Park service together manage 2,169,649 acres (878 029 hectares), or 41 percent of this land. The remaining 3,096,911 acres (1 253 281 hectares) are in State, private, and other ownerships. THE DATA PRESENTED HERE ARE FOR STATE, PRIVATE, AND MISCELLANEOUS FEDERAL LANDS ONLY.

Highlights show the area of commercial timberland in comparison to total forest land area and the distribution of this area by forest type, stand-size class, and site class. Discussions of the data reliability and terminology are included. These two items should be reviewed carefully when using this information.

HIGHLIGHTS

Area

- The forest land area is 692 thousand acres (280 thousand hectares), or 22 percent of the total State and private land area in Bernalillo, Sandoval, and Torrance Counties.

- Of the forest land, 82.8 thousand acres (33.5 thousand hectares), almost 12 percent, is classified as commercial timberland.

- Private ownership accounts for 82.2 thousand acres (33.3 thousand hectares), 99 percent of the commercial timberland.

- Ponderosa pine, Douglas-fir, aspen, and Engelmann spruce are the predominant types and occupy 86 percent of the commercial timberland. White fir, spruce-subalpine fir, southwestern white pine, cottonwood, and pinyon-juniper[1] cover the remaining area.

- Over 60 percent of the commercial timberland is in the 50 to 84 cubic foot productivity class, 99 percent of this is privately owned.

Inventory

- Growing stock volume amounts to 128.5 million cubic feet (3.6 million cubic meters) and sawtimber volume totals 505.2 million board feet.[2]

- Rough, rotten, and salvable dead trees comprise 10.8 million cubic feet (306 thousand cubic meters), nearly 8 percent of the total sound wood volume.

- The largest share of the total growing stock volume is made up of Douglas-fir (27 percent), aspen (23 percent), and ponderosa pine (18 percent). Engelmann spruce, white fir, southwestern white pine, subalpine fir, pinyon/juniper, and cottonwood account for the remaining volume.

- Private owners control 99 percent of both the total growing stock and the sawtimber volume.

Growth and Mortality

- Net annual growth totals 3,124 thousand cubic feet (88 thousand cubic meters). Growth and mortality were not measured for pinyon and juniper trees.

- Ninety-nine percent of the total net growth is on private lands.

- The annual mortality of 138 thousand cubic feet (4 thousand cubic meters) offsets 4 percent of the gross annual growth.

---

[1] The area occupied by pinyon-juniper forest type classified as commercial is so classified because the site index for other associated species in these stands (usually ponderosa pine or Douglas-fir) was high enough to produce 20 cubic feet per acre per year average annual growth, and nonstockable indicators were not present in sufficient quantities to lower yield capability below 20 cubic feet per acre per year. Although pinyon/juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timber land statistics.

[2] International 1/4-inch rule.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and working circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 10,383 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 349 ground sample locations. Sample trees were selected using a 10-point cluster which includes fixed plots (1/300 acre) for trees less than 5.0 inches d.b.h. and variable plots (40 BAF [basal area factor]) for trees 5.0 inches d.b.h. or larger.

3. Equations prepared from detailed measurements collected on standing trees throughout the Southwest were used to compute the volume and defect of individual tally trees.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standing error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

Table 1.--*Area of forest land in Bernalillo, Sandoval, and Torrance Counties, with percent standard error, 1978*

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	68,034	6.1	14,766	18.0	82,800	4.8
Other forest land:						
Unproductive nonreserved	574,790	2.0	3,863	38.3	578,653	2.0

Table 2.--*Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, with percent standard error, 1978*

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	99,094	7.6	29,407	18.3	128,501	7.4
Sawtimber (M board feet[1])	409,569	8.6	95,620	21.3	505,189	8.3
Net annual growth:						
Growing stock (cubic feet)	2,435,971	8.3	687,846	17.1	3,123,817	7.7
Sawtimber (board feet[1])	9,389,088	10.2	2,423,866	31.7	11,812,954	10.4
Annual mortality:						
Growing stock (cubic feet)	137,702	44.6	--	--	137,702	44.6
Sawtimber (board feet[1])	685,120	46.7	--	--	685,120	46.7

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for Bernalillo, Sandoval, and Torrance Counties in New Mexico are displayed in tables 3 through 23.

TERMINOLOGY

Land

Bureau of the Census.--Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. Includes noncensus water. See definition below.

Water

Census water.--As defined by the Bureau of the Census, streams, sloughs, estuaries, and canals more than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.--The same as defined by the Bureau of the Census, except minimum width of streams, sloughs, estuaries, and canals is 120 feet and minimum size of lakes, reservoirs, and ponds is 1 acre.

Land Use Classes

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.--Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.--Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.--Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.--Federal lands administered by the Bureau of Land Management.

Indian lands.--Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.

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

Private and Other

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

Forest industry lands.--Lands owned by companies or by individuals operating wood-processing plants.

Farmer-owned lands.--Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Miscellaneous Federal lands.--Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

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

Forest Type and Tree Species

Forest types.--A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.--Tree species presently or prospectively suitable for industrial wood products.

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

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

Area Condition Classes

Stocking.--Stocking is an effort to express the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full-site occupancy. Overstocking is characterized by sites with over 133-percent stocking.

Class 10.--Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.--Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

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

Class 70.--Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.--Low-risk old-growth stands.

Class 90.--High-risk old-growth stands.

Nonstocked.--Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.--Growing stock trees (1) having no serious defect in quality limiting present or prospective use for timber products; (2) of relatively high vigor; and (3) containing no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.--Growing stock trees meeting specified standards of size and quality, but not qualifying as desirable trees.

Rough trees.--(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of roughness or poor form; and (2) all live trees of noncommercial species.

Rotten trees.--Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

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

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree Size Classes

Seedlings.--Live trees less than 1.0 inch in diameter at breast height.

Saplings.--Trees 1.0 to 4.9 inches in diameter at breast height.

Poletimber trees.--Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.--Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwoods, 11.0 inches.

Volume

Cull volume.--Portions of a tree's volume that are not usable for industrial wood products because of rot, form, or other defect.

Net volume.--Gross volume less deductions for cull.

Growing stock volume.--Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.--Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.--The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year and surviving to its end, plus the net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.--Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

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

Table 3.--*Total land and water area in Bernalillo, Sandoval, and Torrance Counties, by ownership class, 1978*

Ownership class	Acres	Hectares
National Forest	626,010	253 338
Bureau of Land Management	619,581	250 737
National Park Service[1]	29,902	12 101
Bureau of Indian Affairs	894,156	361 853
State	394,154	159 509
Private and other	2,702,757	1 093 772
Total land area	5,266,560	2 131 310
Census water	7,872	3 186
Gross area[2]	5,274,432	2 134 496

[1]Not included with miscellaneous Federal ownership (a category of the Private and other ownership class) for purposes of clarity.

[2]U.S. Bureau of the Census, land and water area of the United States, 1970.

Table 4.--*Total land area in Bernalillo, Sandoval, and Torrance Counties, by major land class and ownership class, 1978*

Land class	Ownership class					
	State		Private[1]		Total	
	Acres	Hectares	Acres	Hectares	Acres	Hectares
Commercial timberland	599	242	82,201	33 266	82,800	33 508
Other forest land:						
Unproductive reserved	300	121	29,902	12 101	30,202	12 222
Unproductive nonreserved	99,926	40 439	478,727	193 735	578,653	234 174
Total forest land	100,825	40 802	590,830	239 102	691 655	279 904
Nonforest land	293,329	118 707	2,141,829	866 771	2,435,158	985 478
Total land area	394,154	159 509	2,732,659	1 105 873	3,126,813	1 265 382

[1]On this and all following tables, the private ownership category includes a small portion of miscellaneous Federal, and county and municipal ownership.

Table 5.--*Area of commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by forest type, stand-size class, and site class, 1978*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
	Acres				
Douglas-fir:					
Sawtimber	--	1,341	15,899	5,074	22,314
Poletimber	--	--	--	611	611
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	1,341	15,899	5,685	22,925
Ponderosa pine:					
Sawtimber	--	--	13,314	3,691	17,005
Poletimber	--	--	1,323	1,967	3,290
Sapling and seedling	--	--	1,254	1,820	3,074
Nonstocked	--	--	--	--	--
Total	--	--	15,891	7,478	23,369
Southwestern white pine:					
Sawtimber	--	--	670	--	670
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	670	--	670
Spruce-subalpine fir:					
Sawtimber	--	--	671	670	1,341
Poletimber	--	--	670	--	670
Sapling and seedling	--	--	--	607	607
Nonstocked	--	--	--	--	--
Total	--	--	1,341	1,277	2,618
White fir:					
Sawtimber	--	592	1,975	3,194	5,761
Poletimber	--	--	644	--	644
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	613	--	613
Total	--	592	3,232	3,194	7,018
Engelmann spruce:					
Sawtimber	--	611	3,785	--	4,396
Poletimber	--	670	2,454	--	3,124
Sapling and seedling	--	--	661	1,929	2,590
Nonstocked	--	--	--	662	662
Total	--	1,281	6,900	2,591	10,772
Pinyon-juniper:					
Sawtimber	--	--	--	662	662
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	662	662
Aspen:					
Sawtimber	--	661	5,852	1,253	7,766
Poletimber	611	--	662	--	1,273
Sapling and seedling	--	--	1,829	3,237	5,066
Nonstocked	--	--	--	--	--
Total	611	661	8,343	4,490	14,105
Cottonwood:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	661	661
Total	--	--	--	661	661
All types:					
Sawtimber	--	3,205	42,166	14,544	59,915
Poletimber	611	670	5,753	2,578	9,612
Sapling and seedling	--	--	3,744	7,593	11,337
Nonstocked	--	--	613	1,323	1,936
Total	611	3,875	52,276	26,038	82,800

Table 6.--*Area of State-owned commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by forest type, stand-size class, and site class, 1978*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	11	84	27	122
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	11	84	27	122
Ponderosa pine:					
Sawtimber	--	--	100	28	128
Poletimber	--	--	38	39	77
Sapling and seedling	--	--	19	13	32
Nonstocked	--	--	--	--	--
Total	--	--	157	80	237
Southwestern white pine:					
Sawtimber	--	--	6	--	6
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	6	--	6
Spruce-subalpine fir:					
Sawtimber	--	--	6	5	11
Poletimber	--	--	6	--	6
Sapling and seedling	--	--	--	4	4
Nonstocked	--	--	--	--	--
Total	--	--	12	9	21
White fir:					
Sawtimber	--	--	12	29	41
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	12	29	41
Engelmann spruce:					
Sawtimber	--	--	16	--	16
Poletimber	--	5	4	--	9
Sapling and seedling	--	--	6	17	23
Nonstocked	--	--	--	7	7
Total	--	5	26	24	55
Pinyon-juniper:					
Sawtimber	--	--	--	19	19
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	19	19
Aspen:					
Sawtimber	--	6	43	6	55
Poletimber	--	--	7	--	7
Sapling and seedling	--	--	4	26	30
Nonstocked	--	--	--	--	--
Total	--	6	54	32	92
Cottonwood:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	6	6
Total	--	--	--	6	6
All types:					
Sawtimber	--	17	267	114	398
Poletimber	--	5	55	39	99
Sapling and seedling	--	--	29	60	89
Nonstocked	--	--	--	13	13
Total	--	22	351	226	599

Table 7.--*Area of privately owned commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by forest type, stand-size class, and site class, 1978*

Forest type and stand-size class	Site class				All classes
	120+	85-119	50-84	20-49	
			Acres		
Douglas-fir:					
Sawtimber	--	1,330	15,815	5,047	22,192
Poletimber	--	--	--	611	611
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	1,330	15,815	5,658	22,803
Ponderosa pine:					
Sawtimber	--	--	13,214	3,663	16,877
Poletimber	--	--	1,285	1,928	3,213
Sapling and seedling	--	--	1,235	1,807	3,042
Nonstocked	--	--	--	--	--
Total	--	--	15,734	7,398	23,132
Southwestern white pine:					
Sawtimber	--	--	664	--	664
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	664	--	664
Spruce-subalpine fir:					
Sawtimber	--	--	665	665	1,330
Poletimber	--	--	664	--	664
Sapling and seedling	--	--	--	603	603
Nonstocked	--	--	--	--	--
Total	--	--	1,329	1,268	2,597
White fir:					
Sawtimber	--	592	1,963	3,165	5,720
Poletimber	--	--	644	--	644
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	613	--	613
Total	--	592	3,220	3,165	6,977
Engelmann spruce:					
Sawtimber	--	611	3,769	--	4,380
Poletimber	--	665	2,450	--	3,115
Sapling and seedling	--	--	655	1,912	2,567
Nonstocked	--	--	--	655	655
Total	--	1,276	6,874	2,567	10,717
Pinyon-juniper:					
Sawtimber	--	--	--	643	643
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	643	643
Aspen:					
Sawtimber	--	655	5,809	1,247	7,711
Poletimber	611	--	655	--	1,266
Sapling and seedling	--	--	1,825	3,211	5,036
Nonstocked	--	--	--	--	--
Total	611	655	8,289	4,458	14,013
Cottonwood:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	655	655
Total	--	--	--	655	655
All types:					
Sawtimber	--	3,188	41,899	14,430	59,517
Poletimber	611	665	5,698	2,539	9,513
Sapling and seedling	--	--	3,715	7,533	11,248
Nonstocked	--	--	613	1,310	1,923
Total	611	3,853	51,925	25,812	82,201

Table 8.--*Area of commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by stand volume and ownership class, 1978*

Stand volume per acre[1]	Ownership class		
	State	Private	State and private
	Acres		
Less than 1,500 board feet	162	15,730	15,892
1,500 to 4,999 board feet	216	29,540	29,756
5,000 to 9,999 board feet	120	22,154	22,274
10,000 board feet or more	101	14,777	14,878
All classes	599	82,201	82,800

[1]International 1/4-inch rule.

Table 9.--*Area of commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by forest type and area condition class, 1978*

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	--	--	592	3,115	3,779	3,883	607	4,423	6,526	--	22,925	9 278
Ponderosa pine	--	--	662	1,967	2,589	8,733	5,042	2,493	1,883	--	23,369	9 457
Southwestern white pine	--	--	--	--	--	--	670	--	--	--	670	271
Spruce-subalpine fir	--	607	--	1,341	--	670	--	--	--	--	2,618	1 060
White fir	--	--	--	1,255	592	1,975	--	644	1,939	613	7,018	2 840
Engelmann spruce	--	--	1,923	2,466	1,282	3,231	--	538	670	662	10,772	4 359
Pinyon-juniper	--	--	--	--	--	--	--	--	662	--	662	268
Aspen	--	--	--	661	5,860	3,662	1,268	--	2,654	--	14,105	5 708
Cottonwood	--	--	--	--	--	--	--	--	--	661	661	267
All types	--	607	3,177	10,805	14,102	22,154	7,587	8,098	14,334	1,936	82,800	33 508

Table 10.--*Area of unproductive reserved and unproductive nonreserved forest land in Bernalillo, Sandoval, and Torrance Counties, by land class, ownership class, and forest type, 1978*

Land class	Forest type								All types	
	Ponderosa pine	White fir	Juniper	Mixed softwoods	Total softwoods	Aspen	Mixed hardwoods	Total hardwoods		
	Acres									*Hectares*
Other forest land area:										
Unproductive reserved:										
State	4	--	292	4	300	--	--	--	300	121
Private	10,385	--	15,065	4,452	29,902	--	--	--	29,902	12 101
Total	10,389	--	15,357	4,456	30,202	--	--	--	30,202	12 222
Unproductive nonreserved:										
State	1,217	6	97,520	1,160	99,903	6	17	23	99,926	40 439
Private	9,150	665	459,669	5,403	474,887	655	3,185	3,840	478,727	193 735
Total	10,367	671	557,189	6,563	574,790	661	3,202	3,863	578,653	234 174
Total all areas:										
State	1,221	6	97,812	1,164	100,203	6	17	23	100,226	40 560
Private	19,535	665	474,734	9,855	504,789	655	3,185	3,840	508,629	205 836
Total acres	20,756	671	572,546	11,019	604,992	661	3,202	3,863	608,855	--
Total hectares	8 400	272	231 702	4 459	244 833	267	1 296	1 563		246 396

Table 11.--*Number of growing stock trees on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by species and diameter class, 1978*

Species	Diameter class (inches at breast height)															
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand trees															
Douglas-fir	947	1,373	724	414	362	236	176	92	85	52	39	33	17	10	24	4,584
Ponderosa pine	1,131	1,733	1,070	814	360	219	101	65	42	37	25	19	11	7	15	5,649
Southwestern white pine	185	96	113	51	27	16	22	13	9	6	3	--	1	1	([1])	543
Subalpine fir	545	238	110	41	32	15	5	7	5	1	--	--	--	--	([1])	999
White fir	990	917	426	337	221	165	89	40	24	19	21	13	12	9	16	3,299
Engelmann spruce	1,505	1,004	813	625	276	135	77	59	24	19	11	4	5	1	2	4,560
Pinyon/juniper	405	326	123	62	--	7	9	6	5	--	--	--	--	--	--	943
Total softwoods	5,708	5,687	3,379	2,344	1,278	793	479	282	194	134	99	69	46	28	57	20,577
Aspen	2,740	2,104	1,077	517	451	254	227	69	46	15	4	3	1	--	--	7,508
Cottonwood	--	--	--	--	--	--	--	--	--	1	--	1	2	--	--	4
Total hardwoods	2,740	2,104	1,077	517	451	254	227	69	46	16	4	4	3	--	--	7,512
All species	8,448	7,791	4,456	2,861	1,729	1,047	706	351	240	150	103	73	49	28	57	28,089

[1] Less than 500 trees.

Table 12.--*Number of cull and salvable dead trees on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by ownership class, and softwoods and hardwoods, 1978*

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
State:				
Softwoods	2	([1])	2	3
Hardwoods	([1])	3	3	2
Total	2	3	5	5
Private:				
Softwoods	252	19	271	447
Hardwoods	15	465	480	305
Total	267	484	751	752
State and private:				
Softwoods	254	19	273	450
Hardwoods	15	468	483	307
Total	269	487	756	757

[1]Less than 500 trees.

Table 13.--*Net volume of growing stock on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by ownership class, forest type, and stand-size class, 1978*

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					*Thousand cubic meters*
State:							
	Douglas-fir	281	--	--	--	281	8
	Ponderosa pine	143	47	5	--	195	6
	Southwestern white pine	5	--	--	--	5	(1)
	Spruce-subalpine fir	32	6	1	--	39	1
	White fir	53	--	--	--	53	2
	Engelmann spruce	39	15	13	(2)	67	2
	Pinyon-juniper	11	--	--	--	11	(1)
	Aspen	177	7	8	--	192	5
	Cottonwood	--	--	--	2	2	(1)
	All types	741	75	27	2	845	24
Private:							
	Douglas-fir	50,132	684	--	--	50,816	1 439
	Ponderosa pine	17,399	1,699	629	--	19,727	558
	Southwestern white pine	668	--	--	--	668	19
	Spruce-subalpine fir	3,890	745	98	--	4,733	134
	White fir	8,612	478	--	233	9,323	264
	Engelmann spruce	10,112	4,280	1,341	53	15,786	447
	Pinyon-juniper	384	--	--	--	384	11
	Aspen	21,792	2,332	1,923	--	26,047	738
	Cottonwood	--	--	--	172	172	5
	All types	112,989	10,218	3,991	458	127,656	3 615
State and private:							
	Douglas-fir	50,413	684	--	--	51,097	1 447
	Ponderosa pine	17,542	1,746	634	--	19,922	564
	Southwestern white pine	673	--	--	--	673	19
	Spruce-subalpine fir	3,922	751	99	--	4,772	135
	White fir	8,665	478	--	233	9,376	266
	Engelmann spruce	10,151	4,295	1,354	53	15,853	449
	Pinyon-juniper	395	--	--	--	395	11
	Aspen	21,969	2,339	1,931	--	26,239	743
	Cottonwood	--	--	--	174	174	5
	All types	113,730	10,293	4,018	460	128,501	3 639

[1]Less than 0.5 thousand cubic meters.
[2]Less than 0.5 thousand cubic feet.

Table 14.--*Net volume of sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by ownership class, forest type, and stand-size class, 1978*

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
State:						
	Douglas-fir	1,263	--	--	--	1,263
	Ponderosa pine	572	101	13	--	686
	Southwestern white pine	24	--	--	--	24
	Spruce-subalpine fir	129	10	--	--	139
	White fir	220	--	--	--	220
	Engelmann spruce	182	23	39	3	247
	Pinyon-juniper	48	--	--	--	48
	Aspen	631	16	15	--	662
	Cottonwood	--	--	--	9	9
	All types	3,069	150	67	12	3,298
Private:						
	Douglas-fir	218,676	1,603	--	--	220,279
	Ponderosa pine	72,347	3,605	2,415	--	78,367
	Southwestern white pine	2,928	--	--	--	2,928
	Spruce-subalpine fir	15,629	1,224	--	--	16,853
	White fir	33,571	904	--	963	35,438
	Engelmann spruce	43,312	7,634	4,041	271	55,258
	Pinyon-juniper	1,609	--	--	--	1,609
	Aspen	80,452	3,623	6,173	--	90,248
	Cottonwood	--	--	--	911	911
	All types	468,524	18,593	12,629	2,145	501,891
State and private:						
	Douglas-fir	219,939	1,603	--	--	221,542
	Ponderosa pine	72,919	3,706	2,428	--	79,053
	Southwestern white pine	2,952	--	--	--	2,952
	Spruce-subalpine fir	15,758	1,234	--	--	16,992
	White fir	33,791	904	--	963	35,658
	Engelmann spruce	43,494	7,657	4,080	274	55,505
	Pinyon-juniper	1,657	--	--	--	1,657
	Aspen	81,083	3,639	6,188	--	90,910
	Cottonwood	--	--	--	920	920
	All types	471,593	18,743	12,696	2,157	505,189

[1]International 1/4-inch rule.

Table 15.--*Net volume of growing stock on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by species and diameter class, 1978*

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	1,163	1,827	3,130	3,584	3,935	2,873	3,445	2,795	2,722	2,660	1,599	1,074	4,432	35,239
Ponderosa pine	1,273	2,884	2,251	2,550	1,890	1,628	1,511	1,696	1,488	1,373	980	734	2,358	22,616
Southwestern white pine	287	238	229	228	453	395	330	263	122	--	73	57	33	2,708
Subalpine fir	240	225	307	250	144	258	206	73	--	--	--	--	69	1,772
White fir	718	1,526	1,826	2,107	1,889	1,170	914	927	1,325	1,015	992	881	2,444	17,734
Engelmann spruce	1,526	3,252	2,885	2,116	1,990	2,182	1,129	1,193	882	383	532	163	312	18,545
Pinyon/juniper	53	91	--	44	113	118	61	--	--	--	--	--	--	480
Total softwoods	5,260	10,043	10,628	10,879	10,414	8,624	7,596	6,947	6,539	5,431	4,176	2,909	9,648	99,094
Aspen	2,447	3,486	6,050	5,127	6,208	2,627	2,136	730	223	151	48	--	--	29,233
Cottonwood	--	--	--	--	--	--	--	40	--	32	102	--	--	174
Total hardwoods	2,447	3,486	6,050	5,127	6,208	2,627	2,136	770	223	183	150	--	--	29,407
All species	7,707	13,529	16,678	16,006	16,622	11,251	9,732	7,717	6,762	5,614	4,326	2,909	9,648	128,501

Table 16.--*Net volume of sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by species and diameter class, 1978*

Species	Diameter class (inches at breast height)												
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	9,902	15,302	19,070	14,881	18,649	15,554	15,450	15,273	9,240	6,230	25,955	165,506
Ponderosa pine	7,508	11,681	9,504	8,840	8,593	9,560	8,663	8,018	5,764	4,349	14,039	96,519
Southwestern white pine	772	975	2,114	1,962	1,675	1,362	649	--	406	324	191	10,430
Subalpine fir	1,057	1,211	735	1,329	1,061	372	--	--	--	--	375	6,140
White fir	6,205	9,248	8,643	5,301	4,020	3,920	5,355	4,010	3,883	3,455	9,736	63,776
Engelmann spruce	10,477	10,305	10,251	11,325	5,846	6,162	4,556	1,990	2,787	865	1,667	66,231
Pinyon/juniper	--	133	328	337	169	--	--	--	--	--	--	967
Total softwoods	35,921	48,855	50,645	43,975	40,013	36,930	34,673	29,291	22,080	15,223	51,963	409,569
Aspen	XXXX	27,223	34,643	14,770	11,845	3,980	1,193	791	255	--	--	94,700
Cottonwood	XXXX	--	--	--	--	220	--	169	531	--	--	920
Total hardwoods	XXXX	27,223	34,643	14,770	11,845	4,200	1,193	960	786	--	--	95,620
All species	35,921	76,078	85,288	58,745	51,858	41,130	35,866	30,251	22,866	15,223	51,963	505,189

Table 17.--*Net volume of growing stock and sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by ownership class and species, 1978*

Ownership class	Species											All species
	Douglas-fir	Ponderosa pine	Southwestern white pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	GROWING STOCK *Thousand cubic feet*											
State	206	210	15	14	95	97	9	646	198	1	199	845
Private	35,033	22,406	2,693	1,758	17,639	18,448	471	98,448	29,035	173	29,208	127,656
Total	35,239	22,616	2,708	1,772	17,734	18,545	480	99,094	29,233	174	29,407	128,501
	GROWING STOCK *Thousand cubic meters*											
State	6	6	([1])	([1])	3	3	([1])	18	6	([1])	6	24
Private	992	634	77	50	499	522	14	2 788	822	5	827	3 615
Total	998	640	77	50	502	525	14	2 806	828	5	833	3 639
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*											
State	983	788	60	48	349	365	17	2,610	679	9	688	3,298
Private	164,523	95,731	10,370	6,092	63,427	65,866	950	406,959	94,021	911	94,932	501,891
Total	165,506	96,519	10,430	6,140	63,776	66,231	967	409,569	94,700	920	95,620	505,189

[1]Less than 500 cubic meters.

Table 18.--*Net volume of timber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by class of timber, and softwoods and hardwoods, 1978*

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw log portion	79,834	16,703	96,537
Upper-stem portion	3,957	721	4,678
Total	83,791	17,424	101,215
Poletimber trees	15,303	11,983	27,286
All growing stock trees	99,094	29,407	128,501
Sound cull trees	2,572	193	2,765
Rotten cull trees	236	1,867	2,103
Salvable dead trees	4,648	1,292	5,940
All timber	106,550	32,759	139,309

Table 19.--*Net volume of growing stock on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by forest type and species, 1978*

Forest type	Species											All species	
	Douglas-fir	Ponderosa pine	Southwestern white pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods		
	Thousand cubic feet												*Thousand cubic meters*
Douglas-fir	28,925	3,005	1,780	--	10,186	1,977	176	46,049	5,048	--	5,048	51,097	1 447
Ponderosa pine	963	16,935	80	--	1,153	272	133	19,536	386	--	386	19,922	564
Southwestern white pine	267	--	377	--	29	--	--	673	--	--	--	673	19
Subalpine fir	58	--	--	1,198	--	3,374	--	4,630	142	--	142	4,772	135
White fir	1,046	702	173	--	5,546	292	--	7,759	1,617	--	1,617	9,376	266
Engelmann spruce	1,736	711	231	275	359	10,104	--	13,416	2,437	--	2,437	15,853	449
Pinyon-juniper	--	224	--	--	--	--	171	395	--	--	--	395	11
Aspen	2,244	1,039	67	299	461	2,526	--	6,636	19,603	--	19,603	26,239	743
Cottonwood	--	--	--	--	--	--	--	--	--	174	174	174	5
All types	35,239	22,616	2,708	1,772	17,734	18,545	480	99,094	29,233	174	29,407	128,501	--
	Thousand cubic meters												
All types	998	640	77	50	502	525	14	2 806	828	5	833	--	3 639

Table 20.--*Net volume of sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by forest type and species, 1978*

Forest type	Species											All species
	Douglas-fir	Ponderosa pine	Southwestern white pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	134,086	15,697	6,810	--	38,073	8,571	482	203,719	17,823	--	17,823	221,542
Ponderosa pine	4,837	69,043	399	--	3,421	1,038	108	78,846	207	--	207	79,053
Southwestern white pine	1,344	--	1,475	--	133	--	--	2,952	--	--	--	2,952
Subalpine fir	290	--	--	3,334	--	13,368	--	16,992	--	--	--	16,992
White fir	5,111	3,251	741	--	19,239	977	--	29,319	6,339	--	6,339	35,658
Engelmann spruce	9,180	3,090	767	1,409	1,190	31,400	--	47,036	8,469	--	8,469	55,505
Pinyon-juniper	--	1,280	--	--	--	--	377	1,657	--	--	--	1,657
Aspen	10,658	4,158	238	1,397	1,720	10,877	--	29,048	61,862	--	61,862	90,910
Cottonwood	--	--	--	--	--	--	--	--	--	920	920	920
All types	165,506	96,519	10,430	6,140	63,776	66,231	967	409,569	94,700	920	95,620	505,189

Table 21.--*Net annual growth of growing stock and sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by ownership class and species, 1978*

Ownership class	Species										All species
	Douglas-fir	Ponderosa pine	Southwestern white pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	GROWING STOCK *Cubic feet*										
State	3,821	8,583	204	317	1,708	2,535	17,168	3,801	48	3,849	21,017
Private	656,729	707,739	43,654	39,079	354,372	617,230	2,418,803	679,063	4,934	683,997	3,102,800
Total	660,550	716,322	43,858	39,396	356,080	619,765	2,435,971	682,864	4,982	687,846	3,123,817
	GROWING STOCK *Cubic meters*										
State	108	243	6	9	48	72	486	108	1	109	595
Private	18 597	20 041	1 236	1 106	10 035	17 478	68 493	19 229	140	19 369	87 862
Total	18 705	20 284	1 242	1 115	10 083	17 550	68 979	19 337	141	19 478	88 457
	SAWTIMBER *Board feet, International 1/4-inch rule*										
State	15,500	31,760	703	776	6,159	5,759	60,657	16,551	243	16,794	77,451
Private	2,775,097	2,807,855	138,651	98,069	1,535,330	1,973,429	9,328,431	2,382,235	24,837	2,407,072	11,735,503
Total	2,790,597	2,839,615	139,354	98,845	1,541,489	1,979,188	9,389,088	2,398,786	25,080	2,423,866	11,812,954

Table 22.--*Annual mortality of growing stock and sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by ownership class, and softwoods and hardwoods, 1978*

Species group and ownership class	Growing stock		Sawtimber
	- Cubic feet -	*- Cubic meters -*	*- Board feet*[1] *-*
Softwoods:			
State	1,109	31	5,499
Private	136,593	3 868	679,621
Total	137,702	3 899	685,120
Hardwoods:			
State	--	--	--
Private	--	--	--
Total	--	--	--

[1]International 1/4-inch rule.

Table 23.--*Annual mortality of growing stock and sawtimber on commercial timberland in Bernalillo, Sandoval, and Torrance Counties, by cause of death and species, 1978*

Cause of Death	Species										
	Douglas-fir	Ponderosa pine	Southwestern white pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	GROWING STOCK *Cubic feet*										
Insects	--	--	--	--	--	24,843	24,843	--	--	--	24,843
Disease	--	--	--	--	13,473	--	13,473	--	--	--	13,473
Weather	--	13,608	11,642	--	--	--	25,250	--	--	--	25,250
Unknown	16,899	--	--	--	--	57,237	74,136	--	--	--	74,136
Total	16,899	13,608	11,642	--	13,473	82,080	137,702	--	--	--	137,702
	GROWING STOCK *Cubic meters*										
Insects	--	--	--	--	--	703	703	--	--	--	703
Disease	--	--	--	--	382	--	382	--	--	--	382
Weather	--	385	330	--	--	--	715	--	--	--	715
Unknown	478	--	--	--	--	1 621	2 099	--	--	--	2 099
Total	478	385	330	--	382	2 324	3 899	--	--	--	3 899
	SAWTIMBER *Board feet, International 1/4-inch rule*										
Insects	--	--	--	--	--	128,443	128,443	--	--	--	128,443
Disease	--	--	--	--	58,880	--	58,880	--	--	--	58,880
Weather	--	82,099	45,212	--	--	--	127,311	--	--	--	127,311
Unknown	72,110	--	--	--	--	298,376	370,486	--	--	--	370,486
Total	72,110	82,099	45,212	--	58,880	426,819	685,120	--	--	--	685,120

Felt, Dorothy G.
1981. Forest area and timber resource statistics for State and private lands in Bernalillo, Sandoval, and Torrance Counties, New Mexico, 1978. USDA For. Serv. Resour. Bull. INT-25, 22 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

KEYWORDS: forest survey (regional), forest area classification, stand volume.

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with, providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

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Provo, Utah (in cooperation with Brigham Young University)

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United States
Department of
Agriculture

Forest Service

**Intermountain
Forest and Range
Experiment Station
Ogden, UT 84401**

Resource
Bulletin
INT-26

April 1982

Forest Area and Timber Resource Statistics for State and Private Lands in Northwestern Montana, 1977

Dorothy G. Felt
Velma J. Sterrett

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SUMMARY

Presents land area, commercial timberland area, timber inventory, growth, and mortality data based on Resources Evaluation standards.

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United States
Department of
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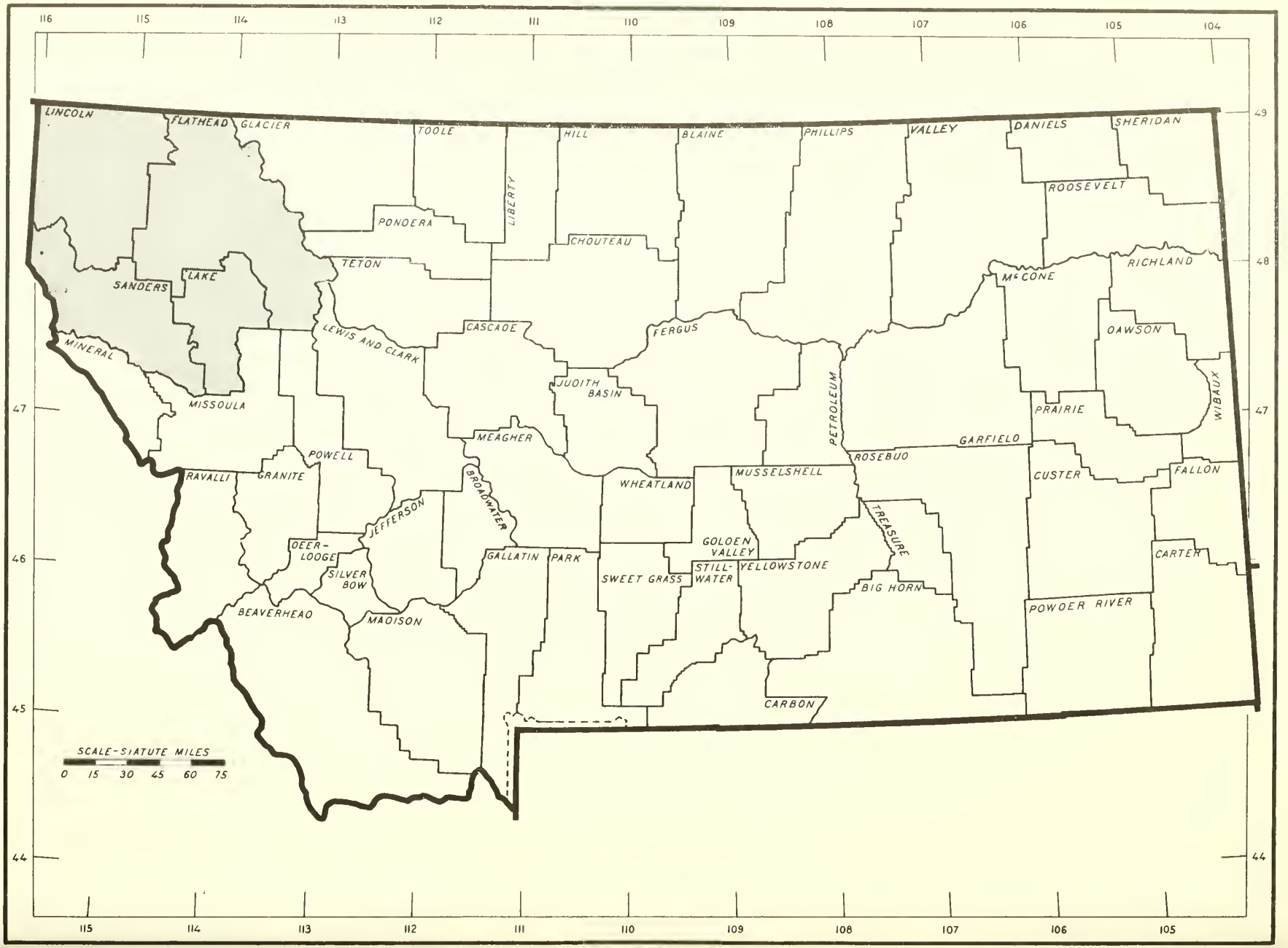
INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory o State and private lands in northwestern Montana, which include Lincoln, Flathead, Sanders, al Lake Counties (fig. 1). Data collection began in January 1977 and was completed in November 1977. This bulletin does not note changes and trends since the inventory of western Montana in 1958, nor does it contain estimates of timber removals. These items will be included in the State Analytical Report to be published in the near future.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forest and range lands. Fundamental to the accomplishment of this objective are the periodic State-by-State resource inventories. Originally, Resources Evaluation--formerly Forest Survey--was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station, with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.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PARK
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YELLOWSTONE
CARTER
SILVER BOW
SWEET GRASS
BIG HORN
BEAVERHEAD
MADISON
POWDER RIVER
CARBON
SCALE-STATUTE MILES
0 15 30 45 60 75

HIGHLIGHTS

Area

- State and private lands account for 2,573 thousand acres (1 041 thousand hectares), 31 percent of the total land area in northwestern Montana (fig. 2).
- Forests occupy 1,602 thousand acres (648 thousand hectares) including reserved land, 62 percent of the total State and private land area in the working circle.
- Of the forest land, 1,581 thousand acres (640 thousand hectares), almost 99 percent, are classified as commercial timberland.
- Private ownership accounts for 1,301 thousand acres (527 thousand hectares), 82 percent of the commercial timberland.
- Douglas-fir, lodgepole pine, ponderosa pine, and larch are the predominant forest types and occupy 82 percent of the commercial timberland.
- Almost 50 percent of the commercial timberland is in the 50- to 84-cubic foot productivity class and 82 percent of such land is privately owned.

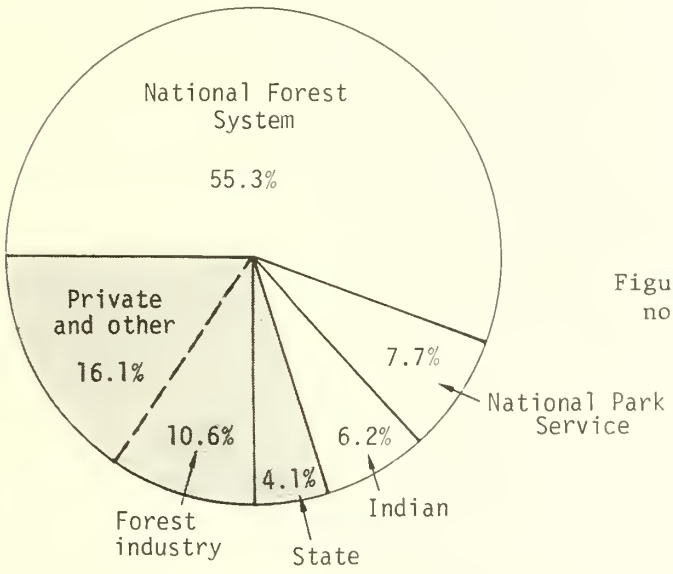

Figure 2.--Total land area in northwestern Montana by ownership.

Inventory

- Growing stock volume amounts to 2,790 million cubic feet (79 million cubic meters) and sawtimber volume totals 10,346 million board feet.[1]
- Rough, rotten, and salvable dead trees comprise 160 million cubic feet (4.5 million cubic meters), 5 percent of the total sound wood volume.
- The largest share of the total growing stock volume is made up of Douglas-fir (32 percent), lodgepole pine (20 percent), western larch (18 percent), and ponderosa pine (10 percent). The remaining percentage is made up of 10 other species (table 16).
- Private owners control almost 79 percent of the total growing stock and 77 percent of the sawtimber volume.

[1] International 1/4-inch rule.

Growth and Mortality

- Net annual growth totals 65,904 thousand cubic feet (1 866 thousand cubic meters).
- Eighty percent of the total net growth is on private lands.
- The annual mortality of 12,956 thousand cubic feet (367 thousand cubic meters) offsets 16 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and working circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 20,985 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field samples.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 701 ground sample locations. Sample trees were selected using a 10-point cluster which includes fixed plots (1/300 acre) for trees less than 5.0 inches d.b.h. and variable plots (40 BAF [basal area factor]) for trees 5.0 inches d.b.h. or larger.

3. For most species, volume and defect were computed using Kemp's equations.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very smal sample sizes, and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

Table 1.--*Area of forest land in northwestern Montana, with percent standard error, 1977*

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	1,560,851	1.1	19,902	48.5	1,580,753	1.1
Other forest land:						
Unproductive nonreserved	12,480	24.2	1,341	30.2	13,821	22.1

Table 2.--*Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland in northwestern Montana, with percent standard error, 1977*

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	2,735,117	3.2	54,798	23.1	2,789,915	3.2
Sawtimber (M board feet[1])	10,231,082	4.1	115,318	31.1	10,346,400	4.1
Net annual growth:						
Growing stock (cubic feet)	64,127,628	5.4	1,776,553	23.6	65,904,181	5.3
Sawtimber (board feet[1])	226,614,913	6.3	7,157,344	50.0	233,772,257	6.2
Annual mortality:						
Growing stock (cubic feet)	12,788,411	11.1	167,545	73.5	12,955,956	11.0
Sawtimber (board feet[1])	40,329,750	14.9	--	--	40,329,750	14.9

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for northwestern Montana are displayed in tables 3 through 24.

TERMINOLOGY

Land

Bureau of the Census.--Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. Includes noncensus water. See definition below.

Water

Census water.--As defined by the Bureau of the Census, streams, sloughs, estuaries, and canals more than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.--The same as defined by the Bureau of the Census, except minimum width of streams, sloughs, estuaries, and canals is 120 feet and minimum size of lakes, reservoirs, and ponds is 1 acre.

Land Use Classes

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.--Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.--Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.--Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.--Federal lands administered by the Bureau of Land Management.

Indian lands.--Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.

State lands.--Lands owned by States or lands leased to these governmental units for 50 years or more.

Private and Other

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

Forest industry lands.--Lands owned by companies or by individuals operating wood-processing plants.

Farmer-owned lands.--Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Miscellaneous Federal lands.--Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

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

Forest Type and Tree Species

Forest types.--A classification of forest land based upon the species forming a pluralit of live-tree stocking.

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

Commercial species.--Tree species presently or prospectively suitable for industrial woo products.

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

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

Area Condition Classes

Stocking.--Stocking is an effort to express the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range, which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less then full-site occupancy. Overstocking is characterized by sites with over 133-percent stocking.

Class 10.--Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.--Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

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

Class 70.--Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.--Low-risk old-growth stands.

Class 90.--High-risk old-growth stands.

Nonstocked.--Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.--Growing stock trees (1) having no serious defect in quality to limit present or prospective use for timber products; (2) of relatively high vigor; and (3) containing no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.--Growing stock trees meeting specified standards of size and quality, but not qualifying as desirable trees.

Rough trees.--(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of roughness or poor form; and (2) all live trees of noncommercial species.

Rotten trees.--Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

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

Saw-log portion.--That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.--That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree Size Classes

Seedlings.--Live trees less than 1.0 inch in diameter at breast height.

Saplings.--Trees 1.0 to 4.9 inches in diameter at breast height.

Poletimber trees.--Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.--Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwoods, 11.0 inches.

Volume

Cull volume.--Portions of a tree's volume that are not usable for industrial wood products because of rot, form, or other defect.

Net volume.--Gross volume less deductions for cull.

Growing stock volume.--Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.--Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.--The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.--Number of sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.--A classification of forest land in terms of inherent capacity to grow crops f industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not includ- ng thinnings or mortality loss) attainable at culmination of mean net annual growth over age. eight-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

Nonstocked land.--Commercial timberland less than 16.7 percent stocked with growing stock rees.

Table 3.--*Total land and water area in northwestern Montana, by ownership class, 1977*

Ownership class	Acres	Hectares
National Forest	4,632,189	1 874 588
Bureau of Land Management	0	0
National Park Service[1]	643,103	260 256
Bureau of Indian Affairs	522,059	211 271
Forest industry	889,036	359 781
State	338,329	136 917
Private and other	1,345,282	544 419
Total land area	8,369,998	3 387 232
Census water	258,610	104 656
Gross area[2]	8,628,608	3 491 888

[1]Not included with miscellaneous Federal ownership (a category of private and other) for purposes of clarity.

[2]U.S. Bureau of the Census, land and water area of the United States, 1970.

Table 4.--*Total land area in northwestern Montana, by major land class and ownership class, 1977*

Land class	Ownership class							
	State		Forest industry		Private[1]		Total	
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares
Commercial timberland	279,462	113 095	819,407	331 603	481,884	195 013	1,580,753	639 711
Productive reserved	902	365	400	162	4,921	1 991	6,223	2 518
Other forest land:								
Unproductive reserved	--	--	--	--	1,028	416	1,028	416
Unproductive nonreserved	3,199	1 294	2,392	968	8,230	3 331	13,821	5 593
Total forest land	283,563	114 754	822,199	332 733	496,063	200 751	1,601,825	648 238
Nonforest land	54,766	22 163	66,837	27 048	849,219	343 668	970,822	392 879
Total land area	338,329	136 917	889,036	359 781	1,345,282	544 419	2,572,647	1 041 117

[1]On this and all following tables, the private ownership category includes a small portion of miscellaneous Federal and county and municipal ownership.

Table 5.--*Area of commercial timberland in northwestern Montana, by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
	Acres					
Douglas-fir:						
Sawtimber	--	46,272	121,607	250,612	34,343	452,834
Poletimber	--	--	15,518	67,172	14,847	97,537
Sapling and seedling	--	--	36,639	79,900	52,433	168,972
Nonstocked	--	--	--	6,328	--	6,328
Total	--	46,272	173,764	404,012	101,623	725,671
Western hemlock:						
Sawtimber	--	--	3,827	--	--	3,827
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	4,259	--	--	--	4,259
Nonstocked	--	--	--	--	--	--
Total	--	4,259	3,827	--	--	8,086
Ponderosa pine:						
Sawtimber	1,448	5,678	27,482	50,531	4,230	89,369
Poletimber	--	4,423	1,447	7,879	--	13,749
Sapling and seedling	--	--	606	11,245	11,562	23,413
Nonstocked	--	--	4,426	1,255	6,539	12,220
Total	1,448	10,101	33,961	70,910	22,331	138,751
Western white pine:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	3,998	--	--	--	3,998
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	3,998	--	--	--	3,998
Lodgepole pine:						
Sawtimber	--	4,269	39,805	45,080	5,457	94,611
Poletimber	5,011	12,316	34,818	66,607	12,745	131,497
Sapling and seedling	--	7,017	8,440	21,138	26,656	63,251
Nonstocked	--	--	--	--	--	--
Total	5,011	23,602	83,063	132,825	44,858	289,359
Larch:						
Sawtimber	4,259	9,723	43,609	39,201	1,453	98,245
Poletimber	--	--	2,211	5,011	--	7,222
Sapling and seedling	--	--	7,530	18,328	6,175	32,033
Nonstocked	--	--	--	682	--	682
Total	4,259	9,723	53,350	63,222	7,628	138,182
Western redcedar:						
Sawtimber	--	--	21,502	5,774	--	27,276
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	21,502	5,774	--	27,276
Whitebark pine:						
Sawtimber	--	--	--	792	5,736	6,528
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	1,326	1,326
Total	--	--	--	792	7,062	7,854

Table 5 (con.)

Forest type and stand-size class	Site class: 165+	120-164	85-119	50-84	20-49	All classes
			Acres			
Grand fir:						
Sawtimber	4,269	2,809	33,919	15,840	--	56,837
Poletimber	--	--	1,405	--	--	1,405
Sapling and seedling	--	4,426	6,486	792	--	11,704
Nonstocked	--	--	--	--	--	--
Total	4,269	7,235	41,810	16,632	--	69,946
Subalpine fir:						
Sawtimber	--	5,673	14,101	14,877	4,202	38,853
Poletimber	--	--	5,108	--	--	5,108
Sapling and seedling	--	--	2,725	33,146	12,696	48,567
Nonstocked	--	--	--	--	--	--
Total	--	5,673	21,934	48,023	16,898	92,528
Engelmann spruce:						
Sawtimber	--	5,403	19,976	11,330	--	36,709
Poletimber	--	--	3,827	9,110	--	12,937
Sapling and seedling	--	--	--	7,835	--	7,835
Nonstocked	--	--	--	--	--	--
Total	--	5,403	23,803	28,275	--	57,481
Juniper:[1]						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	1,719	--	1,719
Nonstocked	--	--	--	--	--	--
Total	--	--	--	1,719	--	1,719
Aspen:						
Sawtimber	--	4,260	--	--	--	4,260
Poletimber	--	3,659	--	--	--	3,659
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	7,919	--	--	--	7,919
Cottonwood:						
Sawtimber	--	--	1,255	--	6,508	7,763
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	1,255	--	6,508	7,763
Other hardwoods:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	4,220	--	4,220
Nonstocked	--	--	--	--	--	--
Total	--	--	--	4,220	--	4,220
All types:						
Sawtimber	9,976	84,087	327,083	434,037	61,929	917,112
Poletimber	5,011	24,396	64,334	155,779	27,592	277,112
Sapling and seedling	--	15,702	62,426	178,323	109,522	365,973
Nonstocked	--	--	4,426	8,265	7,865	20,556
Total	14,987	124,185	458,269	776,404	206,908	1,580,753

[1]On this and all following tables, the area occupied by juniper classified as commercial is so classified because the site index for other associated species on these stands (usually ponderosa pine or Douglas-fir) was high enough to indicate a site potential productivity level exceeding 20 cubic feet per acre per year average annual growth, and nonstockable indicators were not present in sufficient quantities to lower the yield capability below 20 cubic feet per acre per year.

Although juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

Table 6.--*Area of State-owned commercial timberland in northwestern Montana, by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
			Acres			
Douglas-fir:						
Sawtimber	--	10,702	30,392	39,416	4,302	84,812
Poletimber	--	--	3,387	7,780	1,898	13,065
Sapling and seedling	--	--	4,077	7,480	1,442	12,999
Nonstocked	--	--	--	1,996	--	1,996
Total	--	10,702	37,856	56,672	7,642	112,872
Western hemlock:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Ponderosa pine:						
Sawtimber	1,448	1,498	1,562	1,670	641	6,819
Poletimber	--	18	1,447	13	--	1,478
Sapling and seedling	--	--	606	2,638	17	3,261
Nonstocked	--	--	--	320	--	320
Total	1,448	1,516	3,615	4,641	658	11,878
Western white pine:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	36	--	--	--	36
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	36	--	--	--	36
Lodgepole pine:						
Sawtimber	--	--	5,779	9,984	4,522	20,285
Poletimber	804	72	6,340	14,904	36	22,156
Sapling and seedling	--	2,810	26	4,237	2,341	9,414
Nonstocked	--	--	--	--	--	--
Total	804	2,882	12,145	29,125	6,899	51,855
Larch:						
Sawtimber	79	1,441	5,801	12,394	1,453	21,168
Poletimber	--	--	2,211	804	--	3,015
Sapling and seedling	--	--	3,272	2,727	1,855	7,854
Nonstocked	--	--	--	682	--	682
Total	79	1,441	11,284	16,607	3,308	32,719
Western redcedar:						
Sawtimber	--	--	109	1,453	--	1,562
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	109	1,453	--	1,562
Whitebark pine:						
Sawtimber	--	--	--	792	1,405	2,197
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	1,326	1,326
Total	--	--	--	792	2,731	3,523

Table 6 (con.)

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
			Acres			
Grand fir:						
Sawtimber	--	2,809	4,335	2,838	--	9,982
Poletimber	--	--	1,405	--	--	1,405
Sapling and seedling	--	--	2,060	792	--	2,852
Nonstocked	--	--	--	--	--	--
Total	--	2,809	7,800	3,630	--	14,239
Subalpine fir:						
Sawtimber	--	1,404	9,832	11,218	4,202	26,656
Poletimber	--	--	682	--	--	682
Sapling and seedling	--	--	2,725	7,683	2,573	12,981
Nonstocked	--	--	--	--	--	--
Total	--	1,404	13,239	18,901	6,775	40,319
Engelmann spruce:						
Sawtimber	--	1,441	2,943	2,792	--	7,176
Poletimber	--	--	--	828	--	828
Sapling and seedling	--	--	--	1,684	--	1,684
Nonstocked	--	--	--	--	--	--
Total	--	1,441	2,943	5,304	--	9,688
Juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Aspen:						
Sawtimber	--	80	--	--	--	80
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	80	--	--	--	80
Cottonwood:						
Sawtimber	--	--	320	--	358	678
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	320	--	358	678
Other hardwoods:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	13	--	13
Nonstocked	--	--	--	--	--	--
Total	--	--	--	13	--	13
All types:						
Sawtimber	1,527	19,375	61,073	82,557	16,883	181,415
Poletimber	804	126	15,472	24,329	1,934	42,665
Sapling and seedling	--	2,810	12,766	27,254	8,228	51,058
Nonstocked	--	--	--	2,998	1,326	4,324
Total	2,331	22,311	89,311	137,138	28,371	279,462

Table 7.--*Area of industry-owned commercial timberland in northwestern Montana, by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
				Acres		
Douglas-fir:						
Sawtimber	--	26,369	68,906	150,356	25,861	271,492
Poletimber	--	--	--	22,193	12,949	35,142
Sapling and seedling	--	--	9,112	29,461	34,587	73,160
Nonstocked	--	--	--	4,332	--	4,332
Total	--	26,369	78,018	206,342	73,397	384,126
Western hemlock:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	4,259	--	--	--	4,259
Nonstocked	--	--	--	--	--	--
Total	--	4,259	--	--	--	4,259
Ponderosa pine:						
Sawtimber	--	--	12,929	30,331	676	43,936
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	8,607	7,139	15,746
Nonstocked	--	--	4,426	338	2,881	7,645
Total	--	--	17,355	39,276	10,696	67,327
Western white pine:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Lodgepole pine:						
Sawtimber	--	4,269	17,272	30,537	338	52,416
Poletimber	--	4,320	20,111	47,496	8,747	80,674
Sapling and seedling	--	--	--	16,304	24,315	40,619
Nonstocked	--	--	--	--	--	--
Total	--	8,589	37,383	94,337	33,400	173,709
Larch:						
Sawtimber	--	4,320	21,386	17,598	--	43,304
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	4,258	11,639	4,320	20,217
Nonstocked	--	--	--	--	--	--
Total	--	4,320	25,644	29,237	4,320	63,521
Western redcedar:						
Sawtimber	--	--	8,538	4,321	--	12,859
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	8,538	4,321	--	12,859
Whitebark pine:						
Sawtimber	--	--	--	--	4,331	4,331
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	4,331	4,331

Table 7 (con.)

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
			Acres			
Grand fir:						
Sawtimber	4,269	--	21,660	13,002	--	38,931
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	4,426	4,426	--	--	8,852
Nonstocked	--	--	--	--	--	--
Total	4,269	4,426	26,086	13,002	--	47,783
Subalpine fir:						
Sawtimber	--	4,269	4,269	--	--	8,538
Poletimber	--	--	4,426	--	--	4,426
Sapling and seedling	--	--	--	20,611	5,102	25,713
Nonstocked	--	--	--	--	--	--
Total	--	4,269	8,695	20,611	5,102	38,677
Engelmann spruce:						
Sawtimber	--	--	13,071	4,269	--	17,340
Poletimber	--	--	--	4,320	--	4,320
Sapling and seedling	--	--	--	409	--	409
Nonstocked	--	--	--	--	--	--
Total	--	--	13,071	8,998	--	22,069
Juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Aspen:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Cottonwood:						
Sawtimber	--	--	338	--	408	746
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	338	--	408	746
Other hardwoods:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
All types:						
Sawtimber	4,269	39,227	168,369	250,414	31,614	493,893
Poletimber	--	4,320	24,537	74,009	21,696	124,562
Sapling and seedling	--	8,685	17,796	87,031	75,463	188,975
Nonstocked	--	--	4,426	4,670	2,881	11,977
Total	4,269	52,232	215,128	416,124	131,654	819,407

Table 8.--*Area of privately owned commercial timberland in northwestern Montana, by forest type, stand-size class, and site class, 1977*

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
			Acres			
Douglas-fir:						
Sawtimber	--	9,201	22,309	60,840	4,180	96,530
Poletimber	--	--	12,131	37,199	--	49,330
Sapling and seedling	--	--	23,450	42,959	16,404	82,813
Nonstocked	--	--	--	--	--	--
Total	--	9,201	57,890	140,998	20,584	228,673
Western hemlock:						
Sawtimber	--	--	3,827	--	--	3,827
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	3,827	--	--	3,827
Ponderosa pine:						
Sawtimber	--	4,180	12,991	18,530	2,913	38,614
Poletimber	--	4,405	--	7,866	--	12,271
Sapling and seedling	--	--	--	--	4,406	4,406
Nonstocked	--	--	--	597	3,658	4,255
Total	--	8,585	12,991	26,993	10,977	59,546
Western white pine:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	3,962	--	--	--	3,962
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	3,962	--	--	--	3,962
Lodgepole pine:						
Sawtimber	--	--	16,754	4,559	597	21,910
Poletimber	4,207	7,924	8,367	4,207	3,962	28,667
Sapling and seedling	--	4,207	8,414	597	--	13,218
Nonstocked	--	--	--	--	--	--
Total	4,207	12,131	33,535	9,363	4,559	63,795
Larch:						
Sawtimber	4,180	3,962	16,422	9,209	--	33,773
Poletimber	--	--	--	4,207	--	4,207
Sapling and seedling	--	--	--	3,962	--	3,962
Nonstocked	--	--	--	--	--	--
Total	4,180	3,962	16,422	17,378	--	41,942
Western redcedar:						
Sawtimber	--	--	12,855	--	--	12,855
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	12,855	--	--	12,855
Whitebark pine:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--

Table 8 (con.)

Forest type and stand-size class	Site class: 165+	120-164	85-119	50-84	20-49	All classes
			Acres			
Grand fir:						
Sawtimber	--	--	7,924	--	--	7,924
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	7,924	--	--	7,924
Subalpine fir:						
Sawtimber	--	--	--	3,659	--	3,659
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	4,852	5,021	9,873
Nonstocked	--	--	--	--	--	--
Total	--	--	--	8,511	5,021	13,532
Engelmann spruce:						
Sawtimber	--	3,962	3,962	4,269	--	12,193
Poletimber	--	--	3,827	3,962	--	7,789
Sapling and seedling	--	--	--	5,742	--	5,742
Nonstocked	--	--	--	--	--	--
Total	--	3,962	7,789	13,973	--	25,724
Juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	1,719	--	1,719
Nonstocked	--	--	--	--	--	--
Total	--	--	--	1,719	--	1,719
Aspen:						
Sawtimber	--	4,180	--	--	--	4,180
Poletimber	--	3,659	--	--	--	3,659
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	7,839	--	--	--	7,839
Cottonwood:						
Sawtimber	--	--	597	--	5,742	6,339
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	597	--	5,742	6,339
Other hardwoods:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	4,207	--	4,207
Nonstocked	--	--	--	--	--	--
Total	--	--	--	4,207	--	4,207
All types:						
Sawtimber	4,180	25,485	97,641	101,066	13,432	241,804
Poletimber	4,207	19,950	24,325	57,441	3,962	109,885
Sapling and seedling	--	4,207	31,864	64,038	25,831	125,940
Nonstocked	--	--	--	597	3,658	4,255
Total	8,387	49,642	153,830	223,142	46,883	481,884

Table 9.--*Area of commercial timberland in northwestern Montana, by stand volume and ownership class, 1977*

Stand volume per acre[1]	Ownership class			
	State	Forest industry	Private	All owners
	Acres			
Less than 1,500 board feet	42,060	188,462	127,323	357,845
1,500 to 4,999 board feet	70,973	207,079	201,397	479,449
5,000 to 9,999 board feet	74,972	220,866	99,961	395,799
10,000 board feet or more	91,457	203,000	53,203	347,660
All classes	279,462	819,407	481,884	1,580,753

[1]International 1/4-inch rule.

Table 10.--*Area of commercial timberland in northwestern Montana, by forest type and area condition class, 1977*

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	--	683	46,897	57,824	63,405	201,929	95,565	151,505	101,535	6,328	725,671	293 670
Western hemlock	--	--	3,827	--	--	4,259	--	--	--	--	8,086	3 272
Ponderosa pine	3,563	--	6,284	7,928	1,448	27,698	33,636	30,503	15,471	12,220	138,751	56 151
Western white pine	--	--	--	--	3,998	--	--	--	--	--	3,998	1 618
Lodgepole pine	--	20,271	1,114	74,410	98,305	33,328	25,523	6,489	29,919	--	289,359	117 100
Larch	606	15,533	2,615	33,230	32,240	7,504	10,637	27,251	7,884	682	138,182	55 920
Western redcedar	--	--	--	4,260	4,282	4,269	4,423	4,268	5,774	--	27,276	11 038
Whitebark pine	--	--	--	--	--	--	--	--	6,528	1,326	7,854	3 178
Grand fir	606	--	10,596	7,078	--	25,740	4,401	11,568	9,957	--	69,946	28 306
Subalpine fir	--	4,864	8,597	16,334	1,405	19,065	12,681	19,701	9,881	--	92,528	37 445
Engelmann spruce	--	--	3,827	2,118	7,996	26,285	--	11,533	5,722	--	57,481	23 262
Juniper	--	--	--	--	--	--	1,719	--	--	--	1,719	696
Aspen	--	--	--	--	--	4,260	3,659	--	--	--	7,919	3 205
Cottonwood	--	--	--	--	--	--	6,508	--	1,255	--	7,763	3 142
Other hardwoods	--	4,220	--	--	--	--	--	--	--	--	4,220	1 708
All types	4,775	45,571	83,757	203,182	213,079	354,337	198,752	262,818	193,926	20,556	1,580,753	639 711

Land class	Forest type: Douglas-fir	Ponderosa pine	Lodgepole pine	Larch	Grand fir	Subalpine fir	Engelmann spruce	Mixed softwoods	Total softwoods	Mixed hardwoods	Total hardwoods	All types	
	Acres												*Hectares*
Productive reserved area:													
State	371	55	169	113	37	100	26	18	889	13	13	902	365
Forest industry	190	35	78	31	21	19	11	12	397	3	3	400	162
Private	2,344	489	624	422	91	69	358	199	4,596	325	325	4,921	1 991
Total	2,905	579	871	566	149	188	395	229	5,882	341	341	6,223	2 518
Other forest land area:													
Unproductive reserved:													
State	--	--	--	--	--	--	--	--	--	--	--	--	--
Forest industry	--	--	--	--	--	--	--	--	--	--	--	--	--
Private	65	--	--	--	--	65	--	778	908	120	120	1,028	416
Total	65	--	--	--	--	65	--	778	908	120	120	1,028	416
Unproductive nonreserved:													
State	321	--	--	--	--	320	--	2,558	3,199	--	--	3,199	1 294
Forest industry	338	--	--	--	--	338	--	1,472	2,148	244	244	2,392	968
Private	2,316	1,720	--	--	--	597	--	2,500	7,133	1,097	1,097	8,230	3 331
Total	2,975	1,720	--	--	--	1,255	--	6,530	12,480	1,341	1,341	13,821	5 593
Total all areas:													
State	692	55	169	113	37	420	26	2,576	4,088	13	13	4,101	1 659
Forest industry	528	35	78	31	21	357	11	1,484	2,545	247	247	2,792	1 130
Private	4,725	2,209	624	422	91	731	358	3,477	12,637	1,542	1,542	14,179	5 738
Total acres	5,945	2,299	871	566	149	1,508	395	7,537	19,270	1,802	1,802	21,072	--
Total hectares	2 406	930	353	229	60	610	160	3 050	7 798	729	729	--	8 527

Table 12.--*Number of growing stock trees on commercial timberland in northwestern Montana, by species and diameter class, 19*

Species	Diameter class (inches at breast height): 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand trees															
Douglas-fir	117,499	53,777	34,684	19,631	11,651	7,460	4,284	2,965	1,777	873	480	268	141	89	78	255,657
Ponderosa pine	10,915	5,760	5,179	2,617	1,702	1,355	1,051	637	530	337	343	251	163	87	148	31,075
Western white pine	1,400	140	537	324	191	201	219	46	56	35	4	18	3	3	14	3,191
Lodgepole pine	47,120	64,709	38,941	19,121	7,083	2,278	925	183	35	28	9	2	--	--	--	180,433
Whitebark pine	126	--	110	84	110	166	193	113	99	52	21	11	4	3	--	1,092
Western larch	31,293	15,794	11,262	7,425	3,703	2,065	1,735	1,259	925	620	437	299	264	145	219	77,445
Grand fir	18,953	9,766	5,013	2,670	1,635	1,004	657	341	223	115	64	16	10	8	3	40,478
Subalpine fir	23,448	10,096	5,016	2,212	1,362	628	191	144	88	11	2	2	--	--	--	43,200
Engelmann spruce	19,748	5,933	4,144	2,105	1,532	1,071	614	349	224	108	74	35	25	16	17	35,995
Western hemlock	4,321	2,155	809	717	499	120	70	27	78	8	7	--	--	--	--	8,811
Western redcedar	7,251	1,381	950	663	539	510	203	195	108	65	25	7	14	10	30	11,951
Juniper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total softwoods	282,074	169,511	106,645	57,569	30,007	16,858	10,142	6,259	4,143	2,252	1,466	909	624	361	509	689,329
Aspen	7,952	2,465	637	560	434	171	17	24	18	15	--	--	--	4	3	12,300
Cottonwood	2,013	--	254	267	78	98	75	37	47	26	7	2	--	8	26	2,938
Other hardwoods	14,658	7,304	1,913	865	237	54	5	22	3	--	--	4	--	--	--	25,065
Total hardwoods	24,623	9,769	2,804	1,692	749	323	97	83	68	41	7	6	--	12	29	40,303
All species	306,697	179,280	109,449	59,261	30,756	17,181	10,239	6,342	4,211	2,293	1,473	915	624	373	538	729,632

Table 13.--*Number of cull and salvable dead trees on commercial timberland in northwestern Montana, by ownership class, and softwoods and hardwoods, 1977*

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
State:				
Softwoods	379	1,015	1,394	3,699
Hardwoods	1	20	21	61
Total	380	1,035	1,415	3,760
Forest industry:				
Softwoods	1,962	1,796	3,758	9,404
Hardwoods	120	96	216	--
Total	2,082	1,892	3,974	9,404
Private:				
Softwoods	1,035	749	1,784	4,183
Hardwoods	186	373	559	249
Total	1,221	1,122	2,343	4,432
All owners:				
Softwoods	3,376	3,560	6,936	17,286
Hardwoods	307	489	796	310
Total	3,683	4,049	7,732	17,596

Table 14.--*Net volume of growing stock on commercial forest land in [illegible],*
by ownership class, forest type, and stand-size class, 19[illegible]

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic meters					*Thousand cubic meters*
State:							
	Douglas-fir	194,644	17,264	10,794	432	223,134	6 318
	Western hemlock	--	--	--	--	--	--
	Ponderosa pine	11,471	1,660	1,693	99	14,925	423
	Western white pine	--	37	--	--	37	1
	Lodgepole pine	54,369	60,778	9,017	--	124,164	3 516
	Larch	65,730	6,681	4,197	156	76,764	2 174
	Western redcedar	6,175	--	--	--	6,175	175
	Whitebark pine	3,629	--	--	87	3,716	105
	Grand fir	30,025	1,210	1,226	--	32,461	919
	Subalpine fir	75,301	997	3,938	--	80,236	2 272
	Engelmann spruce	29,572	1,304	420	--	31,296	886
	Juniper	--	--	--	--	--	--
	Aspen	151	--	--	--	151	4
	Cottonwood	403	--	--	--	403	12
	Other hardwoods	--	--	5	--	5	(1)
	All types	471,470	89,931	31,290	774	593,465	16 805
Forest industry:							
	Douglas-fir	567,771	48,166	40,001	391	656,329	18 585
	Western hemlock	--	--	--	--	--	--
	Ponderosa pine	75,591	--	3,734	2,154	81,479	2 307
	Western white pine	--	--	--	--	--	--
	Lodgepole pine	137,532	213,599	11,790	--	362,921	10 277
	Larch	131,937	--	12,927	--	144,864	4 102
	Western redcedar	58,239	--	--	--	58,239	1 649
	Whitebark pine	15,567	--	--	--	15,567	441
	Grand fir	97,776	--	3,178	--	100,954	2 859
	Subalpine fir	36,082	1,417	5,269	--	42,768	1 211
	Engelmann spruce	49,059	7,941	272	--	57,272	1 622
	Juniper	--	--	--	--	--	--
	Aspen	--	--	--	--	--	--
	Cottonwood	428	--	--	--	428	12
	Other hardwoods	--	--	--	--	--	--
	All types	1,169,982	271,123	77,171	2,545	1,520,821	43 065
Private:							
	Douglas-fir	159,004	68,537	41,475	--	269,016	7 618
	Western hemlock	5,801	--	--	--	5,801	164
	Ponderosa pine	43,253	9,644	3,156	525	56,578	1 602
	Western white pine	--	4,067	--	--	4,067	115
	Lodgepole pine	53,686	68,017	15,976	--	137,679	3 899
	Larch	101,464	6,828	2,254	--	110,546	3 130
	Western redcedar	15,511	--	--	--	15,511	439
	Whitebark pine	--	--	--	--	--	--
	Grand fir	13,069	--	--	--	13,069	370
	Subalpine fir	1,807	--	2,349	--	4,156	118
	Engelmann spruce	26,913	15,252	3,821	--	45,986	1 302
	Juniper	--	--	314	--	314	9
	Aspen	7,965	2,004	--	--	9,969	283
	Cottonwood	1,232	--	--	--	1,232	35
	Other hardwoods	--	--	1,705	--	1,705	48
	All types	429,705	174,349	71,050	525	675,629	19 132
All owners:							
	Douglas-fir	921,419	133,967	92,270	823	1,148,479	32 521
	Western hemlock	5,801	--	--	--	5,801	164
	Ponderosa pine	130,315	11,304	8,583	2,778	152,980	4 332
	Western white pine	--	4,104	--	--	4,104	116
	Lodgepole pine	245,587	342,394	36,783	--	624,764	17 692
	Larch	299,131	13,509	19,378	156	332,174	9 406
	Western redcedar	79,925	--	--	--	79,925	2 263
	Whitebark pine	19,196	--	--	87	19,283	546
	Grand fir	140,870	1,210	4,404	--	146,484	4 148
	Subalpine fir	113,190	2,414	11,556	--	127,160	3 601
	Engelmann spruce	105,544	24,497	4,513	--	134,554	3 810
	Juniper	--	--	314	--	314	9
	Aspen	8,116	2,004	--	--	10,120	287
	Cottonwood	2,063	--	--	--	2,063	59
	Other hardwoods	--	--	1,710	--	1,710	48
	All types	2,071,157	535,403	179,511	3,844	2,789,915	79 002

[1]Less than .05 thousand cubic meters.

Table 15.--*Net volume of sawtimber on commercial timberland in northwestern Montana, by ownership class, forest type, and stand-size class, 1977*

Ownership class	Forest type	Stand-size class: Sawtimber	Poletimber	Sapling/seedling	Nonstocked	All classes
		Thousand board feet[1]				
State:						
	Douglas-fir	869,902	32,137	39,796	1,581	943,416
	Western hemlock	--	--	--	--	--
	Ponderosa pine	57,098	6,234	5,215	515	69,062
	Western white pine	--	91	--	--	91
	Lodgepole pine	187,681	77,593	18,431	--	283,705
	Larch	328,232	13,047	11,838	967	354,084
	Western redcedar	31,417	--	--	--	31,417
	Whitebark pine	11,208	--	--	260	11,468
	Grand fir	128,805	2,302	5,743	--	136,850
	Subalpine fir	345,754	646	14,796	--	361,196
	Engelmann spruce	151,631	3,087	2,231	--	156,949
	Juniper	--	--	--	--	--
	Aspen	561	--	--	--	561
	Cottonwood	1,319	--	--	--	1,319
	Other hardwoods	--	--	6	--	6
	All types	2,113,608	135,137	98,056	3,323	2,350,124
Forest industry:						
	Douglas-fir	2,574,840	78,461	129,434	2,328	2,785,063
	Western hemlock	--	--	--	--	--
	Ponderosa pine	382,588	--	20,284	12,583	415,455
	Western white pine	--	--	--	--	--
	Lodgepole pine	484,502	278,418	29,275	--	792,195
	Larch	602,539	--	60,165	--	662,704
	Western redcedar	262,970	--	--	--	262,970
	Whitebark pine	81,412	--	--	--	81,412
	Grand fir	443,083	--	13,348	--	456,431
	Subalpine fir	168,635	2,751	7,164	--	178,550
	Engelmann spruce	228,115	16,893	1,259	--	246,267
	Juniper	--	--	--	--	--
	Aspen	--	--	--	--	--
	Cottonwood	1,406	--	--	--	1,406
	Other hardwoods	--	--	--	--	--
	All types	5,230,090	376,523	260,929	14,911	5,882,453
Private:						
	Douglas-fir	602,705	132,538	119,051	--	854,294
	Western hemlock	22,010	--	--	--	22,010
	Ponderosa pine	198,049	22,478	14,907	2,614	238,048
	Western white pine	--	9,968	--	--	9,968
	Lodgepole pine	193,908	98,630	2,648	--	295,186
	Larch	391,986	9,126	1,449	--	402,561
	Western redcedar	56,092	--	--	--	56,092
	Whitebark pine	--	--	--	--	--
	Grand fir	32,405	--	--	--	32,405
	Subalpine fir	6,470	--	6,680	--	13,150
	Engelmann spruce	102,681	30,014	17,703	--	150,398
	Juniper	--	--	902	--	902
	Aspen	29,510	2,575	--	--	32,085
	Cottonwood	4,823	--	--	--	4,823
	Other hardwoods	--	--	1,901	--	1,901
	All types	1,640,639	305,329	165,241	2,614	2,113,823
All owners:						
	Douglas-fir	4,047,447	243,136	288,281	3,909	4,582,773
	Western hemlock	22,010	--	--	--	22,010
	Ponderosa pine	637,735	28,712	40,406	15,712	722,565
	Western white pine	--	10,059	--	--	10,059
	Lodgepole pine	866,091	454,641	50,354	--	1,371,086
	Larch	1,322,757	22,173	73,452	967	1,419,349
	Western redcedar	350,479	--	--	--	350,479
	Whitebark pine	92,620	--	--	260	92,880
	Grand fir	604,293	2,302	19,091	--	625,686
	Subalpine fir	520,859	3,397	28,640	--	552,896
	Engelmann spruce	482,427	49,994	21,193	--	553,614
	Juniper	--	--	902	--	902
	Aspen	30,071	2,575	--	--	32,646
	Cottonwood	7,548	--	--	--	7,548
	Other hardwoods	--	--	1,907	--	1,907
	All types	8,984,337	816,989	524,226	20,848	10,346,400

[1]International 1/4-inch rule.

Table 16.--*Net volume of growing stock on commercial timberland in northwestern Montana, by species and diameter class, 1977*

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	101,538	115,164	121,392	123,365	104,706	99,984	79,509	49,503	35,060	22,818	14,618	10,772	13,226	891,655
Ponderosa pine	5,168	11,392	14,667	21,600	25,619	22,171	24,626	21,158	28,662	26,052	20,802	13,656	37,543	273,116
Western white pine	2,064	2,485	3,012	4,746	7,285	2,073	3,513	2,685	454	2,316	376	499	3,636	35,144
Lodgepole pine	194,788	173,839	108,628	52,283	29,983	7,743	1,814	1,846	654	139	--	--	--	571,717
Whitebark pine	485	521	1,143	2,937	5,248	3,968	4,047	3,249	1,578	788	389	272	--	24,625
Western larch	33,114	51,311	45,406	41,107	50,658	50,155	48,491	40,120	35,201	28,167	28,784	17,910	40,495	510,919
Grand fir	13,671	17,076	19,169	20,346	18,886	15,137	12,614	8,574	5,564	1,940	1,506	1,474	661	136,618
Subalpine fir	20,025	15,722	15,952	11,010	4,840	5,335	4,068	578	161	152	--	--	--	77,843
Engelmann spruce	16,373	15,217	19,984	25,963	19,886	14,721	13,094	8,338	6,649	3,793	3,053	2,407	3,161	150,639
Western hemlock	2,514	4,160	5,204	1,767	1,761	735	3,822	522	419	--	--	--	--	20,904
Western redcedar	3,327	3,649	5,541	7,306	3,620	4,722	3,405	2,669	1,178	456	1,001	729	4,334	41,937
Total softwoods	393,067	410,536	360,098	310,430	272,492	226,744	199,003	139,242	115,580	86,621	70,529	47,719	103,056	2,735,117
Aspen	2,343	4,861	5,230	3,140	361	857	916	1,009	--	--	--	473	458	19,648
Cottonwood	840	1,707	949	1,599	1,782	1,237	1,959	1,287	373	152	--	782	4,999	17,666
Other hardwoods	6,633	5,918	2,929	936	148	600	93	--	--	227	--	--	--	17,484
Total hardwoods	9,816	12,486	9,108	5,675	2,291	2,694	2,968	2,296	373	379	--	1,255	5,457	54,798
All species	402,883	423,022	369,206	316,105	274,783	229,438	201,971	141,538	115,953	87,000	70,529	48,974	108,513	2,789,915

Table 17.--*Net volume of sawtimber on commercial timberland in northwestern Montana, by species and diameter class, 1977*

Species	Diameter class (inches at breast height)													
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	437,871	606,470	552,515	546,639	443,751	279,721	200,105	130,842	84,766	62,854	77,650	3,423,184
Ponderosa pine	39,855	97,977	134,818	125,240	144,051	126,655	173,655	158,124	126,925	85,310	247,848	1,460,458
Western white pine	13,371	26,266	41,122	11,541	19,295	14,736	2,553	13,314	2,178	2,926	21,541	168,843
Lodgepole pine	440,411	303,877	172,596	43,641	10,024	10,073	5,592	768	--	--	--	984,982
Whitebark pine	5,358	16,961	29,985	22,229	22,151	17,671	8,648	4,357	2,173	1,525	--	131,058
Western larch	193,776	244,722	303,479	300,512	290,358	240,226	213,815	175,199	179,986	111,710	250,745	2,504,528
Grand fir	69,555	106,247	100,747	80,441	64,134	41,723	25,975	8,988	6,937	6,775	3,050	514,572
Subalpine fir	61,797	57,811	25,689	28,192	21,443	3,067	888	843	--	--	--	199,730
Engelmann spruce	76,408	131,562	108,159	78,929	69,335	43,970	35,474	21,102	17,412	14,236	19,143	615,730
Western hemlock	18,170	8,025	8,958	3,739	20,344	2,807	2,298	--	--	--	--	64,341
Western redcedar	20,886	36,352	17,998	23,354	16,487	12,807	5,513	2,126	4,633	3,363	20,137	163,656
Total softwoods	1,377,458	1,636,270	1,496,066	1,264,457	1,121,373	793,456	672,516	515,663	425,010	288,699	640,114	10,231,082
Aspen	XXXX	16,508	1,863	4,362	4,567	4,941	--	--	--	2,224	2,155	36,620
Cottonwood	XXXX	8,257	9,103	6,126	9,492	6,014	1,711	697	--	3,585	23,494	68,479
Other hardwoods	XXXX	4,885	767	3,044	457	--	--	1,066	--	--	--	10,219
Total hardwoods	XXXX	29,650	11,733	13,532	14,516	10,955	1,711	1,763	--	5,809	25,649	115,318
All species	1,377,458	1,665,920	1,507,799	1,277,989	1,135,889	804,411	674,227	517,426	425,010	294,508	665,763	10,346,400

Table 18.--*Net volume of growing stock and sawtimber on commercial timberland in northwestern Montana, by ownership class and species, 197*

Ownership class	Species																
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western hemlock	Western redcedar	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	All species
	GROWING STOCK *Thousand cubic feet*																
State	172,927	29,688	9,644	123,457	10,446	116,181	23,329	41,538	50,049	459	7,510	585,228	300	2,411	5,526	8,237	593,465
Forest industry	490,788	174,945	21,032	302,965	14,098	281,585	96,598	27,399	63,864	13,346	22,686	1,509,306	7,152	3,502	861	11,515	1,520,821
Private	227,940	68,483	4,468	145,295	81	113,153	16,691	8,906	36,726	7,099	11,741	640,583	12,196	11,753	11,097	35,046	675,629
Total	891,655	273,116	35,144	571,717	24,625	510,919	136,618	77,843	150,639	20,904	41,937	2,735,117	19,648	17,666	17,484	54,798	2,789,915
	GROWING STOCK *Thousand cubic meters*																
State	4 896	841	273	3 496	296	3 290	661	1 176	1 417	13	213	16 572	8	68	157	233	16 805
Forest industry	13 898	4 954	595	8 579	399	7 974	2 735	776	1 809	378	642	42 739	203	99	24	326	43 065
Private	6 455	1 939	127	4 114	2	3 204	473	252	1 040	201	332	18 139	346	333	314	993	19 132
Total	25 249	7 734	995	16 189	697	14 468	3 869	2 204	4 266	592	1 187	77 450	557	500	495	1 552	79 002
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*																
State	734,405	150,122	48,870	257,802	54,325	621,416	86,712	119,434	227,377	1,030	31,213	2,332,706	439	8,800	8,179	17,418	2,350,124
Forest industry	1,942,527	998,209	103,888	430,367	76,486	1,459,659	370,369	66,360	281,540	41,169	91,582	5,862,156	10,031	10,143	123	20,297	5,882,453
Private	746,252	312,127	16,085	296,813	247	423,453	57,491	13,936	106,813	22,142	40,861	2,036,220	26,150	49,536	1,917	77,603	2,113,823
Total	3,423,184	1,460,458	168,843	984,982	131,058	2,504,528	514,572	199,730	615,730	64,341	163,656	10,231,082	36,620	68,479	10,219	115,318	10,346,400

Table 19.--*Net volume of timber on commercial timberland in northwestern Montana, by class of timber, and softwoods and hardwoods, 1977*

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw-log portion	1,721,217	18,615	1,739,832
Upper-stem portion	210,297	4,773	215,070
Total	1,931,514	23,388	1,954,902
Poletimber trees	803,603	31,410	835,013
All growing stock trees	2,735,117	54,798	2,789,915
Sound cull trees	14,874	943	15,817
Rotten cull trees	20,123	951	21,074
Salvable dead trees	121,623	1,072	122,695
All timber	2,891,737	57,764	2,949,501

Table 20.--*Net volume of growing stock on commercial timberland in northwestern Montana, by forest type and species, 19[illegible]*

Forest type	Species																	
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western hemlock	Western redcedar	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	All species	
	Thousand cubic feet																	*Thousand cubic meters*
Douglas-fir	709,259	134,400	1,829	73,143	--	162,673	34,044	5,647	20,055	1,284	1,446	1,143,780	1,630	413	2,656	4,699	1,148,479	32 521
Western hemlock	331	--	--	695	--	350	411	391	440	3,183	--	5,801	--	--	--	--	5,801	164
Ponderosa pine	27,102	111,558	--	6,234	--	7,900	186	--	--	--	--	152,980	--	--	--	--	152,980	4 332
Western white pine	--	--	812	1,498	--	--	--	--	--	--	--	2,310	--	--	1,794	1,794	4,104	116
Lodgepole pine	43,760	8,823	1,772	426,669	847	88,780	9,797	14,988	12,313	320	2,371	610,440	10,798	2,873	653	14,324	624,764	17 692
Larch	56,097	13,977	3,488	38,216	--	186,380	8,780	5,063	8,188	1,991	2,747	324,927	--	1,428	5,819	7,247	332,174	9 406
Western redcedar	4,787	930	3,652	--	--	12,176	15,654	347	3,479	8,569	28,480	78,074	495	1,224	132	1,851	79,925	2 263
Whitebark pine	--	--	--	87	16,043	--	--	1,779	514	860	--	19,283	--	--	--	--	19,283	546
Grand fir	27,341	1,839	16,056	6,084	--	13,399	59,311	2,844	6,680	4,697	4,588	142,839	--	1,746	1,899	3,645	146,484	4 148
Subalpine fir	12,446	--	5,917	6,828	7,735	20,070	1,014	41,304	29,064	--	1,649	126,027	--	1,133	--	1,133	127,160	3 601
Engelmann spruce	10,446	700	779	11,048	--	19,191	7,421	5,278	69,536	--	573	124,972	--	5,592	3,990	9,582	134,554	3 810
Juniper	86	228	--	--	--	--	--	--	--	--	--	314	--	--	--	--	314	9
Aspen	--	661	839	--	--	--	--	--	--	--	--	1,500	6,466	2,154	--	8,620	10,120	287
Cottonwood	--	--	--	--	--	--	--	202	370	--	83	655	--	1,103	305	1,408	2,063	59
Other hardwoods	--	--	--	1,215	--	--	--	--	--	--	--	1,215	259	--	236	495	1,710	48
All types	891,655	273,116	35,144	571,717	24,625	510,919	136,618	77,843	150,639	20,904	41,937	2,735,117	19,648	17,666	17,484	54,798	2,789,915	--
	Thousand cubic meters																	
All types	25 249	7 734	995	16 189	697	14 468	3 869	2 204	4 266	592	1 187	77 450	557	500	495	1 552		79 002

Table 21.--*Volume of timber on commercial timberland in northwestern Montana, by forest type and species, 19[illegible]*

Forest type	Species																
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western hemlock	Western redcedar	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	All species
	Thousand board feet, International 1/4-inch rule																
Douglas-fir	2,690,840	732,444	9,028	151,391	--	796,473	116,434	9,298	64,760	4,840	4,086	4,579,594	--	1,448	1,731	3,179	4,582,773
Western hemlock	1,585	--	--	1,027	--	2,079	2,123	2,079	2,404	10,713	--	22,010	--	--	--	--	22,010
Ponderosa pine	92,251	574,617	--	14,696	--	40,005	996	--	--	--	--	722,565	--	--	--	--	722,565
Western white pine	--	--	4,467	5,592	--	--	--	--	--	--	--	10,059	--	--	--	--	10,059
Lodgepole pine	163,175	46,670	2,822	615,228	2,740	408,881	25,432	30,091	49,252	--	5,510	1,349,801	14,547	6,738	--	21,285	1,371,086
Larch	216,382	82,819	18,102	115,743	--	900,688	26,243	11,302	24,916	4,998	10,168	1,411,361	--	7,132	856	7,988	1,419,349
Western redcedar	25,493	4,961	20,485	--	--	62,555	73,170	1,792	19,129	19,021	116,923	341,529	2,622	5,640	688	8,950	350,479
Whitebark pine	--	--	--	260	85,703	--	--	2,681	2,410	1,826	--	92,880	--	--	--	--	92,880
Grand fir	127,377	11,345	75,346	15,044	--	76,715	234,482	5,628	28,990	22,943	17,092	614,962	--	6,319	4,405	10,724	625,686
Subalpine fir	55,359	--	32,622	26,845	42,615	115,545	2,907	125,242	140,493	--	7,942	547,570	--	5,326	--	5,326	552,896
Engelmann spruce	52,722	4,125	4,485	37,249	--	101,587	32,785	13,617	281,617	--	1,935	530,122	--	21,411	2,081	23,492	553,614
Juniper	--	902	--	--	--	--	--	--	--	--	--	902	--	--	--	--	902
Aspen	--	2,575	1,486	--	--	--	--	--	--	--	--	4,061	19,451	9,134	--	28,585	32,646
Cottonwood	--	--	--	--	--	--	--	--	1,759	--	--	1,759	--	5,551	458	5,789	7,548
Other hardwoods	--	--	--	1,907	--	--	--	--	--	--	--	1,907	--	--	--	--	1,907
All types	3,423,184	1,460,458	168,843	984,982	131,058	2,504,528	514,572	199,730	615,730	64,341	163,656	10,231,082	36,620	68,479	10,219	115,318	10,346,40[illegible]

Table 22.--*Net annual growth of growing stock and sawtimber on commercial timberland in northwestern Montana, by ownership class and species, 1977*

Ownership class	Species																
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western hemlock	Western redcedar	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	All species
	GROWING STOCK																
	Cubic feet																
State	5,825,635	665,548	153,572	3,735,110	-52,488	2,111,416	555,274	622,965	716,360	56,037	170,891	12,558,318	12,623	65,991	358,522	437,136	12,995,454
Forest industry	11,018,161	2,287,014	564,450	8,178,937	52,631	3,541,076	2,023,849	1,353,485	1,219,164	586,653	577,695	31,203,115	199,151	116,127	42,245	357,523	31,560,638
Private	8,672,211	1,677,010	362,480	4,093,178	551	2,700,888	259,740	578,144	1,190,281	424,343	407,369	20,366,195	148,670	355,117	478,107	981,894	21,348,089
Total	23,516,007	4,629,572	1,080,502	16,007,225	694	8,153,380	2,836,863	2,554,592	3,125,805	1,067,033	1,155,955	64,127,628	360,444	537,235	878,874	1,776,553	65,904,181
	GROWING STOCK																
	Cubic meters																
State	108 330	18 846	4 348	105 767	-1 486	59 789	15 667	17 640	20 285	1 587	4 839	355 612	357	1 869	10 152	12 378	367 990
Forest industry	312 000	64 761	15 984	231 601	1 490	94 609	57 309	38 327	34 523	16 612	16 358	883 574	5 640	3 288	1 196	10 124	893 698
Private	245 570	47 488	10 264	115 906	16	76 480	7 355	16 371	33 705	12 016	11 536	576 707	4 209	10 056	13 539	27 804	604 511
Total	665 900	131 095	30 596	453 274	20	230 878	80 331	72 338	88 513	30 215	32 733	1 815 893	10 206	15 213	24 887	50 306	1 866 199
	SAWTIMBER																
	Board feet, International 1/4-inch rule																
State	16,831,196	3,360,612	693,595	7,180,192	-264,626	7,559,009	2,074,991	2,674,920	3,162,264	41,019	758,008	44,051,180	55,095	187,712	783,068	1,025,875	45,077,055
Forest industry	43,250,130	14,217,855	2,925,731	15,215,020	208,796	9,859,552	7,695,042	1,097,518	6,935,394	967,242	991,993	103,364,273	230,011	122,756	2,419	355,186	103,719,459
Private	27,685,663	9,218,411	617,181	10,630,814	1,521	14,789,371	2,214,872	1,281,102	6,916,226	2,525,741	3,318,558	79,199,460	2,938,872	2,777,323	60,088	5,776,283	84,975,743
Total	87,766,989	26,796,878	4,236,507	33,026,026	-54,309	32,207,932	11,984,905	5,053,540	17,013,884	3,534,002	5,048,559	226,614,915	3,223,978	3,087,791	845,575	7,157,344	233,772,257

Table 23.--*Annual mortality of growing stock and sawtimber on commercial timberland in northwestern Montana, by ownership class, and softwoods and hardwoods, 1977*

Species group and ownership class	Growing stock		Sawtimber
	- Cubic feet -	*- Cubic meters -*	*- Board feet*[1] *-*
Softwoods:			
State	2,491,296	70 546	9,367,030
Forest industry	7,319,740	207 272	23,315,807
Private	2,977,375	84 310	7,646,913
Total	12,788,411	362 128	40,329,750
Hardwoods:			
State	971	28	--
Forest industry	--	--	--
Private	166,574	4 717	--
Total	167,545	4 745	--

[1]International 1/4-inch rule.

Table 24.--*Annual mortality of growing stock and sawtimber on commercial timberland in northwestern Montana, by cause of death and species, 1977*

Cause of Death	Species													
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western redcedar	Total softwoods	Aspen	Total hardwoods	All species
	GROWING STOCK *Cubic feet*													
Insects	316,814	362,963	--	902,227	--	270,770	62,210	21,678	103,544	--	2,040,206	--	--	2,040,206
Disease	802,736	--	144,828	84,175	40,856	565,037	1,241,183	481,306	78,061	69,257	3,507,439	--	--	3,507,439
Fire	--	--	--	98,931	--	92,888	--	--	--	--	191,819	--	--	191,819
Animal	33,941	--	--	--	--	--	--	--	--	--	33,941	--	--	33,941
Weather	179,385	--	--	312,607	59,556	370,329	150,166	83,964	68,076	--	1,224,083	60,157	60,157	1,284,240
Suppression	--	--	--	277,916	--	--	--	--	--	--	277,916	--	--	277,916
Unknown	703,966	184,216	77,786	2,099,784	28,111	199,988	302,034	239,362	132,627	--	3,967,874	107,388	107,388	4,075,262
Logging	758,010	--	28,737	84,692	--	46,550	88,664	--	538,480	--	1,545,133	--	--	1,545,133
Total	2,794,852	547,179	251,351	3,860,332	128,523	1,545,562	1,844,257	826,310	920,788	69,257	12,788,411	167,545	167,545	12,955,956
	GROWING STOCK *Cubic meters*													
Insects	8 971	10 277	--	25 548	--	7 668	1 762	614	2 932	--	57 772	--	--	57 772
Disease	22 731	--	4 101	2 384	1 157	16 000	35 146	13 629	2 210	1 961	99 319	--	--	99 319
Fire	--	--	--	2 802	--	2 630	--	--	--	--	5 432	--	--	5 432
Animal	961	--	--	--	--	--	--	--	--	--	961	--	--	961
Weather	5 079	--	--	8 852	1 686	10 487	4 252	2 378	1 928	--	34 662	1 704	1 704	36 366
Suppression	--	--	--	7 870	--	--	--	--	--	--	7 870	--	--	7 870
Unknown	19 934	5 217	2 202	59 459	796	5 663	8 553	6 778	3 756	--	112 358	3 041	3 041	115 399
Logging	21 465	--	814	2 398	--	1 318	2 511	--	15 248	--	43 754	--	--	43 754
Total	79 141	15 494	7 117	109 313	3 639	43 766	52 224	23 399	26 074	1 961	362 128	4 745	4 745	366 873
	SAWTIMBER *Board feet, International 1/4-inch rule*													
Insects	1,271,578	1,402,733	--	2,259,268	--	1,317,683	--	--	562,431	--	6,813,693	--	--	6,813,693
Disease	2,799,117	--	253,408	--	227,172	3,421,008	5,991,957	2,039,393	423,167	348,482	15,503,704	--	--	15,503,704
Fire	--	--	--	--	--	556,187	--	--	--	--	556,187	--	--	556,187
Animal	194,204	--	--	--	--	--	--	--	--	--	194,204	--	--	194,204
Weather	612,867	--	--	974,253	265,121	1,941,522	557,869	440,784	379,130	--	5,171,546	--	--	5,171,546
Suppression	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Unknown	3,300,010	759,381	423,951	2,879,776	162,751	682,525	1,234,201	567,662	631,397	--	10,641,654	--	--	10,641,654
Logging	141,464	--	158,179	--	--	--	455,106	--	694,013	--	1,448,762	--	--	1,448,762
Total	8,319,240	2,162,114	835,538	6,113,297	655,044	7,918,925	8,239,133	3,047,839	2,690,138	348,482	40,329,750	--	--	40,329,750

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1982. Forest area and timber resource statistics for state and private lands in northwestern Montana, 1977. USDA For. Serv. Resour. Bull. INT-26, 29 p. Intermt. For. and Range Exp. Stn., Ogden, Utah 84401.

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

KEYWORDS: forest surveys (regional), forest area classification, stand volume

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

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**Intermountain
Forest and Range
Experiment Station
Ogden, UT 84401**

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Forest Area and Timber Resource Statistics for State and Private Lands in the Headwater Counties of Montana, 1978

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RESEARCH SUMMARY

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

ACKNOWLEDGMENTS

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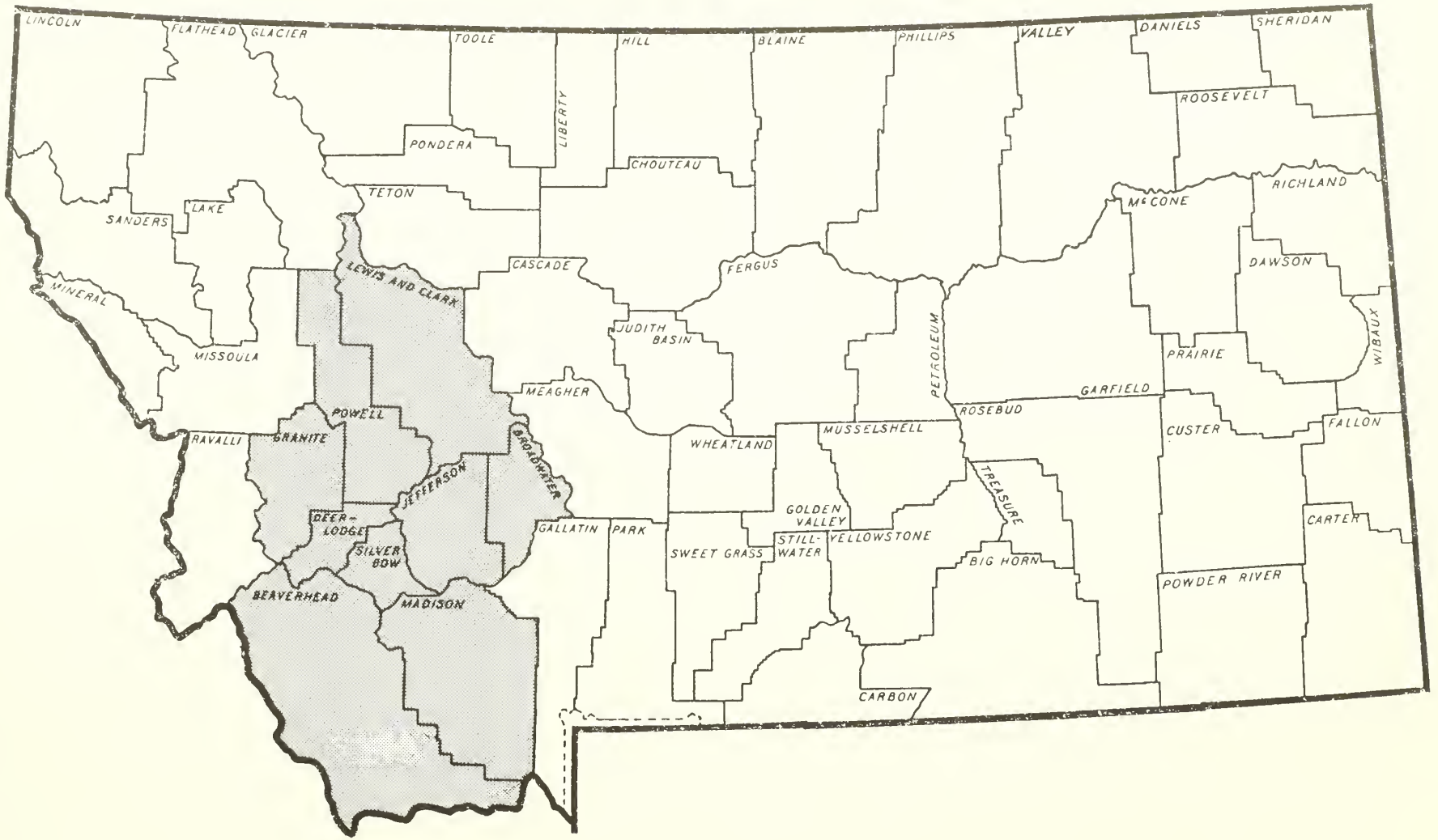
INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of State and private lands in the headwater counties of Montana, which include Beaverhead, Broadwater, Deer Lodge, Granite, Jefferson, Lewis and Clark, Madison, Powell, and Silver Bow (fig. 1). Data collection began in January 1978 and was completed in December 1978. This bulletin does not note changes and trends since the inventory of western Montana in 1958 and west-central Montana in 1966, nor does it contain estimates of timber removals. These items will be included in a State Analytical Report to be published in the near future.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forests and rangelands. Fundamental to the acomplishment of this objective are the periodic State-by-State resource inventories. Orginally, Resources Evaluation—formerly Forest Survey—was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, South Dakota (west of the 103d meridian), and Oklahoma and Texas (west of the 100th meridian) are administered by the Intermountain Forest and Range Experiment Station, with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

MONTANA


LINCOLN
FLATHEAD
GLACIER
TOOLE
LIBERTY
HILL
BLAINE
PHILLIPS
VALLEY
DANIELS
SHERIDAN
ROOSEVELT
PONDERA
CHOUTEAU
TETON
LAKE
SANDERS
McCONE
RICHLAND
CASCADE
FERGUS
DAWSON
LEWIS AND CLARK
MINERAL
JUDITH BASIN
PETROLEUM
WIBAUX
MISSOULA
PRAIRIE
MEAGHER
GARFIELD
POWELL
ROSEBUD
RAVALLI
GRANITE
BROADWATER
WHEATLAND
MUSSELSHELL
CUSTER
FALLON
JEFFERSON
TREASURE
GOLDEN VALLEY
DEER-LODGE
GALLATIN
PARK
STILL-WATER
YELLOWSTONE
CARTER
SILVER BOW
SWEET GRASS
BIG HORN
BEAVERHEAD
MADISON
POWDER RIVER
CARBON

HIGHLIGHTS

Area

- State and private lands account for 6,602 thousand acres (2 672 thousand hectares), 49 percent of the total land area in the headwater counties of Montana (fig. 2).
- Forests occupy 1,246 thousand acres (504 thousand hectares) including reserved land, 19 percent of the total State and private land area.
- Of the forest land, 1,180 thousand acres (478 thousand hectares), 95 percent, are classified as commercial timberland.
- Private ownership accounts for 1,018 thousand acres (412 thousand hectares), 86 percent of the commercial timberland.
- Douglas-fir, lodgepole pine, and ponderosa pine are the predominant forest types and occupy 84 percent of the commercial timberland.
- Almost 93 percent of the commercial timberland is in the 20 to 84 cubic feet per acre per year productivity class, and 86 percent of such land is privately owned.

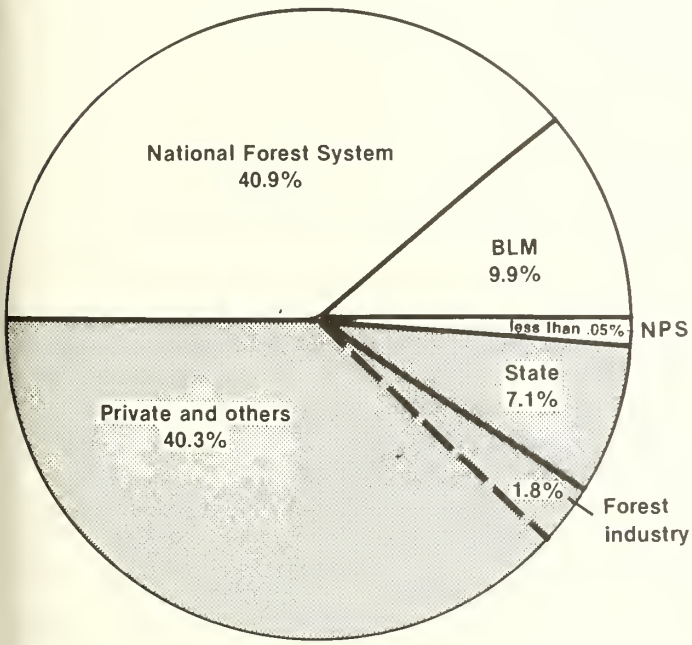


Figure 2.—Percent of total land area in the headwater counties of Montana, by ownership, 1978.

Inventory

- Growing stock volume amounts to 1,757 million cubic feet (50 million cubic meters), and sawtimber volume totals 5,686 million board feet.[1]
- Rough, rotten, and salvable dead trees comprise 135.5 million cubic feet (3.8 million cubic meters), 7 percent of the total sound wood volume.
- Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), lodgepole pine (*Pinus contorta* Dougl.), and ponderosa pine (*Pinus ponderosa* Laws.) account for 47 percent, 29 percent, and 9 percent, respectively, of the growing stock inventory. The remaining 15 percent is composed of 7 other species (table 16).
- Private owners control over 85 percent of the total growing stock and sawtimber volume.

Growth and Mortality

- Net annual growth totals 37,124 thousand cubic feet (1 051.2 thousand cubic meters).
- Of the total net growth, almost 85 percent is on private lands.
- The annual mortality of 5, 515 thousand cubic feet (156.2 thousand cubic meters) offsets 13 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and study-area levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 52,463 sample points systematically placed on the latest resource aerial photography available. The sample points were summarized and grouped into strata for subsequent field sampling. The photopoints, adjusted to meet known land areas, were used to compute area expansion factors for the field samples.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 1,331 ground sample locations. Sample trees were selected using a 10-point cluster that includes fixed plots (1/300 acre) for trees less than 5.0 inches diameter at breast height (d.b.h.) and variable plots (40 basal area factor) for trees 5.0 inches d.b.h. or larger.

3. For most species, volume and defect were computed using Kemp's equations.

4. All photo and field data were sent to Ogden, Utah, for processing. Final estimates were based on computer-generated statistical summaries of the data.

[1] International 1/4-inch rule.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for the headwater counties of Montana are displayed in tables 3 through 24.

TERMINOLOGY

Land

Bureau of the Census.—Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

Resources Evaluation.—The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet, and minimum size of lakes, etc., is 1 acre.

Water

Bureau of the Census.—Streams, sloughs, estuaries, and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Resources Evaluation.—The same as the Bureau of the Census except minimum width of streams, etc., is 120 feet, and minimum size of lakes, etc., is 1 acre.

Land Use Classes

Forest land.—Land at least 10.0 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Table 1.--Area of forest land in the headwater counties of Montana, with percent standard error, 1978

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	1,102,860	±1.9	77,140	±19.7	1,180,000	±1.8
Other forest land:						
Unproductive nonreserved	51,205	±20.6	14,119	±41.3	65,324	±18.2

Table 2.--Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland in the headwater counties of Montana, with percent standard error, 1978

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	1,662,066	±4.1	94,902	±31.7	1,756,968	±4.1
Sawtimber (M board feet[1])	5,370,399	±4.9	315,180	±39.1	5,685,579	±5.0
Net annual growth:						
Growing stock (M cubic feet)	35,108	±8.7	2,016	±28.0	37,124	±8.3
Sawtimber (M board feet[1])	116,142	±7.6	8,927	±29.8	125,069	±7.3
Annual mortality:						
Growing stock (M cubic feet)	5,297	±15.6	218	±58.2	5,515	±15.2
Sawtimber (M board feet[1])	15,779	±21.1	675	±89.8	16,454	±20.6

[1]International 1/4-inch rule.

Tables 1 and 2 do not include data for National Forest and Bureau of Land Management ownerships.

Commercial timberland.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.—Forest land incapable of producing 20 cubic feet per acre per year of industrial wood in natural stands because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.—Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.—Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.—Federal lands administered by the Bureau of Land Management.

Miscellaneous Federal lands.—Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian trust lands.

Indian trust lands.—Indian lands held in trust by the Federal Government, for Indian tribal groups or for individual allotments.

State lands.—Lands owned by States or lands leased to these governmental units for 50 years or more.

County and municipal lands.—Lands owned by counties and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

Private Ownership Classes

Forest industry lands.—Lands owned by companies or by individuals operating wood-processing plants.

Farmer-owned lands.—Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Other private lands.—Privately owned lands other than forest industry and farmer-owned lands.

Forest Type and Tree Species

Forest types.—A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.—Tree species presently or prospectively suitable for industrial wood products.

Softwoods.—Monocotyledonous trees, usually evergreen, having needles or scalelike leaves.

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

Area Condition Classes

Stocking.—Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range, which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent less than full-site occupancy. Overstocking is characterized by sites with 133 percent or more stocking.

Class 10.—Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.—Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.—Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.—Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

Class 60.—Areas poorly stocked with desirable trees, but with medium to full stocking of growing stock trees.

Class 70.—Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.—Low-risk old-growth stands.

Class 90.—High-risk old-growth stands.

Nonstocked.—Areas less than 16.7 percent stocked with growing stock trees.

Productivity

Productivity class.—A classification of forest land in terms of potential growth in cubic feet of fully stocked natural stands.

Stand-Size Classes

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

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

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

Nonstocked land.—Commercial timberland less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.—Growing stock trees (1) having no serious defect in quality to limit present or prospective use for timber products; (2) of relatively high vigor; and (3) containing no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.—Growing stock trees meeting specified standards of size and quality, but not qualifying as desirable trees.

Rough trees.—(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of roughness or poor form; and (2) all live trees of noncommercial species.

Rotten trees.—Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

Salvable dead trees.—Standing or down dead trees that are considered merchantable by Rocky Mountain regional standards.

Saw-log portion.—That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.—That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree-Size Classes

Seedlings.—Live trees less than 1.0 inch in d.b.h.

Saplings.—Trees 1.0 to 4.9 inches in d.b.h.

Poletimber trees.—Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.—Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h for softwood sawtimber is 9.0 inches and for hardwoods 11.0 inches.

Volume

Cull volume.—Portions of a tree's volume that are not usable for industrial wood products because of rot, form, or other defect.

Net volume.—Gross volume less deductions for cull.

Growing stock volume.—Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.—Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.—The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.—Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Table 3.--Total land and water area in the headwater counties of Montana, by ownership class, 1978

Ownership class	Area	
	Acres	*Hectares*
National Forest	5,477,126	2 216 523
Bureau of Land Management	1,321,821	534 924
National Park Service[1]	2,184	884
Forest industry	243,141	98 396
State	947,320	383 368
Private and other	5,411,123	2 189 813
Total land area	13,402,715	5 423 908
Census water	100,109	40 513
Gross area[2]	13,502,824	5 464 421

[1]Not included with miscellaneous Federal ownership (a category of private and other) for purposes of clarity.

[2]U.S. Bureau of the Census, land and water area of the United States, 1980.

Table 4.--Total land area in the headwater counties of Montana, by major land class and ownership class, 1978

Land class	Ownership class						Total	
	State		Forest industry		Private[1]			
	Acres	*Hectares*	*Acres*	*Hectares*	*Acres*	*Hectares*	*Acres*	*Hectares*
Commercial timberland	162,220	65 648	186,917	75 643	830,863	336 240	1,180,000	477 531
Productive reserved	0	0	427	173	0	0	427	173
Other forest land:								
Unproductive reserved	0	0	0	0	89	36	89	36
Unproductive nonreserved	8,919	3 610	2,906	1 176	53,499	21 650	65,324	26 436
Total forest land	171,139	69 258	190,250	76 992	884,451	357 926	1,245,840	504 176
Nonforest land	776,181	314 110	52,891	21 404	4,526,672	1 831 887	5,355,744	2 167 401
Total land area	947,320	383 368	243,141	98 396	5,411,123	2 189 813	6,601,584	2 671 577

[1]On this and all following tables, the private ownership category includes a small portion of miscellaneous Federal, and county and municipal ownership.

Table 5.--Area of commercial timberland in the headwater counties of Montana, by forest type, stand-size class, and productivity class, 1978

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
				Acres		
Douglas-fir:						
Sawtimber	--	3,523	28,379	255,783	151,909	439,594
Poletimber	--	3,474	--	40,725	71,847	116,046
Sapling and seedling	--	--	--	33,749	58,360	92,109
Nonstocked	--	--	--	--	7,438	7,438
Total	--	6,997	28,379	330,257	289,554	655,187
Ponderosa pine:						
Sawtimber	--	--	7,806	26,033	64,569	98,408
Poletimber	--	--	--	--	18,479	18,479
Sapling and seedling	--	--	--	3,564	13,406	16,970
Nonstocked	--	--	1,001	--	4,607	5,608
Total	--	--	8,807	29,597	101,061	139,465
Lodgepole pine:						
Sawtimber	--	--	2,725	46,684	24,973	74,382
Poletimber	--	911	7,568	50,940	25,763	85,182
Sapling and seedling	--	434	2,422	14,558	12,521	29,935
Nonstocked	--	--	--	3,481	--	3,481
Total	--	1,345	12,715	115,663	63,257	192,980
Western larch:						
Sawtimber	--	--	--	1,249	--	1,249
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	1,249	--	1,249
Whitebark-limber pine						
Sawtimber	--	--	--	2,581	17,636	20,217
Poletimber	--	--	--	--	4,650	4,650
Sapling and seedling	--	--	3,526	--	7,463	10,989
Nonstocked	--	--	--	--	--	--
Total	--	--	3,526	2,581	29,749	35,856
Subalpine fir-spruce:						
Sawtimber	--	--	3,650	27,220	--	30,870
Poletimber	--	--	--	7,124	2,607	9,731
Sapling and seedling	--	--	--	7,006	4,900	11,906
Nonstocked	--	--	3,632	--	--	3,632
Total	--	--	7,282	41,350	7,507	56,139
Spruce:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	3,649	3,649
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	3,649	3,649

(con.)

Table 5 (con.)

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
Juniper:[1]						
Sawtimber	--	--	1,813	2,083	8,305	12,201
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	6,134	6,134
Total	--	--	1,813	2,083	14,439	18,335
Aspen:						
Sawtimber	--	--	7,183	4,638	--	11,821
Poletimber	--	--	5,952	4,687	5,679	16,318
Sapling and seedling	--	--	--	--	9,659	9,659
Nonstocked	--	--	--	3,660	3,776	7,436
Total	--	--	13,135	12,985	19,114	45,234
Cottonwood:						
Sawtimber	--	--	--	11,547	16,177	27,724
Poletimber	--	--	--	--	3,266	3,266
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	916	916
Total	--	--	--	11,547	20,359	31,906
All types:						
Sawtimber	--	3,523	51,556	377,818	283,569	716,466
Poletimber	--	4,385	13,520	103,476	132,291	253,672
Sapling and seedling	--	434	5,948	58,877	109,958	175,217
Nonstocked	--	--	4,633	7,141	22,871	34,645
Total	--	8,342	75,657	547,312	548,689	1,180,000

[1]On this and all following tables, the area occupied by juniper forest type classified as commercial is so classified because the site index for other associated species in these stands (usually ponderosa pine or Douglas-fir) was high enough to indicate a site potential productivity exceeding 20 cubic feet per acre per year mean annual increment, and nonstockable indicators were not present in sufficient quantities to lower the yield capability below 20 cubic feet per acre per year.

Although juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

Table 6.--Area of State-owned commercial timberland in the headwater counties of Montana, by forest type, stand-size class, and productivity class, 1978

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
	Acres					
Douglas-fir:						
Sawtimber	--	--	3,673	30,106	21,424	55,203
Poletimber	--	988	--	5,230	11,719	17,937
Sapling and seedling	--	--	--	4,288	7,412	11,700
Nonstocked	--	--	--	--	667	667
Total	--	988	3,673	39,624	41,222	85,507
Ponderosa pine:						
Sawtimber	--	--	1,297	4,753	7,939	13,989
Poletimber	--	--	--	--	2,380	2,380
Sapling and seedling	--	--	--	216	1,729	1,945
Nonstocked	--	--	124	--	414	538
Total	--	--	1,421	4,969	12,462	18,852
Lodgepole pine:						
Sawtimber	--	--	1,132	8,603	4,479	14,214
Poletimber	--	911	564	8,997	3,407	13,879
Sapling and seedling	--	434	36	2,699	1,278	4,447
Nonstocked	--	--	--	498	--	498
Total	--	1,345	1,732	20,797	9,164	33,038
Western larch:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Whitebark-limber pine:						
Sawtimber	--	--	--	475	3,378	3,853
Poletimber	--	--	--	--	714	714
Sapling and seedling	--	--	414	--	1,094	1,508
Nonstocked	--	--	--	--	--	--
Total	--	--	414	475	5,186	6,075
Subalpine fir-spruce:						
Sawtimber	--	--	590	3,878	--	4,468
Poletimber	--	--	--	1,579	388	1,967
Sapling and seedling	--	--	--	95	1,001	1,096
Nonstocked	--	--	94	--	--	94
Total	--	--	684	5,552	1,389	7,625
Spruce:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	590	590
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	590	590

(con.)

Table 6 (con.)

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
Juniper:						
Sawtimber	--	--	221	370	1,054	1,645
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	802	802
Total	--	--	221	370	1,856	2,447
Aspen:						
Sawtimber	--	--	320	564	--	884
Poletimber	--	--	621	519	916	2,056
Sapling and seedling	--	--	--	--	254	254
Nonstocked	--	--	--	591	450	1,041
Total	--	--	941	1,674	1,620	4,235
Cottonwood:						
Sawtimber	--	--	--	1,639	1,917	3,556
Poletimber	--	--	--	--	236	236
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	59	59
Total	--	--	--	1,639	2,212	3,851
All types:						
Sawtimber	--	--	7,233	50,388	40,191	97,812
Poletimber	--	1,899	1,185	16,325	19,760	39,169
Sapling and seedling	--	434	450	7,298	13,358	21,540
Nonstocked	--	--	218	1,089	2,392	3,699
Total	--	2,333	9,086	75,100	75,701	162,220

Table 7.--Area of industry-owned commercial timberland in the headwater counties of Montana, by forest type, stand-size class, and productivity class, 1978

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
	Acres					
Douglas-fir:						
Sawtimber	--	3,523	8,699	64,152	12,405	88,779
Poletimber	--	377	--	5,335	6,327	12,039
Sapling and seedling	--	--	--	8,094	4,112	12,206
Nonstocked	--	--	--	--	88	88
Total	--	3,900	8,699	77,581	22,932	113,112
Ponderosa pine:						
Sawtimber	--	--	2,633	569	4,118	7,320
Poletimber	--	--	--	--	195	195
Sapling and seedling	--	--	--	181	183	364
Nonstocked	--	--	181	--	1,090	1,271
Total	--	--	2,814	750	5,586	9,150
Lodgepole pine:						
Sawtimber	--	--	101	14,859	5,728	20,688
Poletimber	--	--	1,080	12,626	1,909	15,615
Sapling and seedling	--	--	--	1,652	981	2,633
Nonstocked	--	--	--	36	--	36
Total	--	--	1,181	29,173	8,618	38,972
Western larch:						
Sawtimber	--	--	--	1,249	--	1,249
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	1,249	--	1,249
Whitebark-limber pine:						
Sawtimber	--	--	--	535	3,076	3,611
Poletimber	--	--	--	--	1,057	1,057
Sapling and seedling	--	--	10	--	641	651
Nonstocked	--	--	--	--	--	--
Total	--	--	10	535	4,774	5,319
Subalpine fir-spruce:						
Sawtimber	--	--	876	6,357	--	7,233
Poletimber	--	--	--	1,253	421	1,674
Sapling and seedling	--	--	--	3,373	642	4,015
Nonstocked	--	--	--	--	--	--
Total	--	--	876	10,983	1,063	12,922
Spruce:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	876	876
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	876	876

(con.)

Table 7 (con.)

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
Juniper:						
Sawtimber	--	--	101	60	147	308
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	431	431
Total	--	--	101	60	578	739
Aspen:						
Sawtimber	--	--	--	197	--	197
Poletimber	--	--	107	27	--	134
Sapling and seedling	--	--	--	--	2,435	2,435
Nonstocked	--	--	--	88	48	136
Total	--	--	107	312	2,483	2,902
Cottonwood:						
Sawtimber	--	--	--	1,514	162	1,676
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	1,514	162	1,676
All types:						
Sawtimber	--	3,523	12,410	89,492	25,636	131,061
Poletimber	--	377	1,187	19,241	9,909	30,714
Sapling and seedling	--	--	10	13,300	9,870	23,180
Nonstocked	--	--	181	124	1,657	1,962
Total	--	3,900	13,788	122,157	47,072	186,917

Table 8.--Area of privately owned commercial timberland in the headwater counties of Montana, by forest type, stand-size class, and productivity class, 1978

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
				Acres		
Douglas-fir:						
Sawtimber	--	--	16,007	161,525	118,080	295,612
Poletimber	--	2,109	--	30,160	53,801	86,070
Sapling and seedling	--	--	--	21,367	46,836	68,203
Nonstocked	--	--	--	--	6,683	6,683
Total	--	2,109	16,007	213,052	225,400	456,568
Ponderosa pine:						
Sawtimber	--	--	3,876	20,711	52,512	77,099
Poletimber	--	--	--	--	15,904	15,904
Sapling and seedling	--	--	--	3,167	11,494	14,661
Nonstocked	--	--	696	--	3,103	3,799
Total	--	--	4,572	23,878	83,013	111,463
Lodgepole pine:						
Sawtimber	--	--	1,492	23,222	14,766	39,480
Poletimber	--	--	5,924	29,317	20,447	55,688
Sapling and seedling	--	--	2,386	10,207	10,262	22,855
Nonstocked	--	--	--	2,947	--	2,947
Total	--	--	9,802	65,693	45,475	120,970
Western larch:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Whitebark-limber pine:						
Sawtimber	--	--	--	1,571	11,182	12,753
Poletimber	--	--	--	--	2,879	2,879
Sapling and seedling	--	--	3,102	--	5,728	8,830
Nonstocked	--	--	--	--	--	--
Total	--	--	3,102	1,571	19,789	24,462
Subalpine fir-spruce:						
Sawtimber	--	--	2,184	16,985	--	19,169
Poletimber	--	--	--	4,292	1,798	6,090
Sapling and seedling	--	--	--	3,538	3,257	6,795
Nonstocked	--	--	3,538	--	--	3,538
Total	--	--	5,722	24,815	5,055	35,592
Spruce:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	2,183	2,183
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	2,183	2,183

(con.)

Table 8 (con.)

Forest type and stand-size class	Productivity class					Total acres
	165+	120-164	85-119	50-84	20-49	
Juniper:						
Sawtimber	--	--	1,491	1,653	7,104	10,248
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	4,901	4,901
Total	--	--	1,491	1,653	12,005	15,149
Aspen:						
Sawtimber	--	--	6,863	3,877	--	10,740
Poletimber	--	--	5,224	4,141	4,763	14,128
Sapling and seedling	--	--	--	--	6,970	6,970
Nonstocked	--	--	--	2,981	3,278	6,259
Total	--	--	12,087	10,999	15,011	38,097
Cottonwood:						
Sawtimber	--	--	--	8,394	14,098	22,492
Poletimber	--	--	--	--	3,030	3,030
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	857	857
Total	--	--	--	8,394	17,985	26,379
All types:						
Sawtimber	--	--	31,913	237,938	217,742	487,593
Poletimber	--	2,109	11,148	67,910	102,622	183,789
Sapling and seedling	--	--	5,488	38,279	86,730	130,497
Nonstocked	--	--	4,234	5,928	18,822	28,984
Total	--	2,109	52,783	350,055	425,916	830,863

Table 9.--Area of commercial timberland in the headwater counties of Montana, by stand volume and ownership class, 1978

Stand volume per acre[1]	Ownership class			
	State	Forest industry	Private	All owners
	Acres			
Less than 1,500 board feet	43,666	26,836	251,590	322,092
1,500 to 4,999 board feet	56,437	53,567	310,623	420,627
5,000 to 9,999 board feet	38,678	64,787	174,256	277,721
10,000 board feet or more	23,439	41,727	94,394	159,560
All classes	162,220	186,917	830,863	1,180,000

[1]International 1/4-inch rule.

Table 10.--Area of commercial timberland in the headwater counties of Montana, by forest type and area condition class, 1978

Forest type	Area condition class									Nonstocked	All Classes	
	10	20	30	40	50	60	70	80	90			
	Acres											*Hectares*
Douglas-fir	1,249	--	26,676	64,172	43,591	187,740	134,554	67,688	122,079	7,438	655,187	265 146
Ponderosa pine	--	--	733	15,655	8,544	34,131	42,781	3,438	28,575	5,608	139,465	56 440
Lodgepole pine	3,632	19,708	2,422	35,599	44,581	13,316	3,649	7,768	58,824	3,481	192,980	78 096
Western larch	--	--	--	--	--	--	--	1,249	--	--	1,249	505
Whitebark-limber pine	--	--	--	1,648	2,320	7,175	5,143	--	19,570	--	35,856	14 511
Subalpine fir-spruce	--	2,319	--	6,055	3,650	7,281	3,374	7,298	22,530	3,632	56,139	22 719
Spruce	--	--	--	--	--	3,649	--	--	--	--	3,649	1 477
Juniper	--	--	--	--	--	1,813	10,388	--	--	6,134	18,335	7 420
Aspen	--	--	--	--	14,928	9,059	13,811	--	--	7,436	45,234	18 305
Cottonwood	--	--	--	--	6,165	1,832	22,993	--	--	916	31,906	12 912
All types	4,881	22,027	29,831	123,129	123,779	265,996	236,693	87,441	251,578	34,645	1,180,000	477 531

Table 11.--Area of productive reserved and other forest land in the headwater counties of Montana, by land class, ownership class, and forest type, 1978

Land Class	Forest type											All types	
	Douglas-fir	Ponderosa pine	Lodgepole pine	Whitebark-limber pine	Subalpine fir-spruce	Juniper	Total softwoods	Aspen	Cottonwood	Mixed hardwoods	Total hardwoods		
	Acres												*Hectares*
Productive reserved area:													
State	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest industry	214	--	213	--	--	--	427	--	--	--	--	427	173
Private	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	214	0	213	0	0	0	427	0	0	0	0	427	173
Other forest land area:													
Unproductive reserved:													
State	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest industry	0	0	0	0	0	0	0	0	0	0	0	0	0
Private	--	--	--	--	89	--	89	--	--	--	--	89	36
Total	0	0	0	0	89	0	89	0	0	0	0	89	36
Unproductive nonreserved:													
State	880	1,213	885	1,513	434	2,469	7,394	633	178	714	1,525	8,919	3 610
Forest industry	32	305	458	1,395	105	467	2,762	37	--	107	144	2,906	1 176
Private	6,360	6,625	4,746	6,986	1,109	15,222	41,048	7,319	2,569	2,563	12,451	53,499	21 650
Total	7,272	8,143	6,089	9,894	1,648	18,158	51,204	7,989	2,747	3,384	14,120	65,324	26 436
Total all areas:													
State	880	1,213	885	1,513	434	2,469	7,394	633	178	714	1,525	8,919	3 610
Forest industry	246	305	671	1,395	105	467	3,189	37	--	107	144	3,333	1 349
Private	6,360	6,625	4,746	6,986	1,198	15,222	41,137	7,319	2,569	2,563	12,451	53,588	21 686
Total acres	7,486	8,143	6,302	9,894	1,737	18,158	51,720	7,989	2,747	3,384	14,120	65,840	--
Total hectares	3 030	3 296	2 550	4 004	703	7 348	20 931	3 233	1 112	1 369	5 714	--	26 645

Table 12.--Number of growing stock trees on commercial timberland in the headwater counties of Montana, by species and diameter class, 1978

Species	Diameter class (inches at breast height)															All classes
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand trees															
Douglas-fir	68,872	48,275	35,370	22,327	14,674	9,475	4,530	2,827	1,787	914	578	350	172	122	166	210,439
Ponderosa pine	7,494	8,009	5,730	3,918	2,651	1,735	1,098	713	401	276	148	65	30	18	31	32,317
Lodgepole pine	85,629	51,792	30,030	16,245	6,882	2,974	1,155	513	174	53	14	5	3	--	2	195,471
Whitebark-limber pine	3,353	3,266	2,387	1,717	1,437	466	225	151	59	73	30	9	8	--	4	13,185
Western larch	306	369	448	114	174	57	34	19	13	20	6	8	4	4	1	1,577
Subalpine fir	32,864	11,991	4,779	2,106	1,053	575	136	95	25	28	6	5	--	--	--	53,663
Spruce	4,199	1,592	1,625	426	586	280	291	167	106	72	43	11	17	8	7	9,430
Total softwoods	202,717	125,294	80,369	46,853	27,457	15,562	7,469	4,485	2,565	1,436	825	453	234	152	211	516,082
Aspen	6,666	2,223	1,536	1,068	1,256	644	215	35	16	18	3	--	1	1	--	13,682
Cottonwood	741	616	81	463	223	358	245	121	173	124	125	65	37	34	34	3,440
Other hardwoods	--	--	--	48	--	13	--	--	--	--	--	--	--	--	--	61
Total hardwoods	7,407	2,839	1,617	1,579	1,479	1,015	460	156	189	142	128	65	38	35	34	17,183
All species	210,124	128,133	81,986	48,432	28,936	16,577	7,929	4,641	2,754	1,578	953	518	272	187	245	533,265

Table 13.--Number of cull and salvable dead trees on commercial timberland in the headwater counties of Montana, by ownership class, and softwoods and hardwoods, 1978

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
State:				
Softwoods	923	72	995	3,116
Hardwoods	5	16	21	245
Total	928	88	1,016	3,361
Forest industry:				
Softwoods	512	198	710	3,880
Hardwoods	([1])	2	2	23
Total	512	200	712	3,903
Private:				
Softwoods	4,302	556	4,858	12,540
Hardwoods	52	160	212	1,163
Total	4,354	716	5,070	13,703
All owners:				
Softwoods	5,737	826	6,563	19,536
Hardwoods	57	178	235	1,431
Total	5,794	1,004	6,798	20,967

[1]Less than 0.5 thousand trees.

Table 14.--Net volume of growing stock on commercial timberland in the headwater counties of Montana, by ownership class, forest type, and stand-size class, 1978

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					*Thousand cubic meter*
State:							
	Douglas-fir	97,492	23,444	4,184	10	125,130	3 543
	Ponderosa pine	15,988	2,079	515	101	18,683	529
	Lodgepole pine	39,831	38,344	2,293	--	80,468	2 279
	Western larch	--	--	--	--	--	--
	Whitebark-limber pine	7,349	477	377	--	8,203	232
	Subalpine fir-spruce	13,194	3,019	597	54	16,864	478
	Spruce	--	--	160	--	160	4
	Juniper	1,318	--	--	46	1,364	39
	Aspen	1,539	2,571	15	31	4,156	118
	Cottonwood	5,909	183	--	3	6,095	172
	All types	182,620	70,117	8,141	245	261,123	7 394
Forest industry:							
	Douglas-fir	172,365	21,286	5,699	--	199,350	5 645
	Ponderosa pine	6,238	210	105	78	6,631	188
	Lodgepole pine	58,321	44,865	536	--	103,722	2 937
	Western larch	2,278	--	--	--	2,278	65
	Whitebark-limber pine	7,430	702	110	--	8,242	233
	Subalpine fir-spruce	19,891	2,324	1,527	--	23,742	672
	Spruce	--	--	237	--	237	7
	Juniper	402	--	--	1	403	11
	Aspen	45	120	854	3	1,022	29
	Cottonwood	1,221	--	--	--	1,221	35
	All types	268,191	69,507	9,068	82	346,848	9 822
Private:							
	Douglas-fir	475,098	109,804	18,193	450	603,545	17 091
	Ponderosa pine	79,266	13,151	4,497	656	97,570	2 763
	Lodgepole pine	95,212	149,089	10,000	--	254,301	7 201
	Western larch	--	--	--	--	--	--
	Whitebark-limber pine	23,419	2,229	1,951	--	27,599	782
	Subalpine fir-spruce	58,566	9,104	3,745	2,017	73,432	2 079
	Spruce	--	--	592	--	592	17
	Juniper	7,831	--	--	342	8,173	231
	Aspen	23,314	22,528	314	226	46,382	1 313
	Cottonwood	35,006	2,345	--	52	37,403	1 059
	All types	797,712	308,250	39,292	3,743	1,148,997	32 536
All owners:							
	Douglas-fir	744,955	154,534	28,076	460	928,025	26 279
	Ponderosa pine	101,492	15,440	5,117	835	122,884	3 480
	Lodgepole pine	193,364	232,298	12,829	--	438,491	12 417
	Western larch	2,278	--	--	--	2,278	65
	Whitebark-limber pine	38,198	3,408	2,438	--	44,044	1 247
	Subalpine fir-spruce	91,651	14,447	5,869	2,071	114,038	3 229
	Spruce	--	--	989	--	989	28
	Juniper	9,551	--	--	389	9,940	281
	Aspen	24,898	25,219	1,183	260	51,560	1 460
	Cottonwood	42,136	2,528	--	55	44,719	1 266
	All types	1,248,523	447,874	56,501	4,070	1,756,968	49 752

Table 15.--Net volume of sawtimber on commercial timberland in the headwater counties of Montana, by ownership class, forest type, and stand-size class, 1978

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
State:						
	Douglas-fir	396,135	36,744	15,643	22	448,544
	Ponderosa pine	63,539	2,124	1,548	558	67,769
	Lodgepole pine	138,291	55,808	1,292	--	195,391
	Western larch	--	--	--	--	--
	Whitebark-limber pine	26,444	733	119	--	27,296
	Subalpine fir-spruce	49,448	5,071	1,721	290	56,530
	Spruce	--	--	--	--	--
	Juniper	5,040	--	--	248	5,288
	Aspen	5,663	3,940	76	162	9,841
	Cottonwood	25,186	513	--	17	25,716
	All types	709,746	104,933	20,399	1,297	836,375
Forest industry:						
	Douglas-fir	738,864	40,156	25,079	--	804,099
	Ponderosa pine	29,512	210	433	468	30,623
	Lodgepole pine	186,779	46,769	616	--	234,164
	Western larch	12,048	--	--	--	12,048
	Whitebark-limber pine	27,275	1,072	99	--	28,446
	Subalpine fir-spruce	74,607	4,275	6,161	--	85,043
	Spruce	--	--	--	--	--
	Juniper	1,584	--	--	5	1,589
	Aspen	158	253	4,372	17	4,800
	Cottonwood	4,308	--	--	--	4,308
	All types	1,075,135	92,735	36,760	490	1,205,120
Private:						
	Douglas-fir	1,862,114	167,330	55,334	1,086	2,085,864
	Ponderosa pine	315,842	13,816	12,491	3,584	345,733
	Lodgepole pine	338,734	194,969	8,091	--	541,794
	Western larch	--	--	--	--	--
	Whitebark-limber pine	85,212	3,903	1,132	--	90,247
	Subalpine fir-spruce	216,906	15,981	10,172	10,885	253,944
	Spruce	--	--	--	--	--
	Juniper	30,718	--	--	1,856	32,574
	Aspen	86,197	45,730	1,632	1,180	134,739
	Cottonwood	152,344	6,598	--	247	159,189
	All types	3,088,067	448,327	88,852	18,838	3,644,084
All owners:						
	Douglas-fir	2,997,113	244,230	96,056	1,108	3,338,507
	Ponderosa pine	408,893	16,150	14,472	4,610	444,125
	Lodgepole pine	663,804	297,546	9,999	--	971,349
	Western larch	12,048	--	--	--	12,048
	Whitebark-limber pine	138,931	5,708	1,350	--	145,989
	Subalpine fir-spruce	340,961	25,327	18,054	11,175	395,517
	Spruce	--	--	--	--	--
	Juniper	37,342	--	--	2,109	39,451
	Aspen	92,018	49,923	6,080	1,359	149,380
	Cottonwood	181,838	7,111	--	264	189,213
	All types	4,872,948	645,995	146,011	20,625	5,685,579

[1]International 1/4-inch rule.

Table 16.--Net volume of growing stock on commercial timberland in the headwater counties of Montana, by species and diameter class, 1978

Species	Diameter class (inches at breast height)													All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand cubic feet													
Douglas-fir	92,051	113,033	127,905	128,748	90,422	75,999	61,938	39,391	29,644	22,221	13,415	10,899	20,657	826,323
Ponderosa pine	9,003	14,677	20,016	21,154	20,324	19,099	14,032	13,425	9,283	3,942	2,599	2,200	5,356	155,110
Lodgepole pine	139,239	138,379	97,396	61,619	33,818	19,652	8,116	2,929	986	316	178	--	319	502,947
Whitebark-limber pine	7,900	10,216	13,671	6,387	4,043	3,970	1,823	2,676	1,397	439	499	--	346	53,367
Western larch	1,454	871	2,094	962	962	584	787	1,149	528	697	449	419	135	11,091
Subalpine fir	17,845	13,807	10,707	9,543	3,308	2,812	1,079	1,337	305	335	--	--	--	61,078
Spruce	4,600	2,941	7,092	5,278	7,764	6,174	5,372	4,762	2,878	928	1,713	1,079	1,569	52,150
Total softwoods	272,092	293,924	278,881	233,691	160,641	128,290	93,147	65,669	45,021	28,878	18,853	14,597	28,382	1,662,066
Aspen	4,167	6,690	14,975	11,705	5,405	915	639	844	126	--	63	75	--	45,604
Cottonwood	160	1,993	2,105	5,081	5,237	3,013	6,383	5,708	6,444	3,705	2,300	2,845	3,875	48,849
Other hardwoods	--	270	--	179	--	--	--	--	--	--	--	--	--	449
Total hardwoods	4,327	8,953	17,080	16,965	10,642	3,928	7,022	6,552	6,570	3,705	2,363	2,920	3,875	94,902
All species	276,419	302,877	295,961	250,656	171,283	132,218	100,169	72,221	51,591	32,583	21,216	17,517	32,257	1,756,968

Table 17.--Net volume of sawtimber on commerical timberland in the headwater counties of Montana, by species and diameter class, 1978

Species	Diameter class (inches at breast height)											All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	442,985	599,014	460,710	404,481	338,194	218,575	166,026	125,475	76,167	62,150	119,436	3,013,213
Ponderosa pine	53,014	84,930	99,404	100,983	77,598	75,998	52,749	22,957	15,366	12,345	32,803	628,147
Lodgepole pine	400,694	357,199	194,169	110,197	44,578	15,906	5,394	1,743	993	--	1,799	1,132,672
Whitebark-limber pine	53,931	36,576	22,960	22,076	9,864	14,371	7,581	2,398	2,773	--	1,940	174,470
Western larch	9,550	5,687	5,752	3,480	4,713	6,862	3,161	4,275	2,815	2,619	839	49,753
Subalpine fir	40,310	49,658	17,515	14,730	5,638	6,956	1,589	1,863	--	--	--	138,259
Spruce	31,175	28,770	41,994	33,056	28,373	25,018	15,123	4,938	9,516	6,296	9,626	233,885
Total softwoods	1,031,659	1,161,834	842,504	689,003	508,958	363,686	251,623	163,649	107,630	83,410	166,443	5,370,399
Aspen	XXXXXXXXX	61,205	28,056	4,625	3,171	4,116	595	--	295	353	--	102,416
Cottonwood	XXXXXXXXX	25,926	26,553	14,825	30,730	26,655	29,388	16,693	10,294	12,920	17,863	211,847
Other hardwoods	XXXXXXXXX	917	--	--	--	--	--	--	--	--	--	917
Total hardwoods	XXXXXXXXX	88,048	54,609	19,450	33,901	30,771	29,983	16,693	10,589	13,273	17,863	315,180
	1,031,659	1,249,882	897,113	708,453	542,859	394,457	281,606	180,342	118,219	96,683	184,306	5,685,579

Ownership class	Species												
	Douglas-fir	Ponderosa pine	Lodgepole pine	Whitebark-limber pine	Western larch	Subalpine fir	Spruce	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	All species
	GROWING STOCK												
	Thousand cubic feet												
State	111,807	21,230	87,629	9,761	1,181	10,493	8,124	250,225	4,084	6,712	102	10,898	261,123
Forest industry	182,795	19,449	103,632	9,924	8,917	13,453	7,276	345,446	464	917	21	1,402	346,848
Private	531,721	114,431	311,686	33,682	993	37,132	36,750	1,066,395	41,056	41,220	326	82,602	1,148,997
Total	826,323	155,110	502,947	53,367	11,091	61,078	52,150	1,662,066	45,604	48,849	449	94,902	1,756,968
	GROWING STOCK												
	Thousand cubic meters												
State	3 166	601	2 481	277	34	297	230	7 086	115	190	3	308	7 394
Forest industry	5 176	551	2 935	281	252	381	206	9 782	13	26	1	40	9 822
Private	15 057	3 240	8 826	953	28	1 052	1 041	30 197	1 163	1 167	9	2 339	32 536
Total	23 399	4 392	14 242	1 511	314	1 730	1 477	47 065	1 291	1 383	13	2 687	49 752
	SAWTIMBER												
	Thousand board feet, International 1/4-inch rule												
State	402,304	83,679	217,589	32,724	6,697	22,993	33,795	799,781	7,449	28,937	208	36,594	836,375
Forest industry	749,144	97,566	216,694	33,182	38,381	33,154	32,813	1,200,934	581	3,563	42	4,186	1,205,120
Private	1,861,765	446,902	698,389	108,564	4,675	82,112	167,277	3,369,684	94,386	179,347	667	274,400	3,644,084
Total	3,013,213	628,147	1,132,672	174,470	49,753	138,259	233,885	5,370,399	102,416	211,847	917	315,180	5,685,579

Table 19.--Net volume of timber on commercial timberland in the headwater counties of Montana, by class of timber, and softwoods and hardwoods, 1978

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw-log portion	967,232	50,190	1,017,422
Upper-stem portion	128,818	14,352	143,170
Total	1,096,050	64,542	1,160,592
Poletimber trees	566,016	30,360	596,376
All growing stock trees	1,662,066	94,902	1,756,968
Sound cull trees	15,489	258	15,747
Rotten cull trees	3,321	484	3,805
Salvable dead trees	109,677	6,223	115,900
All timber	1,790,553	101,867	1,892,420

Table 20.--Net volume of growing stock on commercial timberland in the headwater counties of Montana, by forest type and species, 1978

Forest type	Species												All species	
	Douglas-fir	Ponderosa pine	Lodgepole pine	Whitebark-limber pine	Western larch	Subalpine fir	Spruce	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods		
	Thousand cubic feet													*Thousand cubic meters*
Douglas-fir	759,543	45,459	97,338	5,462	6,628	1,675	7,933	924,038	2,368	1,619	--	3,987	928,025	26 279
Ponderosa pine	15,013	103,455	3,698	189	--	--	--	122,355	--	529	--	529	122,884	3 480
Lodgepole pine	37,447	1,770	375,003	1,263	1,367	12,170	6,569	435,589	2,449	453	--	2,902	438,491	12 417
Western larch	356	151	--	--	1,771	--	--	2,278	--	--	--	--	2,278	65
Whitebark-limber pine	2,728	--	1,222	33,054	--	2,751	4,289	44,044	--	--	--	--	44,044	1 247
Subalpine fir-spruce	5,357	--	17,805	13,301	1,249	44,482	31,451	113,645	393	--	--	393	114,038	3 229
Spruce	409	--	--	--	--	--	580	989	--	--	--	--	989	28
Juniper	3,289	597	3,633	98	--	--	1,178	8,795	579	566	--	1,145	9,940	281
Aspen	1,843	3,678	4,248	--	--	--	150	9,919	39,100	2,541	--	41,641	51,560	1 460
Cottonwood	338	--	--	--	76	--	--	414	715	43,141	449	44,305	44,719	1 266
All types	826,323	155,110	502,947	53,367	11,091	61,078	52,150	1,662,066	45,604	48,849	449	94,902	1,756,968	--
	Thousand cubic meters													
All types	23 399	4 392	14 242	1 511	314	1 730	1 477	47 065	1 291	1 383	13	2 687	--	49 752

Table 21.--Net volume of sawtimber on commercial timberland in the headwater counties of Montana, by forest type and species, 1978

Forest type	Species												All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Whitebark-limber pine	Western larch	Subalpine fir	Spruce	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	Thousand board feet, International 1/4-inch rule												
Douglas-fir	2,802,179	203,706	243,584	17,621	24,996	3,915	34,834	3,330,835	--	7,672	--	7,672	3,338,507
Ponderosa pine	32,014	388,796	21,225	567	--	--	--	442,602	--	1,523	--	1,523	444,125
Lodgepole pine	122,116	9,536	765,986	3,511	7,402	28,716	22,763	960,030	9,082	2,237	--	11,319	971,349
Western larch	1,337	915	--	--	9,796	--	--	12,048	--	--	--	--	12,048
Whitebark-limber pine	9,932	--	478	105,581	--	7,653	22,345	145,989	--	--	--	--	145,989
Subalpine fir-spruce	23,755	--	68,819	46,665	7,559	97,975	148,810	393,583	1,934	--	--	1,934	395,517
Spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Juniper	10,883	3,428	17,668	525	--	--	4,324	36,828	--	2,623	--	2,623	39,451
Aspen	10,015	21,766	14,912	--	--	--	809	47,502	89,508	12,370	--	101,878	149,380
Cottonwood	982	--	--	--	--	--	--	982	1,892	185,422	917	188,231	189,213
All types	3,013,213	628,147	1,132,672	174,470	49,753	138,259	233,885	5,370,399	102,416	211,847	917	315,180	5,685,579

Table 22.--Net annual growth of growing stock and sawtimber on commercial timberland in the headwater counties of Montana, by ownership class and species, 1978

Ownership class	Species												All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Whitebark-limber pine	Western larch	Subalpine fir	Spruce	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	GROWING STOCK												
	Thousand cubic feet												
State	2,169	406	2,067	189	14	369	184	5,398	93	143	7	243	5,641
Forest industry	1,909	209	2,338	143	254	409	149	5,411	10	25	2	37	5,448
Private	10,511	2,132	8,583	599	22	1,529	923	24,299	934	778	24	1,736	26,035
Total	14,589	2,747	12,988	931	290	2,307	1,256	35,108	1,037	946	33	2,016	37,124
	GROWING STOCK												
	Thousand cubic meters												
State	61.4	11.5	58.5	5.4	.4	10.4	5.2	152.8	2.6	4.1	.2	6.9	159.7
Forest industry	54.1	5.9	66.2	4.0	7.2	11.6	4.2	153.2	.3	.7	.1	1.1	154.3
Private	297.6	60.4	243.0	17.0	.6	43.3	26.2	688.1	26.5	22.0	.6	49.1	737.2
Total	413.1	77.8	367.7	26.4	8.2	65.3	35.6	994.1	29.4	26.8	.9	57.1	1 051.2
	SAWTIMBER												
	Thousand board feet, International 1/4-inch rule												
State	8,705	1,865	4,963	695	60	598	372	17,258	371	552	14	937	18,195
Forest industry	11,545	1,759	6,182	775	599	666	353	21,879	83	66	3	152	22,031
Private	43,758	9,513	19,712	2,434	72	1,836	-320	77,005	3,903	3,891	44	7,838	84,843
Total	64,008	13,137	30,857	3,904	731	3,100	405	116,142	4,357	4,509	61	8,927	125,069

Table 23.--Annual mortality of growing stock and sawtimber on commercial timberland in the headwater counties of Montana, by ownership class, and softwoods and hardwoods, 1978

Species group and ownership class	Growing Stock		Sawtimber
	Thousand cubic feet	*Thousand cubic meters*	*Thousand board feet*[1]
Softwoods:			
State	645	18.3	1,637
Forest industry	1,816	51.4	6,143
Private	2,836	80.3	7,999
Total	5,297	150.0	15,779
Hardwoods:			
State	41	1.2	92
Forest industry	2	.1	5
Private	175	4.9	578
Total	218	6.2	675
All owners	5,515	156.2	16,454

[1]International 1/4-inch rule.

Table 24.--Annual mortality of growing stock and sawtimber on commercial timberland in the headwater counties of Montana, by cause of death and species, 1978

Cause of Death	Species									All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Subalpine fir	Spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	
	GROWING STOCK *Thousand cubic feet*									
Insects	157	119	406	--	--	682	--	--	--	682
Disease	--	--	126	39	--	165	--	--	--	165
Fire	38	--	105	41	--	184	--	--	--	184
Animal	--	--	158	--	--	158	--	--	--	158
Weather	474	35	446	--	479	1,434	16	--	16	1,450
Suppression	42	--	51	--	--	93	--	--	--	93
Unknown	867	175	911	72	14	2,039	44	158	202	2,241
Logging	360	55	127	--	--	542	--	--	--	542
Total	1,938	384	2,330	152	493	5,297	60	158	218	5,515
	GROWING STOCK *Thousand cubic meters*									
Insects	4.4	3.4	11.5	--	--	19.3	--	--	--	19.3
Disease	--	--	3.6	1.1	--	4.7	--	--	--	4.7
Fire	1.0	--	3.0	1.2	--	5.2	--	--	--	5.2
Animal	--	--	4.5	--	--	4.5	--	--	--	4.5
Weather	13.4	1.0	12.6	--	13.6	40.6	.5	--	.5	41.1
Suppression	1.2	--	1.4	--	--	2.6	--	--	--	2.6
Unknown	24.6	4.9	25.8	2.0	.4	57.7	1.2	4.5	5.7	63.4
Logging	10.2	1.6	3.6	--	--	15.4	--	--	--	15.4
Total	54.8	10.9	66.0	4.3	14.0	150.0	1.7	4.5	6.2	156.2
	SAWTIMBER *Thousand board feet, International 1/4-inch rule*									
Insects	306	699	1,119	--	--	2,124	--	--	--	2,124
Disease	--	--	187	194	--	381	--	--	--	381
Fire	--	--	--	--	--	--	--	--	--	--
Animal	--	--	711	--	--	711	--	--	--	711
Weather	1,902	--	1,128	--	2,703	5,733	73	--	73	5,806
Suppression	--	--	--	--	--	--	--	--	--	--
Unknown	3,277	777	1,357	305	--	5,716	--	602	602	6,318
Logging	545	180	389	--	--	1,114	--	--	--	1,114
Total	6,030	1,656	4,891	499	2,703	15,779	73	602	675	16,454

Sterrett, Velma J.; Felt, Dorothy G. Forest area and timber resource statistics for State and private lands in the headwater counties of Montana, 1978. Resour. Bull. INT-27. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1983. 27 p.

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

KEYWORDS: forest surveys (regional), forest area classification, stand volume

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Forest Service

**Intermountain
Forest and Range
Experiment Station
Ogden, UT 84401**

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Forest Area and Timber Resource Statistics for State and Private Lands in Southwestern Montana, 1978

Dorothy G. Felt
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RESEARCH SUMMARY

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

ACKNOWLEDGMENTS

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INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of State, private, and other lands in Mineral, Missoula, and Ravalli Counties in Southwestern Montana (fig. 1). Data collection began in January 1978 and was completed in November 1978. This bulletin does not note changes and trends since the inventory of western Montana in 1958, nor does it contain estimates of timber removals. These items will be included in a State Analytical Report to be published in the near future.

The primary objective of Resources Evaluation, a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forests and rangelands. Fundamental to the accomplishment of this objective are the periodic State-by-State resource inventories. Originally, Resources Evaluation—formerly Forest Survey—was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station, with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

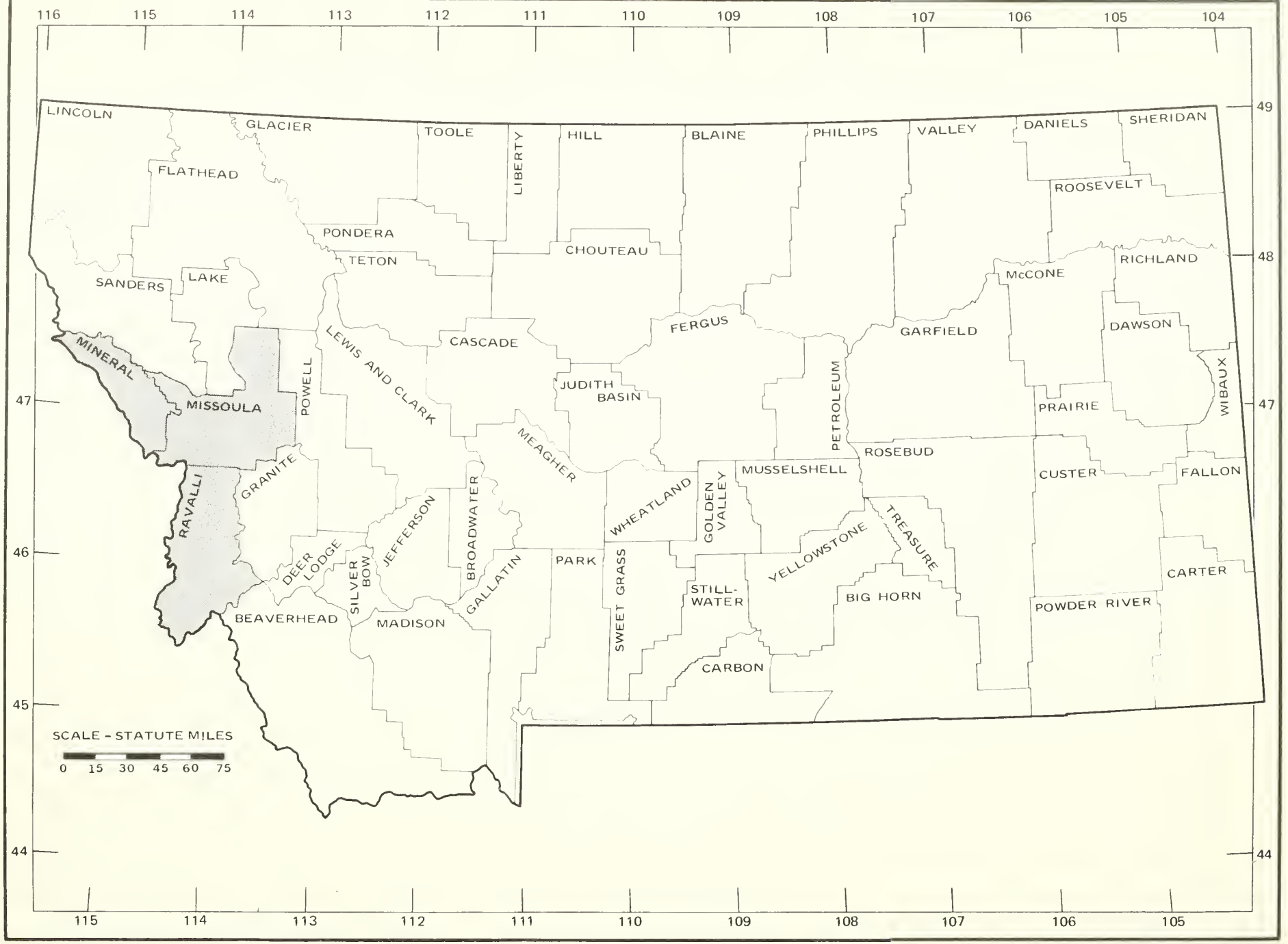

Figure 1.—Southwestern Montana counties: Mineral, Missoula, and Ravalli.

HIGHLIGHTS

Area

- State and private lands account for 1,402 thousand acres (567 thousand hectares), 35 percent of the total land area in Southwestern Montana (fig. 2).
- Forests occupy 889 thousand acres (360 thousand hectares), 63 percent of the total State and private land area.
- Of the forest land, 884 thousand acres (358 thousand hectares), 99 percent, are classified as commercial timberland.
- Private ownership accounts for 758 thousand acres (307 thousand hectares), 86 percent of the commercial timberland.
- Douglas-fir, ponderosa pine, lodgepole pine, and western larch are the predominant forest types and occupy 88 percent of the commercial timberland.
- Almost 57 percent of the commercial timberland is in the 50 to 84 cubic feet per acre per year site class, and 87 percent of such land is privately owned.

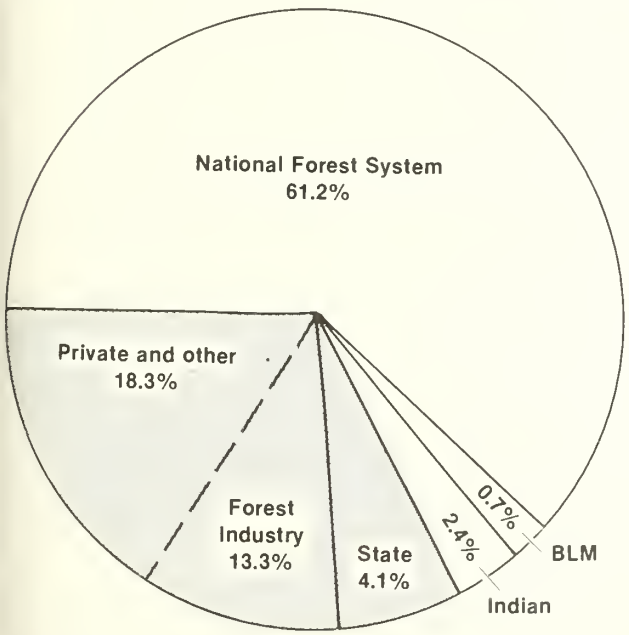

Figure 2.—Total land area in Southwestern Montana, by ownership.

Inventory

- Growing stock volume amounts to 1,401 million cubic feet (40 million cubic meters), and sawtimber volume totals 5,129 million board feet.[1]
- Rough, rotten, and salvable dead trees comprise 99.6 million cubic feet (2.8 million cubic meters), 7 percent of the total sound wood volume.
- The largest share of the total growing stock volume is made up of Douglas-fir (33 percent), lodgepole pine (21 percent), ponderosa pine (20 percent), and western larch (11 percent). The remaining percentage is made up of 9 other species (table 16).
- Private owners control almost 85 percent of the total growing stock and 84 percent of the sawtimber volume.

Growth and Mortality

- Net annual growth totals 26,905 thousand cubic feet (762 thousand cubic meters).
- Of the total net growth, 86 percent is on private lands.
- The annual mortality of 10,212 thousand cubic feet (290 thousand cubic meters) offsets 28 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and study-area levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 11,347 sample points systematically placed on the latest resource aerial photography available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo points, adjusted to meet known land areas, were used to compute area expansion factors for the field samples.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 480 ground sample locations. Sample trees were selected using a 10-point cluster that includes fixed plots (1/300 acre) for trees less than 5.0 inches diameter at breast height (d.b.h.) and variable plots (40 basal area factor) for trees 5.0 inches d.b.h. or larger.

3. For most species, volume and defect were computed using Kemp's equations.

[1] International 1/4-inch rule.

4. All photo and field data were sent to Ogden, Utah, for processing. Final estimates were based on computer-generated statistical summaries of the data.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

TERMINOLOGY AND DATA TABLES

The following section contains definitions that are relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for Southwestern Montana are displayed in tables 3 through 24.

TERMINOLOGY

Land

Bureau of the Census.—Area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area.

Resources Evaluation.—The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet, and minimum size of lakes, etc., is 1 acre.

Water

Bureau of the Census water.—Streams, sloughs, estuaries, and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Resources Evaluation.—The same as the Bureau of the Census except minimum width of streams, etc., is 120 feet, and minimum size of lakes, etc., is 1 acre.

Table 1.--Area of forest land in Southwestern Montana, with percent standard error, 1978

Item	Softwood types		Hardwood types		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	868,306	±1.3	15,204	±33.1	883,510	±1.1
Other forest land:						
Unproductive nonreserved	2,289	±100.0	1,890	±100.0	4,179	±71.0

Table 2.--Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland in Southwestern Montana, with percent standard error, 1978

Item	Softwoods		Hardwoods		All species	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	1,375,853	±4.0	25,579	±34.2	1,401,432	±4.0
Sawtimber (M board feet[1])	5,033,252	±4.9	96,072	±36.1	5,129,324	±4.9
Net annual growth:						
Growing stock (M cubic feet)	26,579	±9.0	326	±71.2	26,905	±8.9
Sawtimber (M board feet[1])	100,893	±9.1	1,892	±95.4	102,785	±9.1
Annual mortality:						
Growing stock (M cubic feet)	9,935	±13.9	277	±89.2	10,212	±14.0
Sawtimber (M board feet[1])	31,592	±18.9	1,343	±89.5	32,935	±18.9

[1]International 1/4-inch rule.

Land Use Classes

Forest land.—Land at least 10.0 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial timberland, but withdrawn from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.—Forest land incapable of producing 20 cubic feet per acre per year of industrial wood in natural stands because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.—Land that has never supported forest and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.—Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.—Federal lands administered by the Bureau of Land Management.

Miscellaneous Federal lands.—Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian trust lands.

Indian trust lands.—Indian lands held in trust by the Federal Government for Indian tribal groups or for individual allotments.

State lands.—Lands owned by States or lands leased to these governmental units for 50 years or more.

County and municipal lands.—Lands owned by counties and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

Private Ownership Classes

Forest industry lands.—Lands owned by companies or by individuals operating wood-processing plants.

Farmer-owned lands.—Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Other private lands.—Privately owned lands other than forest industry and farmer-owned lands.

Forest Type and Tree Species

Forest types.—A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.—Tree species presently or prospectively suitable for industrial wood products.

Softwoods.—Monocotyledonous trees, usually evergreen, having needles or scalelike leaves.

Hardwoods.—Dicotyledonous trees, usually broadleaved and deciduous.

Area Condition Classes

Stocking.—Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range, which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent less than full-site occupancy. Overstocking is characterized by sites with 133 percent or more stocking.

Class 10.—Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.—Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.—Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.—Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

Class 60.—Areas poorly stocked with desirable trees, but with medium to full stocking of growing stock trees.

Class 70.—Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.—Low-risk old-growth stands.

Class 90.—High-risk old-growth stands.

Nonstocked.—Areas less then 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.—Growing stock trees (1) having no serious defect in quality to limit present or prospective use for timber products; (2) of relatively high vigor; and (3) containing no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.—Growing stock trees meeting specified standards of size and quality, but not qualifying as desirable trees.

Rough trees.—(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of roughness or poor form; and (2) all live trees of noncommercial species.

Rotten trees.—Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet long or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

Salvable dead trees.—Standing or down dead trees that are considered merchantable by Rocky Mountain regional standards.

Saw-log portion.—That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.—That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree-Size Classes

Seedlings.—Live trees less than 1.0 inch in d.b.h.

Saplings.—Trees 1.0 to 4.9 inches in d.b.h.

Poletimber trees.—Trees at least 5.0 inches in d.b.h., but smaller than sawtimber size.

Sawtimber trees.—Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwoods 11.0 inches.

Volume

Cull volume.—Portions of a tree's volume that are not usable for industrial wood products because of rot, form, or other defect.

Net volume.—Gross volume less deductions for cull.

Growing stock volume.—Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.—Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.—The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.—Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

Nonstocked land.—Commercial timberland less than 16.7 percent stocked with growing stock trees.

Table 3.--Total land and water area in Southwestern Montana, by ownership class, 1978

Ownership class	Area	
	Acres	*Hectares*
National Forest	2,434,400	985 171
Bureau of Land Management	25,963	10 507
Indian Trust Lands	94,392	38 199
Forest industry	530,323	214 615
State	164,079	66 401
Private and other	707,585	286 350
Total land area	3,956,742	1 601 243
Census water	31,610	12 792
Gross water[1]	3,988,352	1 614 035

[1]U.S. Bureau of the Census, land and water area of the United States, 1980.

Table 4.--Total land area in Southwestern Montana, by major land class and ownership class, 1978

Land class	Ownership class						Total	
	State		Forest industry		Private[1]			
	Acres	*Hectares*	*Acres*	*Hectares*	*Acres*	*Hectares*	*Acres*	*Hectares*
Commercial timberland	125,846	50 928	478,293	193 559	279,371	113 058	883,510	357 545
Productive reserved	0	0	1,029	416	0	0	1,029	416
Other forest land:								
Unproductive reserved	0	0	686	278	0	0	686	278
Unproductive nonreserved	455	184	954	386	2,770	1 121	4,179	1 691
Total forest land	126,301	51 112	480,962	194 639	282,141	114 179	889,404	359 930
Nonforest land	37,778	15 289	49,361	19 976	425,444	172 171	512,583	207 436
Total land area	164,079	66 401	530,323	214 615	707,585	286 350	1,401,987	567 366

[1]On this and all following tables, the private ownership category includes a small portion of miscellaneous Federal, and county and municipal ownership.

Table 5.--Area of commercial timberland in Southwestern Montana, by forest type, stand-size class, and site class, 1978

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
				Acres		
Douglas-fir:						
Sawtimber	--	9,266	42,049	159,100	32,993	243,408
Poletimber	--	--	2,744	46,046	6,825	55,615
Sapling and seedling	--	2,290	5,408	63,550	22,810	94,058
Nonstocked	--	--	--	2,739	4,108	6,847
Total	--	11,556	50,201	271,435	66,736	399,928
Ponderosa pine:						
Sawtimber	--	12,440	44,503	54,347	18,545	129,835
Poletimber	--	--	2,408	2,743	9,930	15,081
Sapling and seedling	--	733	6,492	21,427	5,780	34,432
Nonstocked	--	--	--	5,405	3,022	8,427
Total	--	13,173	53,403	83,922	37,277	187,775
Lodgepole pine:						
Sawtimber	--	2,721	12,830	12,794	7,037	35,382
Poletimber	--	--	18,278	41,018	6,268	65,564
Sapling and seedling	--	--	2,744	5,514	8,546	16,804
Nonstocked	--	--	--	1,838	--	1,838
Total	--	2,721	33,852	61,164	21,851	119,588
Western larch:						
Sawtimber	--	--	9,058	23,247	2,684	34,989
Poletimber	--	--	--	5,657	--	5,657
Sapling and seedling	--	--	2,684	13,290	8,279	24,253
Nonstocked	--	--	--	1,227	--	1,227
Total	--	--	11,742	43,421	10,963	66,126
Western redcedar:						
Sawtimber	--	--	2,900	2,738	--	5,638
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	2,900	2,738	--	5,638
Whitebark pine:						
Sawtimber	--	--	--	2,913	--	2,913
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	2,913	--	2,913
Grand fir:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	2,500	--	2,500
Nonstocked	--	--	--	--	--	--
Total	--	--	--	2,500	--	2,500

(con.)

Table 5 (con.)

Forest type and stand-size class	Site class 165+	120-164	85-119	50-84	20-49	All classes
			Acres			
Subalpine fir-spruce:						
Sawtimber	--	8,212	8,179	13,616	2,721	32,728
Poletimber	--	--	2,721	5,451	1,355	9,527
Sapling and seedling	--	--	2,738	7,293	2,770	12,801
Nonstocked	--	--	--	--	--	--
Total	--	8,212	13,638	26,360	6,846	55,056
Engelmann spruce:						
Sawtimber	--	2,913	16,717	2,738	--	22,368
Poletimber	--	2,912	--	--	--	2,912
Sapling and seedling	--	--	2,770	--	--	2,770
Nonstocked	--	--	--	--	--	--
Total	--	5,825	19,487	2,738	--	28,050
Juniper[1]:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	732	--	732
Total	--	--	--	732	--	732
Aspen:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	1,345	--	--	1,345
Nonstocked	--	--	--	--	--	--
Total	--	--	1,345	--	--	1,345
Cottonwood:						
Sawtimber	--	--	5,952	3,232	--	9,184
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	1,616	1,616
Nonstocked	--	--	--	--	3,059	3,059
Total	--	--	5,952	3,232	4,675	13,859
All types:						
Sawtimber	--	35,552	142,188	274,725	63,980	516,445
Poletimber	--	2,912	26,151	100,915	24,378	154,356
Sapling and seedling	--	3,023	24,181	113,574	49,801	190,579
Nonstocked	--	--	--	11,941	10,189	22,130
Total	--	41,487	192,520	501,155	148,348	883,510

[1]On this and all following tables, the area occupied by juniper forest type classified as commercial is so classified because the site index for other associated species on these stands (usually ponderosa pine or Douglas-fir) was high enough to indicate a site potential productivity level exceeding 20 cubic feet per acre per year average annual growth, and nonstockable indicators were not present in sufficient quantities to lower the yield capability below 20 cubic feet per acre per year.

Although juniper usually occurs on unproductive forest land, when it occurs in mixtures with other species on productive sites, it is reported in the commercial timberland statistics.

Table 6.--Area of State-owned commercial timberland in Southwestern Montana, by forest type, stand-size class, and site class, 1978

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
				Acres		
Douglas-fir:						
Sawtimber	--	1,704	9,190	29,461	6,148	46,503
Poletimber	--	--	--	8,131	1,338	9,469
Sapling and seedling	--	443	2,638	5,805	1,047	9,933
Nonstocked	--	--	--	--	1,338	1,338
Total	--	2,147	11,828	43,397	9,871	67,243
Ponderosa pine:						
Sawtimber	--	3,594	7,498	10,029	3,512	24,633
Poletimber	--	--	35	--	733	768
Sapling and seedling	--	47	1,212	1,251	338	2,848
Nonstocked	--	--	--	--	489	489
Total	--	3,641	8,745	11,280	5,072	28,738
Lodgepole pine:						
Sawtimber	--	--	5,162	940	1,671	7,773
Poletimber	--	--	3,742	3,160	928	7,830
Sapling and seedling	--	--	--	--	912	912
Nonstocked	--	--	--	762	--	762
Total	--	--	8,904	4,862	3,511	17,277
Western larch:						
Sawtimber	--	--	896	4,391	--	5,287
Poletimber	--	--	--	317	--	317
Sapling and seedling	--	--	--	34	--	34
Nonstocked	--	--	--	151	--	151
Total	--	--	896	4,893	--	5,789
Western redcedar:						
Sawtimber	--	--	244	--	--	244
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	244	--	--	244
Whitebark pine:						
Sawtimber	--	--	--	317	--	317
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	317	--	317
Grand fir:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	232	--	232
Nonstocked	--	--	--	--	--	--
Total	--	--	--	232	--	232

(con.)

Table 6 (con.)

Forest type and stand-size class	Site class 165+	120-164	85-119	50-84	20-49	All classes
				Acres		
Subalpine fir-spruce:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	133	1,355	1,488
Sapling and seedling	--	--	--	762	--	762
Nonstocked	--	--	--	--	--	--
Total	--	--	--	895	1,355	2,250
Engelmann spruce:						
Sawtimber	--	317	1,634	--	--	1,951
Poletimber	--	316	--	--	--	316
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	633	1,634	--	--	2,267
Juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	46	--	46
Total	--	--	--	46	--	46
Aspen:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	658	--	--	658
Nonstocked	--	--	--	--	--	--
Total	--	--	658	--	--	658
Cottonwood:						
Sawtimber	--	--	179	178	--	357
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	90	90
Nonstocked	--	--	--	--	338	338
Total	--	--	179	178	428	785
All types:						
Sawtimber	--	5,615	24,803	45,316	11,331	87,065
Poletimber	--	316	3,777	11,741	4,354	20,188
Sapling and seedling	--	490	4,508	8,084	2,387	15,469
Nonstocked	--	--	--	959	2,165	3,124
Total	--	6,421	33,088	66,100	20,237	125,846

Table 7.--Area of industry-owned commercial timberland in Southwestern Montana, by forest type, stand-size class, and site class, 1978

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
	- - - - - - - - - - - - - - - - Acres - - - - - - - - - - - - - - - -					
Douglas-fir:						
Sawtimber	--	3,704	20,059	91,228	21,833	136,824
Poletimber	--	--	2,744	23,116	5,487	31,347
Sapling and seedling	--	904	2,770	40,156	12,175	56,005
Nonstocked	--	--	--	2,739	2,770	5,509
Total	--	4,608	25,573	157,239	42,265	229,685
Ponderosa pine:						
Sawtimber	--	520	14,368	9,613	9,078	33,579
Poletimber	--	--	422	2,743	2,744	5,909
Sapling and seedling	--	89	2,684	13,788	2,721	19,282
Nonstocked	--	--	--	5,405	993	6,398
Total	--	609	17,474	31,549	15,536	65,168
Lodgepole pine:						
Sawtimber	--	2,721	--	5,539	2,770	11,030
Poletimber	--	--	5,487	27,414	2,744	35,645
Sapling and seedling	--	--	2,744	5,514	5,482	13,740
Nonstocked	--	--	--	--	--	--
Total	--	2,721	8,231	38,467	10,996	60,415
Western larch:						
Sawtimber	--	--	8,162	14,393	2,684	25,239
Poletimber	--	--	--	2,744	--	2,744
Sapling and seedling	--	--	2,684	11,304	8,279	22,267
Nonstocked	--	--	--	--	--	--
Total	--	--	10,846	28,441	10,963	50,250
Western redcedar:						
Sawtimber	--	--	--	2,738	--	2,738
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	2,738	--	2,738
Whitebark pine:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Grand Fir:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	217	--	217
Nonstocked	--	--	--	--	--	--
Total	--	--	--	217	--	217

(con.)

Table 7 (con.)

Forest type and stand-size class	Site class 165+	120-164	85-119	50-84	20-49	All classes
			Acres			
Subalpine fir-spruce:						
Sawtimber	--	8,212	8,179	13,616	2,721	32,728
Poletimber	--	--	2,721	3,510	--	6,231
Sapling and seedling	--	--	2,738	5,455	2,770	10,963
Nonstocked	--	--	--	--	--	--
Total	--	8,212	13,638	22,581	5,491	49,922
Engelmann spruce:						
Sawtimber	--	--	10,999	2,738	--	13,737
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	2,770	--	--	2,770
Nonstocked	--	--	--	--	--	--
Total	--	--	13,769	2,738	--	16,507
Juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	89	--	89
Total	--	--	--	89	--	89
Aspen:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	90	--	--	90
Nonstocked	--	--	--	--	--	--
Total	--	--	90	--	--	90
Cottonwood:						
Sawtimber	--	--	2,917	197	--	3,114
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	98	98
Nonstocked	--	--	--	--	--	--
Total	--	--	2,917	197	98	3,212
All types:						
Sawtimber	--	15,157	64,684	140,062	39,086	258,989
Poletimber	--	--	11,374	59,527	10,975	81,876
Sapling and seedling	--	993	16,480	76,434	31,525	125,432
Nonstocked	--	--	--	8,233	3,763	11,996
Total	--	16,150	92,538	284,256	85,349	478,293

Table 8.--Area of privately owned commercial timberland in Southwestern Montana, by forest type, stand-size class, and site class, 1978

Forest type and stand-size class	Site class					All classes
	165+	120-164	85-119	50-84	20-49	
				Acres		
Douglas-fir:						
Sawtimber	--	3,858	12,800	38,411	5,012	60,081
Poletimber	--	--	--	14,799	--	14,799
Sapling and seedling	--	943	--	17,589	9,588	28,120
Nonstocked	--	--	--	--	--	--
Total	--	4,801	12,800	70,799	14,600	103,000
Ponderosa pine:						
Sawtimber	--	8,326	22,637	34,705	5,955	71,623
Poletimber	--	--	1,951	--	6,453	8,404
Sapling and seedling	--	597	2,596	6,388	2,721	12,302
Nonstocked	--	--	--	--	1,540	1,540
Total	--	8,923	27,184	41,093	16,669	93,869
Lodgepole pine:						
Sawtimber	--	--	7,668	6,315	2,596	16,579
Poletimber	--	--	9,049	10,444	2,596	22,089
Sapling and seedling	--	--	--	--	2,152	2,152
Nonstocked	--	--	--	1,076	--	1,076
Total	--	--	16,717	17,835	7,344	41,896
Western larch:						
Sawtimber	--	--	--	4,463	--	4,463
Poletimber	--	--	--	2,596	--	2,596
Sapling and seedling	--	--	--	1,952	--	1,952
Nonstocked	--	--	--	1,076	--	1,076
Total	--	--	--	10,087	--	10,087
Western redcedar:						
Sawtimber	--	--	2,656	--	--	2,656
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	2,656	--	--	2,656
Whitebark pine:						
Sawtimber	--	--	--	2,596	--	2,596
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	2,596	--	2,596
Grand Fir:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	2,051	--	2,051
Nonstocked	--	--	--	--	--	--
Total	--	--	--	2,051	--	2,051

(con.)

Table 8 (con.)

Forest type and stand-size class	Site class 165+	120-164	85-119	50-84	20-49	All classes
	- - - - - - - -	- - - - - - - -	- - - - Acres	- - - - - - - -	- - - - - - - -	- - - - - - - -
Subalpine fir-spruce:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	1,808	--	1,808
Sapling and seedling	--	--	--	1,076	--	1,076
Nonstocked	--	--	--	--	--	--
Total	--	--	--	2,884	--	2,884
Engelmann spruce:						
Sawtimber	--	2,596	4,084	--	--	6,680
Poletimber	--	2,596	--	--	--	2,596
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	5,192	4,084	--	--	9,276
Juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	597	--	597
Total	--	--	--	597	--	597
Aspen:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	597	--	--	597
Nonstocked	--	--	--	--	--	--
Total	--	--	597	--	--	597
Cottonwood:						
Sawtimber	--	--	2,856	2,857	--	5,713
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	1,428	1,428
Nonstocked	--	--	--	--	2,721	2,721
Total	--	--	2,856	2,857	4,149	9,862
All types:						
Sawtimber	--	14,780	52,701	89,347	13,563	170,391
Poletimber	--	2,596	11,000	29,647	9,049	52,292
Sapling and seedling	--	1,540	3,193	29,056	15,889	49,678
Nonstocked	--	--	--	2,749	4,261	7,010
Total	--	18,916	66,894	150,799	42,762	279,371

Table 9.--Area of commercial timberland in Southwestern Montana, by stand volume and ownership class, 1978

Stand volume per acre[1]	Ownership class			
	State	Forest industry	Private	All owners
	- - - - - - - - - - *Acres* - - - - - - - - - -			
Less than 1,500 board feet	16,699	88,312	51,302	156,313
1,500 to 4,999 board feet	44,825	192,776	100,844	338,445
5,000 to 9,999 board feet	40,664	133,968	90,902	265,534
10,000 board feet or more	23,658	63,237	36,323	123,218
All classes	125,846	478,293	279,371	883,510

[1]International 1/4-inch rule.

Table 10.--Area of commercial timberland in Southwestern Montana, by forest type and area condition class, 1978

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	- *Acres* -											*Hectares*
Douglas-fir	--	--	9,078	20,385	17,876	125,238	86,513	70,360	63,631	6,847	399,928	161 846
Ponderosa pine	--	--	22,821	15,161	3,635	65,951	40,864	15,327	15,589	8,427	187,775	75 990
Lodgepole pine	3,356	5,514	2,738	20,869	41,180	12,428	12,931	2,770	15,964	1,838	119,588	48 396
Western larch	2,738	--	8,284	13,255	5,405	5,633	6,350	16,275	6,959	1,227	66,126	26 760
Western redcedar	--	--	--	2,900	--	--	--	--	2,738	--	5,638	2 282
Whitebark pine	--	--	--	--	--	--	--	2,913	--	--	2,913	1 179
Grand fir	--	--	--	--	--	2,500	--	--	--	--	2,500	1 012
Subalpine fir-spruce	--	--	2,738	6,076	--	10,933	6,767	19,026	9,516	--	55,056	22 280
Engelmann spruce	--	2,913	5,509	--	2,900	1,300	--	15,428	--	--	28,050	11 351
Juniper	--	--	--	--	--	--	--	--	--	732	732	296
Aspen	--	--	--	--	--	1,345	--	--	--	--	1,345	544
Cottonwood	--	--	--	1,616	2,720	1,616	1,616	--	3,232	3,059	13,859	5 609
All types	6,094	8,427	51,168	80,262	73,716	226,944	155,041	142,099	117,629	22,130	883,510	357 545

Table 11.--Area of productive reserved and other forest land in Southwestern Montana, by land class, ownership class, and forest type, 1978

Land class	Douglas-fir	Lodgepole pine	Whitebark pine	Total softwoods	Mixed hardwoods	Total hardwoods	All types	
				Acres				*Hectares*
Productive reserved area:								
State	0	0	0	0	0	0	0	0
Forest industry	--	343	686	1,029	--	--	1,029	416
Private	0	0	0	0	0	0	0	0
Total	--	343	686	1,029	--	--	1,029	416
Other forest land area:								
Unproductive reserved:								
State	0	0	0	0	0	0	0	0
Forest industry	--	--	686	686	--	--	686	278
Private	0	0	0	0	0	0	0	0
Total	--	--	686	686	--	--	686	278
Unproductive nonreserved:								
State	443	--	--	443	12	12	455	184
Forest industry	903	--	--	903	51	51	954	386
Private	943	--	--	943	1,827	1,827	2,770	1 121
Total	2,289	--	--	2,289	1,890	1,890	4,179	1 691
Total all areas:								
State	443	0	0	443	12	12	455	184
Forest industry	903	343	1,372	2,618	51	51	2,669	1 080
Private	943	0	0	943	1,827	1,827	2,770	1 121
Total acres	2,289	343	1,372	4,004	1,890	1,890	5,894	--
Total hectares	926	139	555	1 620	765	765	--	2 385

Table 12.--Number of growing stock trees on commercial timberland in Southwestern Montana, by species and diameter class, 1978

Species	Diameter class (inches at breast height)															All classes
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.0	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand trees															
Douglas-fir	43,333	28,610	15,828	12,441	7,233	4,283	2,141	1,421	803	469	235	105	81	29	42	117,054
Ponderosa pine	5,614	8,371	6,319	5,151	3,397	2,216	1,856	1,013	608	369	180	153	72	37	68	35,424
Western white pine	--	--	--	--	--	33	--	7	--	--	--	--	3	--	--	43
Lodgepole pine	15,676	17,732	16,770	10,383	4,138	1,295	586	130	45	9	4	--	--	--	--	66,768
Whitebark pine	--	--	136	153	105	98	16	--	3	--	--	--	--	--	--	511
Western larch	5,163	4,335	3,795	2,514	1,268	863	443	348	199	137	194	82	52	49	90	19,532
Grand fir	2,744	1,122	253	201	145	28	17	22	18	5	4	2	3	--	--	4,564
Subalpine fir	14,819	5,674	4,603	1,504	894	296	144	147	32	20	13	14	3	2	4	28,169
Engelmann spruce	6,092	4,741	2,356	834	771	547	407	297	164	85	76	39	33	2	55	16,499
Western redcedar	2,288	564	--	37	87	43	61	72	13	30	13	7	7	5	2	3,229
Total softwoods	95,729	71,149	50,060	33,218	18,038	9,702	5,671	3,457	1,885	1,124	719	402	254	124	261	291,793
Aspen	1,153	702	304	93	168	58	22	--	7	--	4	7	--	3	--	2,521
Cottonwood	531	161	206	41	12	55	19	22	20	18	17	13	11	7	42	1,175
Other hardwoods	--	--	--	30	64	--	21	16	--	5	--	--	--	--	--	136
Total hardwoods	1,684	863	510	164	244	113	62	38	27	23	21	20	11	10	42	3,832
All species	97,413	72,012	50,570	33,382	18,282	9,815	5,733	3,495	1,912	1,147	740	422	265	134	303	295,625

Table 13.--Number of cull and salvable dead trees on commercial timberland in Southwestern Montana, by ownership class, and softwoods and hardwoods, 1978

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	Thousand trees			
State:				
Softwoods	255	76	331	2,472
Hardwoods	--	14	14	1
Total	255	90	345	2,473
Forest industry:				
Softwoods	867	274	1,141	7,840
Hardwoods	--	7	7	([1])
Total	867	281	1,148	7,840
Private:				
Softwoods	796	111	907	3,450
Hardwoods	--	86	86	10
Total	796	197	993	3,460
All owners:				
Softwoods	1,918	461	2,379	13,762
Hardwoods	--	107	107	11
Total	1,918	568	2,486	13,773

[1]Less than 500 trees.

Table 14.--Net volume of growing stock on commercial timberland in Southwestern Montana, by ownership class, forest type, and stand-size class, 1978

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					*Thousand cubic meters*
State:							
	Douglas-fir	82,639	13,723	6,456	--	102,818	2 912
	Ponderosa pine	39,419	531	1,321	126	41,397	1 172
	Lodgepole pine	25,265	20,210	11	--	45,486	1 288
	Western larch	10,932	576	29	--	11,537	327
	Western redcedar	731	--	--	--	731	20
	Whitebark pine	824	--	--	--	824	24
	Grand fir	--	--	52	--	52	2
	Subalpine fir-spruce	--	2,504	155	--	2,659	75
	Engelmann spruce	6,468	968	--	--	7,436	210
	Juniper	--	--	--	4	4	([1])
	Aspen	--	--	340	--	340	10
	Cottonwood	542	--	31	28	601	17
	All types	166,820	38,512	8,395	158	213,885	6 057
Forest industry:							
	Douglas-fir	232,767	36,311	24,782	392	294,252	8 332
	Ponderosa pine	53,777	5,175	8,997	1,320	69,269	1 962
	Lodgepole pine	28,383	111,441	10,307	--	150,131	4 251
	Western larch	44,809	5,414	10,252	--	60,475	1 712
	Western redcedar	10,125	--	--	--	10,125	287
	Whitebark pine	--	--	--	--	--	--
	Grand fir	--	--	49	--	49	1
	Subalpine fir-spruce	91,174	20,884	7,127	--	119,185	3 375
	Engelmann spruce	49,475	--	--	--	49,475	1 401
	Juniper	--	--	--	7	7	([1])
	Aspen	--	--	18	--	18	1
	Cottonwood	10,485	--	35	--	10,520	298
	All types	520,995	179,225	61,567	1,719	763,506	21 620
Private:							
	Douglas-fir	106,734	17,657	12,406	--	136,797	3 874
	Ponderosa pine	113,247	8,446	6,155	267	128,115	3 628
	Lodgepole pine	36,268	50,252	78	--	86,598	2 452
	Western larch	11,735	4,718	1,632	--	18,085	512
	Western redcedar	7,948	--	--	--	7,948	225
	Whitebark pine	6,755	--	--	--	6,755	191
	Grand fir	--	--	461	--	461	13
	Subalpine fir-spruce	--	1,974	--	--	1,974	56
	Engelmann spruce	19,811	7,934	--	--	27,745	786
	Juniper	--	--	--	49	49	1
	Aspen	--	--	123	--	123	3
	Cottonwood	8,662	--	501	228	9,391	266
	All types	311,160	90,981	21,356	544	424,041	12 007
All owners:							
	Douglas-fir	422,140	67,691	43,644	392	533,867	15 118
	Ponderosa pine	206,443	14,152	16,473	1,713	238,781	6 762
	Lodgepole pine	89,916	181,903	10,396	--	282,215	7 991
	Western larch	67,476	10,708	11,913	--	90,097	2 551
	Western redcedar	18,804	--	--	--	18,804	532
	Whitebark pine	7,579	--	--	--	7,579	215
	Grand fir	--	--	562	--	562	16
	Subalpine fir-spruce	91,174	25,362	7,282	--	123,818	3 506
	Engelmann spruce	75,754	8,902	--	--	84,656	2 397
	Juniper	--	--	--	60	60	1
	Aspen	--	--	481	--	481	14
	Cottonwood	19,689	--	567	256	20,512	581
	All types	998,975	308,718	91,318	2,421	1,401,432	39 684

[1]Less than 500 cubic meters.

Table 15.--Net volume of sawtimber on commercial timberland in Southwestern Montana, by ownership class, forest type, and stand-size class, 1978

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		Thousand board feet[1]				
State:						
	Douglas-fir	359,096	24,709	27,149	--	410,954
	Ponderosa pine	187,582	1,167	4,569	712	194,030
	Lodgepole pine	102,071	25,724	32	--	127,827
	Western larch	47,285	1,462	60	--	48,807
	Western redcedar	1,975	--	--	--	1,975
	Whitebark pine	2,852	--	--	--	2,852
	Grand fir	--	--	83	--	83
	Subalpine fir-spruce	--	3,490	278	--	3,768
	Engelmann spruce	20,996	2,022	--	--	23,018
	Juniper	--	--	--	20	20
	Aspen	--	--	698	--	698
	Cottonwood	2,604	--	57	105	2,766
	All types	724,461	58,574	32,926	837	816,798
Forest industry:						
	Douglas-fir	930,058	72,117	106,657	1,946	1,110,778
	Ponderosa pine	237,470	5,306	48,140	5,969	296,885
	Lodgepole pine	97,291	110,399	11,657	--	219,347
	Western larch	225,654	7,877	45,152	--	278,683
	Western redcedar	50,948	--	--	--	50,948
	Whitebark pine	--	--	--	--	--
	Grand fir	--	--	77	--	77
	Subalpine fir-spruce	443,183	47,685	31,156	--	522,024
	Engelmann spruce	248,312	--	--	--	248,312
	Juniper	--	--	--	38	38
	Aspen	--	--	94	--	94
	Cottonwood	46,873	--	63	--	46,936
	All types	2,279,789	243,384	242,996	7,953	2,774,122
Private:						
	Douglas-fir	430,185	34,174	44,055	--	508,414
	Ponderosa pine	524,260	20,847	21,951	1,515	568,573
	Lodgepole pine	120,028	72,554	230	--	192,812
	Western larch	55,216	11,986	3,394	--	70,596
	Western redcedar	21,484	--	--	--	21,484
	Whitebark pine	23,378	--	--	--	23,378
	Grand fir	--	--	730	--	730
	Subalpine fir-spruce	--	2,840	--	--	2,840
	Engelmann spruce	88,721	16,576	--	--	105,297
	Juniper	--	--	--	254	254
	Aspen	--	--	631	--	631
	Cottonwood	41,636	--	912	847	43,395
	All types	1,304,908	158,977	71,903	2,616	1,538,404
All owners:						
	Douglas-fir	1,719,339	131,000	177,861	1,946	2,030,146
	Ponderosa pine	949,312	27,320	74,660	8,196	1,059,488
	Lodgepole pine	319,390	208,677	11,919	--	539,986
	Western larch	328,155	21,325	48,606	--	398,086
	Western redcedar	74,407	--	--	--	74,407
	Whitebark pine	26,230	--	--	--	26,230
	Grand fir	--	--	890	--	890
	Subalpine fir-spruce	443,183	54,015	31,434	--	528,632
	Engelmann spruce	358,029	18,598	--	--	376,627
	Juniper	--	--	--	312	312
	Aspen	--	--	1,423	--	1,423
	Cottonwood	91,113	--	1,032	952	93,097
	All types	4,309,158	460,935	347,825	11,406	5,129,324

[1]International 1/4-inch rule.

Table 16.--Net volume of growing stock on commercial timberland in Southwestern Montana, by species and diameter class, 1978

Species	Diameter class (inches at breast height)													All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand cubic feet													
Douglas-fir	47,272	71,242	72,071	69,727	49,683	46,215	34,374	25,398	15,165	7,875	8,170	3,357	6,863	457,412
Ponderosa pine	8,275	21,441	31,566	36,329	43,431	33,912	27,247	21,075	12,963	14,067	7,471	4,847	14,859	277,483
Western white pine	--	--	--	659	--	355	--	--	--	--	444	--	--	1,458
Lodgepole pine	85,779	96,711	60,912	28,843	17,531	5,023	2,008	471	266	--	--	--	--	297,544
Whitebark pine	625	1,133	1,370	1,858	330	--	125	--	--	--	--	--	--	5,441
Western larch	10,666	16,464	15,698	15,254	12,035	13,071	9,945	9,016	15,500	7,660	5,758	6,017	15,772	152,856
Grand fir	587	1,431	1,794	428	365	1,130	916	355	408	204	331	--	--	7,949
Subalpine fir	17,173	10,913	9,718	4,756	3,349	4,768	1,655	1,285	915	1,064	290	310	493	56,689
Engelmann spruce	7,872	5,972	10,765	12,759	13,507	13,565	10,491	6,435	7,378	4,450	4,276	334	13,437	111,241
Western redcedar	--	192	751	653	1,147	1,727	322	1,043	561	320	325	342	397	7,780
Total softwoods	178,249	225,499	204,645	171,266	141,378	119,766	87,083	65,078	53,156	35,640	27,065	15,207	51,821	1,375,853
Aspen	1,112	590	2,211	1,247	725	--	349	--	333	741	--	358	--	7,666
Cottonwood	349	264	105	918	385	514	808	764	920	730	835	714	8,446	15,752
Other hardwoods	--	206	737	--	467	509	--	242	--	--	--	--	--	2,161
Total hardwoods	1,461	1,060	3,053	2,165	1,577	1,023	1,157	1,006	1,253	1,471	835	1,072	8,446	25,579
All species	179,710	226,559	207,698	173,431	142,955	120,789	88,240	66,084	54,409	37,111	27,900	16,279	60,267	1,401,432

Table 17.--Net volume of sawtimber on commercial timberland in Southwestern Montana, by species and diameter class, 1978

Species	Diameter class (inches at breast height)											All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	259,893	341,429	260,008	251,705	191,199	143,134	86,002	44,890	47,235	19,536	40,229	1,685,260
Ponderosa pine	94,059	166,930	226,126	190,403	158,708	125,088	77,907	84,903	45,000	29,577	96,635	1,295,336
Western white pine	--	3,601	--	1,960	--	--	--	--	2,582	--	--	8,143
Lodgepole pine	243,892	167,557	100,760	28,223	11,053	2,554	1,452	--	--	--	--	555,491
Whitebark pine	5,863	10,748	1,880	--	686	--	--	--	--	--	--	19,177
Western larch	76,983	90,339	71,930	78,248	59,500	53,938	94,375	47,647	36,023	37,603	97,645	744,231
Grand fir	6,643	2,094	1,868	5,952	4,572	1,689	1,941	955	1,512	--	--	27,226
Subalpine fir	36,970	24,794	17,589	25,086	8,717	6,933	5,047	5,915	1,631	1,784	2,854	137,320
Engelmann spruce	45,397	70,028	73,354	72,743	55,576	33,919	39,849	24,961	24,529	1,952	82,802	525,110
Western redcedar	2,942	3,271	5,720	8,521	1,546	4,936	2,635	1,476	1,491	1,570	1,850	35,958
Total softwoods	772,642	880,791	759,235	662,841	491,557	372,191	309,208	210,747	160,003	92,022	322,015	5,033,252
Aspen	XXXXXXX	6,567	3,800	--	1,765	--	1,603	3,521	--	1,688	--	18,944
Cottonwood	XXXXXXX	4,723	1,959	2,538	3,873	3,580	4,193	3,285	3,777	3,275	39,746	70,949
Other hardwoods	XXXXXXX	--	2,410	2,598	--	1,171	--	--	--	--	--	6,179
Total hardwoods	XXXXXXX	11,290	8,169	5,136	5,638	4,751	5,796	6,806	3,777	4,963	39,746	96,072
All species	772,642	892,081	767,404	667,977	497,195	376,942	315,004	217,553	163,780	96,985	361,761	5,129,324

Table 18.--Net volume of growing stock and sawtimber on commercial timberland in Southwestern Montana, by ownership class and species, 1978

Ownership class	Species															All species
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine spruce	Engelmann spruce	Western redcedar	Total softwoods	Aspen	Cotton-wood	Other hardwoods	Total hardwoods	
	GROWING STOCK															
	Thousand cubic feet															
State	82,848	52,292	30	43,577	1,018	20,842	471	5,294	5,531	173	212,076	1,185	624	--	1,809	213,885
Forest industry	249,094	92,938	1,106	173,319	--	104,272	4,408	43,384	81,306	5,724	755,551	76	5,718	2,161	7,955	763,506
Private	125,470	132,253	322	80,648	4,423	27,742	3,070	8,011	24,404	1,883	408,226	6,405	9,410	--	15,815	424,041
Total	457,412	277,483	1,458	297,544	5,441	152,856	7,949	56,689	111,241	7,780	1,375,853	7,666	15,752	2,161	25,579	1,401,432
	GROWING STOCK															
	Thousand cubic meters															
State	2 346	1 481	1	1 234	29	590	13	150	157	5	6 006	34	17	--	51	6 057
Forest industry	7 054	2 632	31	4 908	--	2 953	125	1 228	2 302	162	21 395	2	162	61	225	21 620
Private	3 553	3 745	9	2 284	125	785	87	227	691	53	11 559	181	267	--	448	12 007
Total	12 953	7 858	41	8 426	154	4 328	225	1 605	3 150	220	38 960	217	446	61	724	39 684
	SAWTIMBER															
	Thousand board feet, International 1/4-inch rule															
State	316,007	256,121	163	94,542	3,948	111,092	1,678	6,723	19,951	720	810,945	3,181	2,672	--	5,853	816,798
Forest industry	933,174	436,170	6,204	266,422	--	526,715	16,854	113,455	414,638	27,413	2,741,045	--	26,898	6,179	33,077	2,774,122
Private	436,079	603,045	1,776	194,527	15,229	106,424	8,694	17,142	90,521	7,825	1,481,262	15,763	41,379	--	57,142	1,538,404
Total	1,685,260	1,295,336	8,143	555,491	19,177	744,231	27,226	137,320	525,110	35,958	5,033,252	18,944	70,949	6,179	96,072	5,129,324

Table 19.--Net volume of timber on commercial timberland in Southwestern Montana, by class of timber, and softwoods and hardwoods, 1978

Class of timber	Softwoods	Hardwoods	All classes
	Thousand cubic feet		
Sawtimber trees:			
Saw-log portion	858,704	16,744	875,448
Upper-stem portion	113,401	3,261	116,662
Total	972,105	20,005	992,110
Poletimber trees	403,748	5,574	409,322
All growing stock trees	1,375,853	25,579	1,401,432
Sound cull trees	7,741	--	7,741
Rotten cull trees	2,655	601	3,256
Salvable dead trees	88,275	350	88,625
All timber	1,474,524	26,530	1,501,054

Table 20.--Net volume of growing stock on commercial timberland in Southwestern Montana, by forest type and species, 1978

Forest type	Species										
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western redcedar	Total softwoods
	Thousand cubic feet										
Douglas-fir	368,275	66,099	--	44,183	107	41,765	1,203	8,433	3,604	--	533,669
Ponderosa pine	30,766	200,624	--	1,074	--	3,642	369	--	391	--	236,866
Lodgepole pine	15,292	4,380	--	220,990	626	26,050	720	6,342	3,243	--	277,643
Western larch	20,267	3,892	352	6,797	--	48,293	3,922	2,962	3,612	--	90,097
Western redcedar	3,090	--	799	1,128	--	5,298	1,735	532	791	5,431	18,804
Whitebark pine	--	--	--	564	4,708	--	--	2,046	261	--	7,579
Grand fir	562	--	--	--	--	--	--	--	--	--	562
Subalpine fir-spruce	16,643	--	--	12,037	--	14,782	--	33,012	47,344	--	123,818
Engelmann spruce	2,517	418	307	10,771	--	11,899	--	3,302	49,952	1,952	81,118
Juniper	--	--	--	--	--	--	--	60	--	--	60
Aspen	--	151	--	--	--	--	--	--	--	--	151
Cottonwood	--	1,919	--	--	--	1,127	--	--	2,043	397	5,486
All types	457,412	277,483	1,458	297,544	5,441	152,856	7,949	56,689	111,241	7,780	1,375,853
	Thousand cubic meters										
All types	12 953	7 858	41	8 426	154	4 328	225	1 605	3 150	220	38 960

Forest type	Species				All speices	
	Aspen	Cottonwood	Other hardwoods	Total hardwoods		
	Thousand cubic feet					*Thousand cubic meters*
Douglas-fir	--	198	--	198	533,867	15 118
Ponderosa pine	460	1,455	--	1,915	238,781	6 762
Lodgepole pine	4,063	509	--	4,572	282,215	7 991
Western larch	--	--	--	--	90,097	2 551
Western redcedar	--	--	--	--	18,804	532
Whitebark pine	--	--	--	--	7,579	215
Grand fir	--	--	--	--	562	16
Subalpine fir-spruce	--	--	--	--	123,818	3 506
Engelmann spruce	2,597	941	--	3,538	84,656	2 397
Juniper	--	--	--	--	60	1
Aspen	330	--	--	330	481	14
Cottonwood	216	12,649	2,161	15,026	20,512	581
All types	7,666	15,752	2,161	25,579	1,401,432	--
	Thousand cubic meters					
All types	217	446	61	724	--	39 684

Table 21.--Net volume of sawtimber on commercial timberland in Southwestern Montana, by forest type and species, 1978

Forest type	Species										
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western redcedar	Total softwoods
	Thousand board feet, International 1/4-inch rule										
Douglas-fir	1,349,006	316,883	--	127,277	--	196,767	5,854	19,543	13,833	--	2,029,163
Ponderosa pine	107,181	917,531	--	5,486	--	17,630	1,934	--	2,119	--	1,051,881
Lodgepole pine	46,137	23,584	--	340,210	2,091	104,870	1,676	4,662	10,248	--	533,478
Western larch	77,105	22,940	1,939	12,797	--	248,544	12,280	6,046	16,435	--	398,086
Western redcedar	12,274	--	4,542	--	--	22,578	5,482	2,270	2,136	25,125	74,407
Whitebark pine	--	--	--	2,642	17,086	--	--	5,089	1,413	--	26,230
Grand fir	890	--	--	--	--	--	--	--	--	--	890
Subalpine fir-spruce	80,133	--	--	33,970	--	74,430	--	89,092	251,007	--	528,632
Engelmann spruce	12,534	2,534	1,662	33,109	--	72,725	--	10,306	218,068	8,983	359,921
Juniper	--	--	--	--	--	--	--	312	--	--	312
Aspen	--	774	--	--	--	--	--	--	--	--	774
Cottonwood	--	11,090	--	--	--	6,687	--	--	9,851	1,850	29,478
All types	1,685,260	1,295,336	8,143	555,491	19,177	744,231	27,226	137,320	525,110	35,958	5,033,252

Forest type	Species				All species
	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	Thousand board feet, International 1/4-inch rule				
Douglas-fir	--	983	--	983	2,030,146
Ponderosa pine	655	6,952	--	7,607	1,059,488
Lodgepole pine	4,737	1,771	--	6,508	539,986
Western larch	--	--	--	--	398,086
Western redcedar	--	--	--	--	74,407
Whitebark pine	--	--	--	--	26,230
Grand fir	--	--	--	--	890
Subalpine fir-spruce	--	--	--	--	528,532
Engelmann spruce	12,903	3,803	--	16,706	376,627
Juniper	--	--	--	--	312
Aspen	649	--	--	649	1,423
Cottonwood	--	57,440	6,179	63,619	93,097
All types	18,944	70,949	6,179	96,072	5,129,324

Table 22.--Net annual growth of growing stock and sawtimber on commercial timberland in Southwestern Montana, by ownership class and species, 1978

Ownership class	Species															
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western redcedar	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	All species
	GROWING STOCK															
	Thousand cubic feet															
State	1,335	921	1	996	-20	264	9	15	105	-6	3,620	8	18	--	26	3,646
Forest industry	3,725	1,713	-38	3,785	--	1,291	55	1,189	515	80	12,315	3	66	40	109	12,424
Private	2,629	3,259	6	3,136	-17	870	65	-50	807	-61	10,644	-26	217	--	191	10,835
Total	7,689	5,893	-31	7,917	-37	2,425	129	1,154	1,427	13	26,579	-15	301	40	326	26,905
	GROWING STOCK															
	Thousand cubic meters															
State	37.8	26.1	([1])	28.2	-0.6	7.5	0.3	0.4	3.0	-0.2	102.5	0.2	0.5	--	0.7	103.2
Forest industry	105.5	48.5	-1.1	107.2	--	36.6	1.6	33.7	14.6	2.3	348.9	0.1	1.9	1.1	3.1	352.0
Private	74.4	92.3	0.2	88.8	-0.5	24.6	1.8	-1.4	22.8	-1.7	301.3	-0.7	6.1	--	5.4	306.7
Total	217.7	166.9	-0.9	224.2	-1.1	68.7	3.7	32.7	40.4	0.4	752.7	-0.4	8.5	1.1	9.2	761.9
	SAWTIMBER															
	Thousand board feet, International 1/4-inch rule															
State	5,104	5,470	4	1,348	28	1,263	29	82	362	-30	13,660	110	48	--	158	13,818
Forest industry	16,329	9,334	-197	9,003	--	4,212	268	1,952	2,147	368	43,416	--	299	95	394	43,810
Private	13,201	18,347	39	8,105	61	1,626	189	703	1,874	-328	43,817	660	680	--	1,340	45,157
Total	34,634	33,151	-154	18,456	89	7,101	486	2,737	4,383	10	100,893	770	1,027	95	1,892	102,785

[1]Less than .05 cubic meters.

Table 23.--Annual mortality of growing stock and sawtimber on commercial timberland in Southwestern Montana, by ownership class, and softwoods and hardwoods, 1978

Species group and ownership class	Growing stock		Sawtimber
	Thousand cubic feet	*Thousand cubic meters*	*Thousand board feet*[1]
Softwoods:			
State	1,615	45.8	4,027
Forest industry	6,202	175.7	20,715
Private	2,118	60.0	6,850
Total	9,935	281.5	31,592
Hardwoods:			
State	29	0.8	138
Forest industry	2	0.1	9
Private	246	7.0	1,196
Total	277	7.9	1,343
All owners	10,212	289.4	32,935

[1]International 1/4-inch rule.

Table 24.--Annual mortality of growing stock and sawtimber on commercial timberland in Southwestern Montana, by cause of death and species, 1978

Cause of death	Species														
	Douglas-fir	Ponderosa pine	Western white pine	Lodgepole pine	Whitebark pine	Western larch	Grand fir	Subalpine fir	Engelmann spruce	Western redcedar	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	GROWING STOCK														
	Thousand cubic feet														
Insects	541	676	--	438	--	95	35	89	41	--	1,915	--	--	--	1,915
Disease	274	--	73	350	--	--	--	211	--	--	908	66	--	66	974
Fire	474	56	--	--	--	--	--	--	--	--	530	--	32	32	562
Weather	1,218	39	--	352	--	234	--	98	618	--	2,559	63	--	63	2,622
Suppression	37	8	--	--	--	--	--	--	--	--	45	--	--	--	45
Unknown	590	307	--	1,281	73	339	--	575	282	103	3,550	116	--	116	3,666
Logging	229	31	--	51	--	--	--	--	117	--	428	--	--	--	428
Total	3,363	1,117	73	2,472	73	668	35	973	1,058	103	9,935	245	32	277	10,212
	GROWING STOCK														
	Thousand cubic meters														
Insects	15.3	19.1	--	12.4	--	2.7	1.0	2.5	1.2	--	54.2	--	--	--	54.2
Disease	7.8	--	2.1	9.9	--	--	--	6.0	--	--	25.8	1.9	--	1.9	27.7
Fire	13.4	1.6	--	--	--	--	--	--	--	--	15.0	--	0.9	0.9	15.9
Weather	34.5	1.1	--	10.0	--	6.6	--	2.8	17.5	--	72.5	1.8	--	1.8	74.3
Suppression	1.0	0.2	--	--	--	--	--	--	--	--	1.2	--	--	--	1.2
Unknown	16.7	8.7	--	36.3	2.1	9.6	--	16.3	8.0	3.0	100.7	3.3	--	3.3	104.0
Logging	6.5	0.9	--	1.4	--	--	--	--	3.3	--	12.1	--	--	--	12.1
Total	95.2	31.6	2.1	70.0	2.1	18.9	1.0	27.6	30.0	3.0	281.5	7.0	0.9	7.9	289.4
	SAWTIMBER														
	Thousand board feet, International 1/4-rule														
Insects	1,195	3,212	--	1,327	--	432	--	--	--	--	6,166	--	--	--	6,166
Disease	906	--	405	1,122	--	--	--	880	--	--	3,313	322	--	322	3,635
Fire	573	177	--	--	--	--	--	--	--	--	750	--	150	150	900
Weather	6,070	201	--	989	--	1,200	--	--	3,013	--	11,473	303	--	303	11,776
Suppression	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Unknown	1,537	1,172	--	1,635	--	1,290	--	1,416	1,274	507	8,831	568	--	568	9,399
Logging	694	--	--	--	--	--	--	--	365	--	1,059	--	--	--	1,059
Total	10,975	4,762	405	5,073	--	2,922	--	2,296	4,652	507	31,592	1,193	150	1,343	32,935

Felt, Dorothy G.; Sterrett, Velma J. Forest area and timber resource statistics for State and private lands in Southwestern Montana, 1978. Resour. Bull. INT-28. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1983. 30 p.

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Resources Evaluation standards.

KEYWORDS: forest surveys (regional), forest area classification, stand volume

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

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**Intermountain
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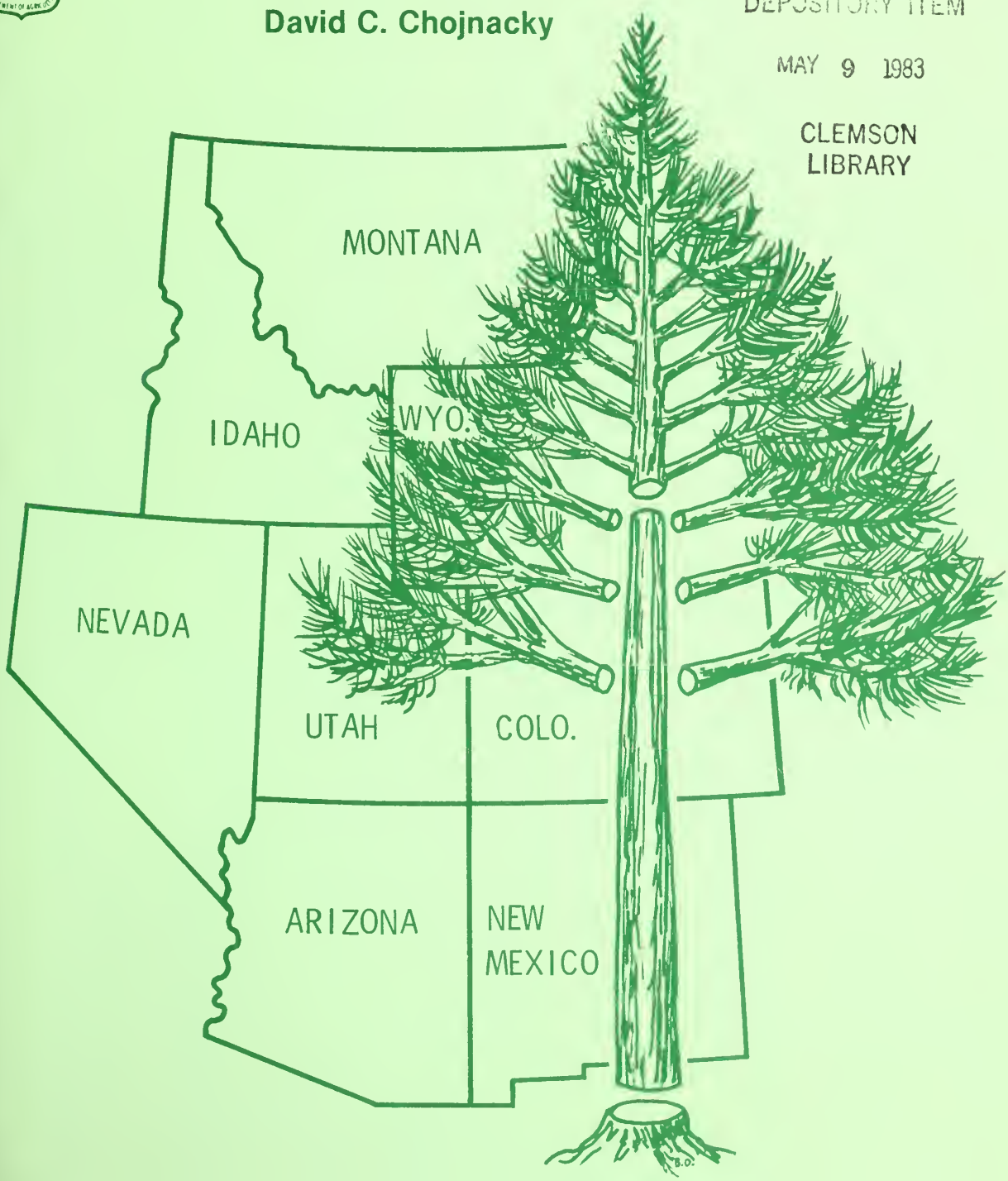
Whole Tree Volume Estimates For The Rocky Mountain States

Dwane D. Van Hooser
David C. Chojnacky



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RESEARCH SUMMARY

The increasing cost of fossil fuels and the rising demand for wood as an alternative have created a need to estimate the amount of wood available from the whole tree, not just the merchantable stem. This report describes methods for converting merchantable volume to weight, and for predicting weights and volumes of wood in tops and limbs. The techniques were used to convert basic merchantable volume statistics for the Rocky Mountain States to dry weight for tree components such as bole, top, and limbs.

The study indicates that the whole tree will produce 31 percent more wood fiber than the merchantable bole alone. An appendix provides data summaries by species, diameter class, type of timber, tree component, and ownership for the Rocky Mountain States.

CONTENTS

Whole Tree Volume Estimates For The Rocky Mountain States

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INTRODUCTION

Wood has historically been a major source of fuel. As recently as 1950 fuelwood was the third-ranking product being removed from the forests of the United States (USDA 1958). From the early 1950's until recently, however, the amount of material cut specifically for fuelwood was on the decline, dropping from more than 58 million cords in 1952 to just over 16 million cords in 1970 (USDA 1974). Recent evidence indicates this trend is reversing (USDA 1982).

Worldwide demand for energy is rising rapidly, with an associated rise in price; predictably, material only marginally useful for fuel is becoming more and more appealing. To fully evaluate how much of this material might be available for conversion to fuel or energy, techniques must be developed to convert conventional summaries of merchantable volume to estimates of total wood fiber.

For example, the most recent analysis of the timber situation in the United States indicates that the Rocky Mountain States contain 112.4 billion cubic feet of timber, of which 89 percent is classed as growing stock, 7 percent as salvable dead, and the remainder as rough or rotten trees (terms are defined in appendix A). As a first step in analyzing the availability of this material for fuel, a manager would convert these estimates to component weight and estimate the amount of material that might be potentially available from those components of the tree that are not included in these estimates of merchantable volume; namely, tops, limbs, and bark. The manager would also estimate how much material is potentially available from other than commercial timberland, logging slash, and mill residues. These estimates are beyond the scope of this paper; however, the need for obtaining these data is receiving serious consideration in current and for future resource inventories.

This paper presents factors for converting current estimates of merchantable volume to weight, and models for predicting the weights and volume of tops and limbs. Moreover, these factors and models were used to convert the basic timber statistics for the Rocky Mountain States (fig. 1) from cubic foot volume to dry weight for each tree component (fig. 2). Data summaries are found in appendix B.

Even though the summaries presented in this report are based on the most up-to-date information available for the Rocky Mountain States, the nature of the data was such that only gross estimators could be used to predict bole, top, and limb weights. Although not as precise as desired, the data do represent a first step in providing fiber estimates of the total forest resource in the Rocky Mountain States.

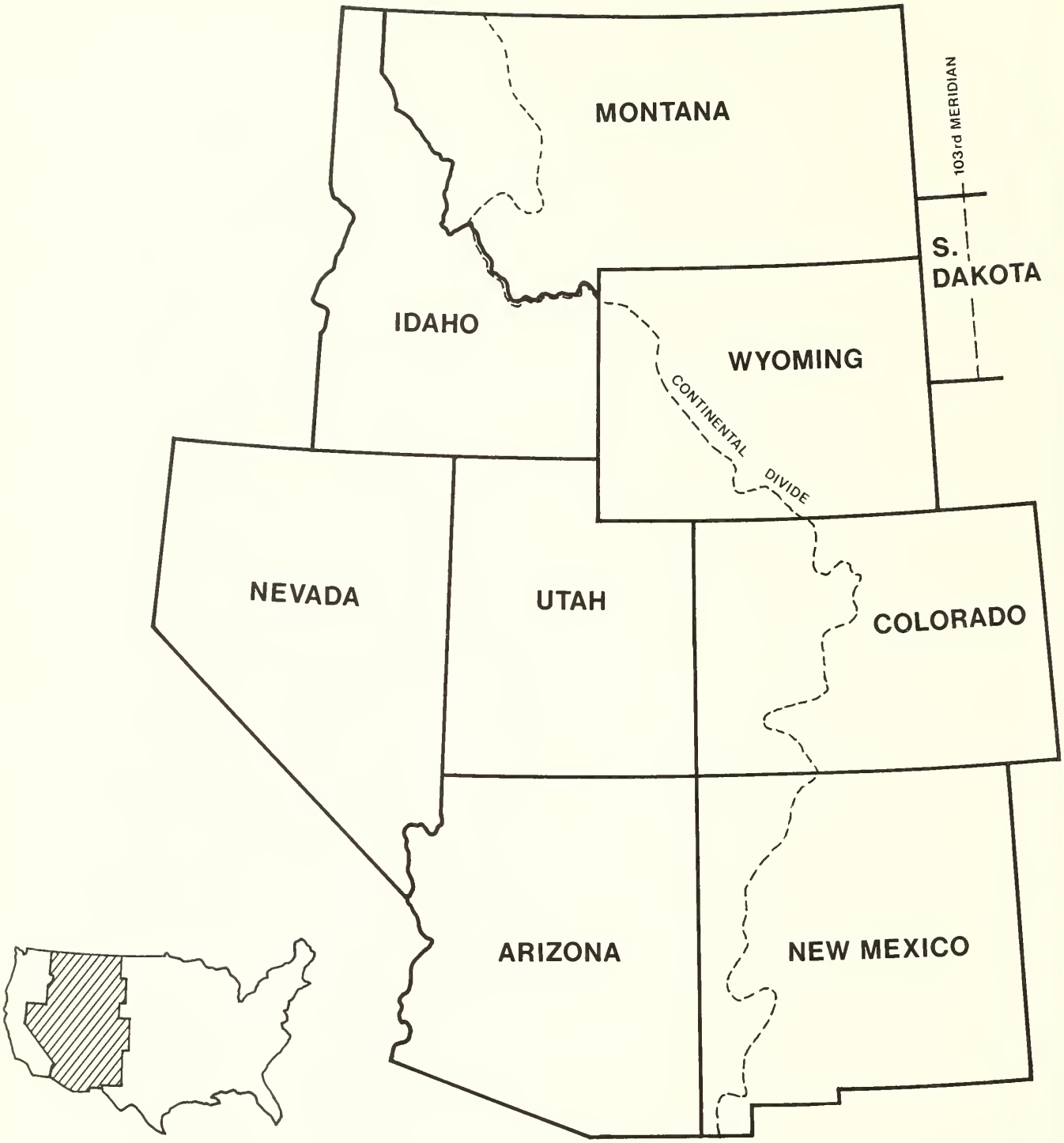

Figure 1.—Rocky Mountain States.

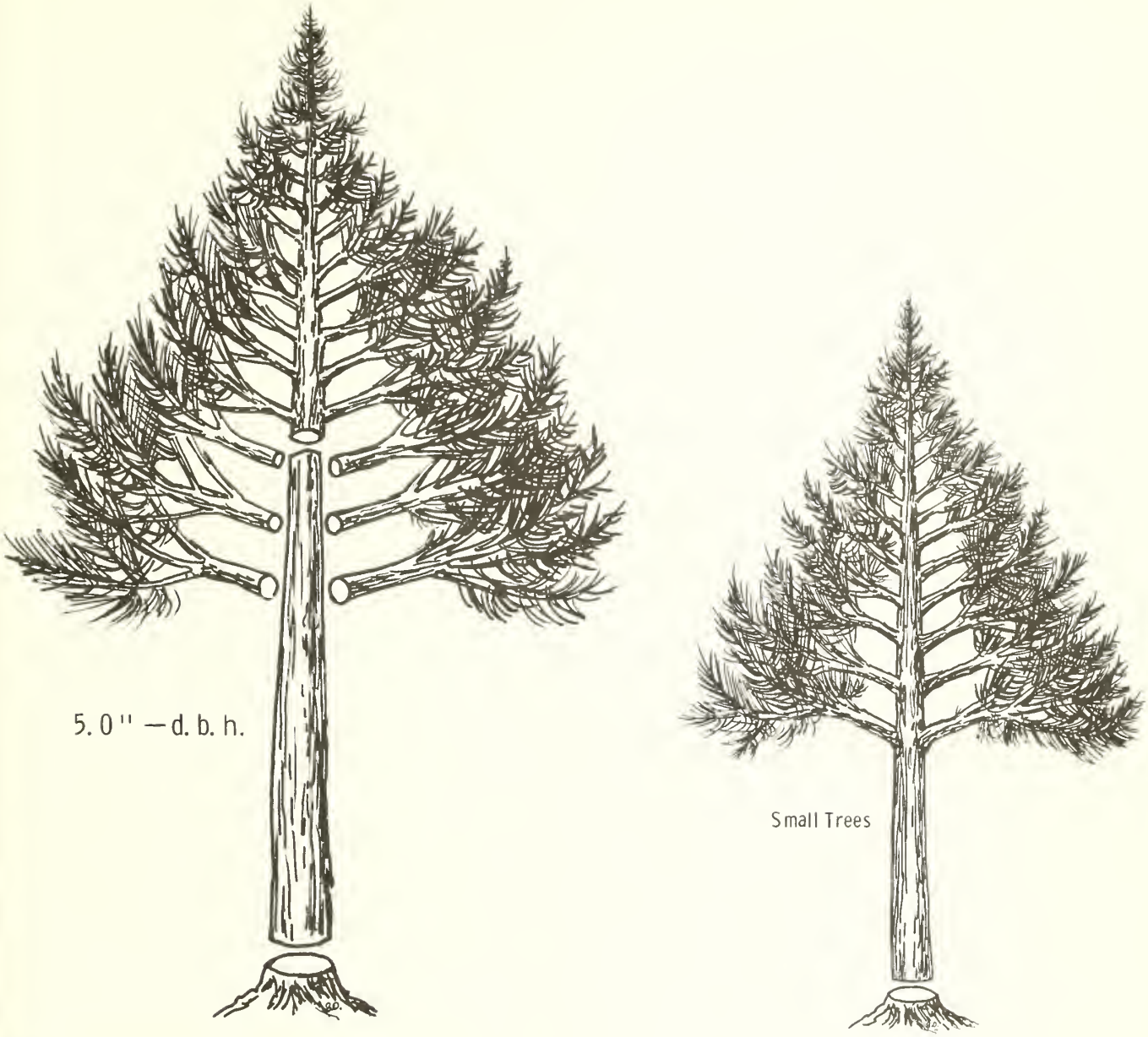

Figure 2.—Tree components.

METHODS

Few methods exist for estimating total weight for trees of the Rocky Mountain region. There are, however, equations available for estimating total tree weight for Rocky Mountain tree species occurring in Canada and the Pacific Northwest (Kurucz 1961; Krumlik 1974; Johnstone 1970; and Gholz and others 1979). These models could not be used because the data base available for total fiber was not compatible with individual tree prediction equations.

Some equations had been developed for calculating the weight of various components of trees. Brown (1978) has developed crown weight prediction equations for northern Idaho and Montana conifers. Gary (1976) worked on lodgepole pine (*Pinus contorta* Dougl.) crown structure and biomass in Colorado. Bartos and Johnston (1978) have developed equations for aspen (*Populus tremuloides* Michx.) in Utah and Wyoming. Zimmerman (1979) estimated biomass for aspen and several northeastern Utah conifers. Snell and Max (1982) have developed bark-to-wood ratios for determining the amount of bark on a tree from the volume or weight of bole wood. These models were used or, in some cases, modified by reanalyzing the raw data, in order to develop the summaries in appendix B.

The data base for this study was the resource summaries developed for the latest timber appraisal (USDA 1982) and included numbers of trees and bole wood volume to a 4-inch top summarized by State, ownership, species, and diameter class. Because the data were already grouped into State-level estimates, bole volume was converted to weight using wood density factors. Top and branch weights were estimated using regression equations, with separate equations developed for trees 5.0 inches d.b.h. and larger, and also for trees less than 5.0 inches d.b.h.

Small Trees

Because the survey procedures used by the Forest Survey project do not include bole-length measurements on trees less than 5.0 inches d.b.h., no attempt was made to separate the weight of small trees into the same components used for trees 5.0 inch and larger in d.b.h. Instead, the bole component was included in the top and branch estimate for small trees.

Trees 5.0 Inches D.B.H. and Larger

Bole weight.—Bole weight was estimated by using wood density factors (table 1) derived from tables 3-7 and 4-2 in the Wood Handbook (USDA 1974) and other available sources. Wood density, which is a function of the specific gravity of the wood and the density of water, is highly variable both within and between species. In the Rocky Mountain States, available data suggests a range of wood densities from slightly more than 19 lb/ft^3 for cottonwood to just over 34 lb/ft^3 for Southwestern hardwoods.

To paraphrase the Wood Handbook, the calculation of wood density at specified levels of moisture content is usually based on average species characteristics. The true value will, of course, differ because of natural variations in anatomy, actual moisture content, and the proportions of heartwood and sapwood that occur. Nevertheless, the approximation of wood density is considered sufficiently accurate to permit proper utilization of wood products where weight is required.

Table 1—Generalized wood density factors by species for the Rocky Mountain States[1]

Species	Wood density factor
	Pounds/cubic foot ovendry
Softwoods	
True fir	
White fir	23.09
Subalpine fir	19.34
Grand fir	21.84
Western redcedar	19.34
Western hemlock	26.21
Western larch	29.95
Lodgepole pine	23.71
Ponderosa pine	23.71
Western white pine	21.84
Engelmann spruce	20.59
Douglas-fir	
Idaho, Montana, Wyoming	28.08
Utah, Arizona, Colorado, New Mexico, Nevada, and Western South Dakota	26.83
Other softwoods	23.71
Hardwoods	
Aspen	21.84
Cottonwood	19.34
Other hardwoods	
Arizona, New Mexico	34.32
All remaining States	24.96

[1]These factors are regionwide averages. The factors used to develop the summaries in appendix B varied by ownership class and State and are available from the authors.

The bark portion of bole weight was estimated by multiplying the bole weight by a bark-to-wood ratio (table 2). Ratios for all species except Engelmann spruce (*Picea engelmannii* Parry), subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.), and aspen were taken from work done by Snell and Max (1982) in the Pacific Northwest. The spruce, subalpine fir, and aspen ratios were developed from data collected by Zimmerman (1979) in Utah. These ratios were computed by the jackknife estimation method used by Snell and Max. Ratios for "other softwoods" and "other hardwoods" in table 2 were estimated based on similarities to species for which bark ratios were known.

Table 2.—Bark-to-wood weight ratios by species for the Rocky Mountain States

Species	Bark-to-wood ratio
Softwoods	
True firs	
White fir	0.18
Subalpine fir	.18
Grand fir	.18
Western redcedar	.10
Western hemlock	.13
Western larch	.10
Lodgepole pine	.08
Ponderosa pine	.19
Western white pine	.16
Engelmann spruce	.13
Douglas-fir	.15
Other softwoods	.10
Hardwoods	
Aspen	.27
Other hardwoods	.27

Bole weight for trees 5 inches d.b.h. and larger was computed as follows:

$$BBM_{ij} = BV_{ij} \cdot WD_j \cdot B_i \qquad (1)$$

where:

BBM_{ij} = ovendry bole weight in pounds from a 1-foot stump to a 4-inch top diameter for trees in the *i*th diameter class, and for the *j*th species

BV_{ij} = cubic foot bole volume inside bark in cubic feet from a 1-foot stump to a 4-inch top diameter for trees in the *i*th diameter class, and the *j*th species

WD_j = ovendry wood density in pounds per cubic foot for trees in the *j*th species (table 1)

B_i = bark factor for *j*th species (table 2).

Weight of tops and branches.—Top and branch weight was estimated from prediction equations developed from Brown's (1978) data (table 3). Brown determined the weight of the tops and branches, including bark, for 98 trees including Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco), Engelmann spruce (*Picea engelmannii* Parry), grand fir

(*Abies grandis* [Dougl.] Lindl.), lodgepole pine, ponderosa pine (*Pinus ponderosa* Laws.), subalpine fir, western hemlock (*Tsuga heterophylla* [Raf.] Sarg.), western larch (*Larix occidentalis* Nutt.), western redcedar (*Thuja plicata* Donn), western white pine (*Pinus monticola* Dougl.), and whitebark pine (*Pinus albicaulis* Engelm.). For the most part, sampled trees were less than 15 inches d.b.h. There were, however, some trees as large as 38 inches d.b.h. sampled in ponderosa pine, Douglas-fir, and western redcedar.

Table 3.—Top and branch weight per tree by species group and diameter class

D.b.h. class	Pines[1]	Other softwoods[2]	Hardwoods[3]
	Pounds per tree ovendry		
6	46.25	37.68	11.29
8	47.81	61.43	28.79
10	74.70	90.80	59.31
12	126.92	125.80	102.07
14	204.46	166.42	151.29
16	307.33	212.67	198.63
18	435.53	264.54	237.03
20	589.06	322.04	263.23
22	767.91	385.16	277.89
24	972.09	453.90	284.12
26	1201.60	528.28	285.71
28	1456.43	608.27	285.80
30	1736.59	693.89	285.80

[1]Includes ponderosa pine and white pine; and lodgepole pine to 12-inch d.b.h.

[2]Includes all other softwoods and lodgepole pine 14 inches d.b.h. and larger.

[3]Includes all hardwoods.

Because there were limited samples within each species, only two regression equations were developed from Brown's data. In addition, scatter diagrams of top and branch weight over d.b.h. indicated that two models would essentially include all observations. The pines were combined, and all other conifers were combined for the following equations:

Pines:

$$TB = 193.5 - 43.5412 \cdot D + 3.1659 \cdot D^2 \quad (2)$$

$R^2 = 0.96$
Mean = 479 lb
Standard deviation = 143 lb

where:

TB = ovendry top, branch, and bark weight in pounds for ponderosa pine, white pine, and lodgepole pine < 14 inches d.b.h.

D = diameter in inches at 4.5 feet.

Other conifers:

$$TB = 0.191 + 2.0304 \cdot D + 0.7031 \cdot D^2 \quad (3)$$

$R^2 = 0.88$
Mean = 156 lb
Standard deviation = 71 lb

where:

TB = ovendry top, branch, and bark weight in pounds for all Rocky Mountain conifers other than pines, with one exception: lodgepole pine > 14 inches d.b.h. was included in this group.

D = diameter in inches at 4.5 feet.

The weight of tops and branches for hardwoods was computed using Bartos and Johnston's (1978) aspen equation:

$$TB = (129.69 \cdot K - 0.05) \cdot (2.2046) \quad (4)$$

where:

TB = ovendry top, branch, and bark weight in pounds for aspen and all other Rocky Mountain hardwoods

$$K = exp^{-\left|\frac{D - 1}{\frac{27.56}{0.56}}\right|^{3.5}}$$

D = diameter in inches at 4.5 feet.

The weights by diameter class developed by regression equations are presented in table 3 and were used to compute top and branch weight in the following way:

$$TBBM_{ij} = N_{ij} \cdot TB_{ij} \quad (5)$$

where:

$TBBM_{ij}$ = ovendry weight in pounds. Includes top wood and bark from a 4-inch diameter to the tip of the tree, and all branch material up to 1/4-inch diameter, for all trees in the *i*th diameter class, and for the *j*th species

TB_{ij} = ovendry weight of tops and branches, including bark, for trees in the *i*th diameter class, and for the *j*th species (table 3)

N_{ij} = number of trees in the *i*th diameter class, and for the *j*th species.

Brown's (1978) data were used to derive weight estimates for small conifers. Weights were graphed by d.b.h. for 234 trees of 12 species from Idaho and Montana. Weights for 2- and 4-inch diameter classes were interpolated from these graphs (table 4).

Bartos and Johnston's (1978) aspen equation was used to determine hardwood top and branch weight:

$$TB = (713.05 \cdot K - 0.28) \cdot (2.2046) \quad (6)$$

where:

$$K = exp^{-\left|\frac{D - 1}{\frac{27.56}{0.56}}\right|^{3.5}}$$

D = diameter at 4.5 feet in inches

TB = ovendry top and branch in pounds for aspen and all other Rocky Mountain hardwoods.

The weights that were developed by diameter class are listed in table 4, and were used to compute whole tree weights in the following way:

$$TBBM_{ij} = N_{ij} \cdot TB_{ij} \quad (7)$$

where:

$TBBM_{ij}$ = ovendry weight in pounds. Includes wood and bark in main stem from 1-foot stump to top of the tree, and branch material up to 1/4-inch diameter, for trees in the *i*th diameter class, and for the *j*th species

N_{ij} = number of trees less than 5.0 inches d.b.h. in the *i*th diameter class and for the *j*th species

TB_{ij} = ovendry weight in pounds for trees in the *i*th diameter class, and for the *j*th species.

Table 4.—Individual weights for small trees by diameter class and species

Species	Two-inch d.b.h. class	Four-inch d.b.h. class
	Pounds/tree ovendry	
Softwoods		
True fir		
Subalpine fir	11	43
Grand fir	10	43
Western redcedar	9	38
Western hemlock	10	38
Western larch	10	50
Lodgepole pine	10	40
Ponderosa pine	10	40
Western white pine	9	42
Engelmann spruce	12	43
Douglas-fir	11	49
Other softwoods	10	43
Hardwoods		
All	4	19

DISCUSSION

The information presented in this paper can be used in making various approximations. For example, the summaries presented in appendix B can be used as current estimates of the weight for the standing resource by species and diameter and by ownership and type of timber for each State in the Rocky Mountain Region. These data also can be used to develop additional factors that can in turn be applied to other resource estimates. As an example, by applying the factors derived from the data in appendix B to the estimate of growth, mortality, and removals presented in appendix 3 of the recent timber situation analysis (USDA 1982), the latter data would be converted to weight estimates.

Factors for determining the proportion of tree weight contributed by tree component in the Northern Rocky Mountains can be determined from table B-10 (appendix B.) Factors for Douglas-fir, which has a total dry weight of 351.6 million tons, would be computed as follows:

Bole factor = (279.1/351.6) · 100
= 79 percent

Top factor = (72.4/351.6) · 100
= 21 percent

Probably a more useful factor to apply to resource statistics would be top and limb weight as a percent of merchantable bole weight. Again using the estimates for Douglas-fir found in table B-10, appendix B, this factor would be computed as:

Top/bole factor = (72.4/279.1) · 100
= 26 percent

In other words, total measurable tree weight (bole, tops, and limbs) is 131 percent of merchantable bole weight.

Under the assumption that stand dynamics are such that this relationship of top weight to bole weight will not change in 1 year's time, this factor can be applied to the growth data for Douglas-fir in the Northern Rocky Mountains—298 million cubic feet[1]—to obtain an estimate of total additional fiber potentially available for fuel as follows:

Net annual growth

Merchantable section = (298 mm ft^3 · 28.08[2] lb/ft^3)
= 8,368 million lb

Top, limbs, etc. = 8,368 million lb · 0.26
= 2,175 million lb

Total potential for fuel = 8,368 million lb + 2,175 million lb
= 10,543 million lb
= 5.3 million tons

Similar factors can be generalized for just softwoods and hardwoods, and for growing stock, rough and rotten culls, and small trees.

The resource summaries presented in appendix B are based on net volumes for growing stock and rough and rotten culls, and are therefore conservative when considered for fiber or fuel potential. By Forest Survey standards a tree can have up to two-thirds of its total volume in cull material and still be classified as growing stock. A rough cull will have two-thirds or more of its total volume in cull material, of which less than half is missing or rotten. The solid cull material is usually severe sweep, crook, or forks that could be easily utilized for fuel. In either case the cull material is deducted from the total gross tree volume. Thus, use of factors developed from the summaries presented in appendix B would very likely underestimate the weight of material potentially available for fuel.

[1]Table 37, appendix 3 (USDA 1982).

[2]Wood density factor for Douglas-fir from table 1.

MANAGEMENT IMPLICATIONS

Summaries like those presented in this report would have greater utility, if they were based on individual tree predictions, rather than State aggregations. At a minimum, this would provide for developing subregional tabulations that would be of greater use to resource managers. Using individual trees as a basis for developing summaries would also make it possible to produce gross rather than net estimates. As alluded to above, a growing stock tree can have up to two-thirds of its volume in missing or cull material. The ability to include this material in estimates of the resource would certainly provide a more accurate assessment of the wood fiber potential within the area of concern.

The use of individual tree attributes rather than data aggregations would also allow the resource manager to use more sophisticated models for predicting wood fiber potential. In this report, model selection was restricted to those that could predict weight based on diameter. Models do exist, however, that include other tree attributes as well.

The summaries presented here also do not include estimates of the wood fiber potential from lands that are not considered commercial timberland. Latest statistics for the Rocky Mountain States indicate that there are some 69 million acres of other forest lands, plus 11 million acres of productive forest land set aside for some use other than timber harvest. No volume or weight estimates are currently available for these lands. The other forest lands are going to be especially important in the future as a source of fiber for fuel. For example, in some of the Rocky Mountain States the value of pinyon pine (*Pinus edulis* Engel. and *Pinus monophylla* Torr. & Frém.) and juniper (*Juniperus* spp.) species for fuelwood now exceeds the value of most "commercial" species for conversion to forest products.

To fully evaluate the wood fiber situation in the Rocky Mountain States, and the nation as a whole, resource specialists must broaden their inventories to include all lands supporting woody vegetation. At the same time, more research must be directed at developing regionalized models for predicting tree component weight and volume estimates for all trees, including those that have not been of commercial value.

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APPENDIX A: GLOSSARY

Bureau of Land Management land—Federal lands administered by the Bureau of Land Management, U.S. Department of the Interior.

Commercial species—Tree species suitable for industrial wood products.

Commercial timberland—Forest land which is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as commercial timber-land have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently, inaccessible and inoperable areas are included.)

Cord—A pile of stacked wood containing 128 cubic feet within its outside surfaces. The standard dimensions are 4 by 4 by 8 feet.

Cull trees—Live trees of sawtimber and poletimber size that are unmerchantable for saw logs now or prospectively because of roughness, rot, or species (also see rotten trees and rough trees).

Deferred forest land—National Forest lands that meet productivity standards for commercial forest, but are under study for possible inclusion in the Wilderness System.

Diameter classes—A classification of trees based on diameter outside bark measured at breast height (4½ feet above the ground). D.b.h. is the common abbreviation for "diameter at breast height." When using 2-inch diameter classes the 6-inch class, for example, includes trees 5.0 through 6.9 inches d.b.h. inclusive.

Farmer and other private—All private ownerships except industry.

Farmer-owned lands—Lands owned by a person who operates a farm, either doing the work himself or directly supervising the work.

Forest industry lands—Lands owned by companies or individuals operating wood-processing plants.

Forest land—Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. (Also see Commercial timberland, Productive-reserved forest land, and Other forest land.) Forest land includes transition zones, such as areas between heavily forested and nonforested lands that are at least 10 percent stocked with forest trees, and forest areas adjacent to urban and built-up lands. Also included are pinyon-juniper and chaparral areas in the West, and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet in width.

Growing-stock trees—Live sawtimber trees, poletimber trees, saplings, and seedlings meeting specified standards of quality or vigor; excludes cull trees.

Growing-stock volume—Net volume in cubic feet of live sawtimber and poletimber trees from stump to a minimum 4-inch top (of central stem) outside bark or to the point where the central stem breaks into limbs.

Growth—See definition for "Net annual growth."

Hardwoods—Dicotyledonous trees, usually broadleaved and deciduous.

Indian lands—Tribal lands held in fee by the Federal Government but administered for Indian tribal groups, and Indian trust allotments.

Industrial wood—All commercial roundwood products except fuelwood.

Land area—Census definition: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres of area.
Forest Survey definition: Same as above except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Logging residues—The unused portions of poletimber and sawtimber trees cut or killed by logging.

Mortality—The volume of sound wood in live trees that have died from natural causes during a specified period.

National Forest System land—Federal lands designated by Executive Order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service including experimental areas and Bankhead-Jones Title III lands.

Net annual growth—The net increase in the volume of trees during a specified year. Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became rough or rotten trees during the year.

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

Other Federal land—Federal land other than lands administered by the Forest Service or the Bureau of Land Management.

Other forest land—Forest land incapable of producing 20 cubic feet per acre of industrial wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Other land—All land area other than forest and range lands.

Other private land—Privately owned land other than forest industry or farmer-owned.

Other public land—Publicly owned land other than National Forest System land.

Other species—Tree species of typical small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Ownership—The property owned by one owner, including all parcels of land in the United States.

Plant byproducts—Wood material from primary manufacturing plants (such as slabs, edgings, trimmings, miscuts, sawdust shavings, veneer cores and clippings, and pulp screenings) that are used for some products.

Poletimber trees—Live trees of commercial species at least 5.0 inches in diameter breast height but smaller than sawtimber size, and of good form and vigor.

Productive-reserved forest land—Productive public forest land withdrawn from timber utilization through statute or administrative regulations.

Removals—The net volume of growing-stock or sawtimber trees removed from the inventory by harvesting; cultural operations, such as timber stand improvement; land clearings; or changes in land use.

Residues—

Coarse residues—Plant residues suitable for chipping, such as slabs, edgings, and ends.

Fine residues—Plant residues not suitable for chipping, such as sawdust, shavings, and veneer clippings.

Logging residues—The unused portions of sawtimber and poletimber trees cut or killed by logging.

Plant residues—Wood materials from primary manufacturing plants that are not used for any product.

Urban residues—Wood materials from urban areas, such as newspapers, lumber and plywood from building demolition, and used packaging and shipping wood materials.

Rotten trees—Live trees of commercial species that do not contain a saw log now or prospectively, primarily because of rot (e.g., when rot accounts for more than 50 percent of the total cull volume).

Rough trees—(a) Live trees of commercial species that do not contain a saw log, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross tree volume in sound material; and (b) all live trees of noncommercial species.

Salvable dead trees—Standing or down dead trees that are considered currently or potentially merchantable by regional standards.

Saw log—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods) or other combinations of size and defect specified by regional standards.

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

Saw log top—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7.0 inches d.o.b. for softwoods, and 9.0 inches d.o.b. for hardwoods.

Sawtimber trees—Live trees of commercial species containing at least one 12-foot saw log or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9 inches in diameter and hardwood trees 11 inches in diameter at breast height.

Small trees—Live trees of commercial species 1.0 inch to 5.0 inches in diameter at breast height and of good form and vigor.

Softwoods—Coniferous trees, usually evergreen, having needle or scalelike leaves.

State, county, and municipal lands—Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Upper-stem portion—That part of the main stem or fork of sawtimber trees above the saw log top to a minimum top diameter of 4.0 inches outside bark or to the point where the main stem or fork breaks into limbs.

Table B-1.—Dry weight of growing stock by species, tree component, and diameter class, Arizona, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	5,194	263	265	332	367	448	442	439	377	1,275	986
TOP	1,429	147	128	126	128	129	124	111	89	300	147
TOTAL	6,623	410	393	458	495	577	566	550	466	1,575	1,133
PONDEROSA PINE											
BOLE	54,207	2,020	2,521	3,529	4,142	4,431	4,727	5,343	5,194	17,432	4,868
TOP	24,718	2,262	1,538	1,652	1,772	1,834	1,924	2,123	2,102	7,603	1,908
TOTAL	78,925	4,282	4,059	5,181	5,914	6,265	6,651	7,466	7,296	25,035	6,776
TRUE FIRS											
BOLE	2,957	108	136	293	259	365	311	223	246	566	450
TOP	881	71	96	122	92	106	76	55	55	134	74
TOTAL	3,838	179	232	415	351	471	387	278	301	700	524
ENGELMANN SPRUCE											
BOLE	3,424	123	164	195	444	469	547	383	427	583	89
TOP	1,287	87	149	137	201	173	162	105	99	154	20
TOTAL	4,711	210	313	332	645	642	709	488	526	737	109
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
OTHER SOFTWOODS											
BOLE	811	41	68	48	95	76	74	76	66	184	83
TOP	308	58	34	19	35	25	26	22	19	55	15
TOTAL	1,119	99	102	67	130	101	100	98	85	239	98
TOTAL SOFTWOODS											
BOLE	66,593	2,555	3,154	4,397	5,307	5,789	6,101	6,464	6,310	20,040	6,476
TOP	28,623	2,625	1,945	2,056	2,228	2,267	2,312	2,416	2,364	8,246	2,164
TOTAL	95,216	5,180	5,099	6,453	7,535	8,056	8,413	8,880	8,674	28,286	8,640
ASPEN & COTTONWOOD											
BOLE	3,044	386	447	467	540	444	294	226	127	112	1
TOP	728	60	92	120	145	126	82	57	26	20	0
TOTAL	3,772	446	539	587	685	570	376	283	153	132	1
OTHER HARDWOODS											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
TOTAL HARDWOODS											
BOLE	3,044	386	447	467	540	444	294	226	127	112	1
TOP	728	60	92	120	145	126	82	57	26	20	0
TOTAL	3,772	446	539	587	685	570	376	283	153	132	1
TOTAL ALL SPECIES											
BOLE	69,637	2,941	3,601	4,864	5,847	6,233	6,395	6,690	6,437	20,152	6,477
TOP	29,351	2,685	2,037	2,176	2,373	2,393	2,394	2,473	2,390	8,266	2,164
TOTAL	98,988	5,626	5,638	7,040	8,220	8,626	8,789	9,163	8,827	28,418	8,641

Table B-2.—Dry weight of growing stock by species, tree component, and diameter class, Colorado, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	18,325	3,659	2,129	2,020	1,721	1,651	1,756	1,352	1,147	2,170	720
TOP	5,648	787	962	941	701	562	501	346	264	475	109
TOTAL	23,973	4,446	3,091	2,961	2,422	2,213	2,257	1,698	1,411	2,645	829
PONDEROSA PINE											
BOLE	12,569	669	934	1,016	1,587	1,597	1,314	1,009	1,069	2,610	764
TOP	7,460	995	671	645	885	838	691	517	546	1,397	275
TOTAL	20,029	1,664	1,605	1,661	2,472	2,435	2,005	1,526	1,615	4,007	1,039
TRUE FIRS											
BOLE	24,033	4,384	4,038	3,762	3,070	2,387	2,059	1,567	974	1,533	259
TOP	8,571	1,490	1,733	1,610	1,141	795	620	438	249	438	57
TOTAL	32,604	5,874	5,771	5,372	4,211	3,182	2,679	2,005	1,223	1,971	316
ENGELMANN SPRUCE											
BOLE	61,680	4,737	5,260	6,879	7,563	7,479	7,241	6,270	4,801	9,911	1,539
TOP	17,532	1,793	2,191	2,579	2,381	2,048	1,757	1,408	991	2,118	266
TOTAL	79,212	6,530	7,451	9,458	9,944	9,527	8,998	7,678	5,792	12,029	1,805
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	39,276	9,850	8,384	7,352	5,951	4,053	1,985	1,029	460	212	0
TOP	11,062	3,494	2,291	1,848	1,612	995	461	218	91	52	0
TOTAL	50,338	13,344	10,675	9,200	7,563	5,048	2,446	1,247	551	264	0
OTHER SOFTWOODS											
BOLE	1,505	404	211	240	172	167	105	94	57	55	0
TOP	631	112	109	126	90	74	43	35	18	24	0
TOTAL	2,136	516	320	366	262	241	148	129	75	79	0
TOTAL SOFTWOODS											
BOLE	157,388	23,703	20,956	21,269	20,064	17,334	14,460	11,321	8,508	16,491	3,282
TOP	50,904	8,671	7,957	7,749	6,810	5,312	4,073	2,962	2,159	4,504	707
TOTAL	208,292	32,374	28,913	29,018	26,874	22,646	18,533	14,283	10,667	20,995	3,989
ASPEN & COTTONWOOD											
BOLE	33,284	4,696	8,960	8,023	5,152	2,969	1,656	940	483	405	0
TOP	6,993	1,205	1,607	1,656	1,141	675	370	190	88	61	0
TOTAL	40,277	5,901	10,567	9,679	6,293	3,644	2,026	1,130	571	466	0
OTHER HARDWOODS											
BOLE	18	0	4	8	6	0	0	0	0	0	0
TOP	6	0	1	2	3	0	0	0	0	0	0
TOTAL	24	0	5	10	9	0	0	0	0	0	0
TOTAL HARDWOODS											
BOLE	33,302	4,696	8,964	8,031	5,158	2,969	1,656	940	483	405	0
TOP	6,999	1,205	1,608	1,658	1,144	675	370	190	88	61	0
TOTAL	40,301	5,901	10,572	9,689	6,302	3,644	2,026	1,130	571	466	0
TOTAL ALL SPECIES											
BOLE	190,690	28,399	29,920	29,300	25,222	20,303	16,116	12,261	8,991	16,896	3,282
TOP	57,903	9,876	9,565	9,407	7,954	5,987	4,443	3,152	2,247	4,565	707
TOTAL	248,593	38,275	39,485	38,707	33,176	26,290	20,559	15,413	11,238	21,461	3,989

Table B-3.—Dry weight of growing stock by species, tree component, and diameter class, Idaho, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	138,161	6,041	9,386	12,303	13,829	16,406	14,163	12,446	11,124	29,108	13,355
TOP	30,779	2,986	3,456	3,685	3,508	3,607	2,791	2,275	1,882	4,838	1,751
TOTAL	168,940	9,027	12,842	15,988	17,337	20,013	16,954	14,721	13,006	33,946	15,106
PONDEROSA PINE											
BOLE	43,469	597	1,057	2,002	2,681	3,275	2,936	2,712	2,395	10,817	14,997
TOP	14,194	917	587	727	955	1,111	1,029	921	808	3,530	3,609
TOTAL	57,663	1,514	1,644	2,729	3,636	4,386	3,965	3,633	3,203	14,347	18,606
TRUE FIRS											
BOLE	85,408	5,269	8,057	9,763	9,559	9,356	8,353	7,503	5,856	14,520	7,172
TOP	22,212	3,345	3,307	3,196	2,532	2,198	1,760	1,454	1,054	2,494	872
TOTAL	107,620	8,614	11,364	12,959	12,091	11,554	10,113	8,957	6,910	17,014	8,044
ENGELMANN SPRUCE											
BOLE	24,659	656	1,233	1,676	2,142	2,519	2,584	2,533	2,486	6,383	2,447
TOP	5,637	412	527	545	571	595	542	482	440	1,188	335
TOTAL	30,296	1,068	1,760	2,221	2,713	3,114	3,126	3,015	2,926	7,571	2,782
WESTERN LARCH											
BOLE	26,494	2,005	2,951	3,188	2,935	2,919	2,330	2,043	1,615	4,406	2,102
TOP	5,220	799	897	778	584	511	373	292	209	591	186
TOTAL	31,714	2,804	3,848	3,966	3,519	3,430	2,703	2,335	1,824	4,997	2,288
WESTERN HEMLOCK											
BOLE	16,863	730	1,421	1,904	1,835	2,080	1,793	1,681	1,293	2,834	1,292
TOP	3,872	529	525	522	433	403	303	285	213	478	181
TOTAL	20,735	1,259	1,946	2,426	2,268	2,483	2,096	1,966	1,506	3,312	1,473
WESTERN WHITE PINE											
BOLE	24,233	609	1,418	1,631	2,410	2,050	2,332	2,485	2,323	6,255	2,720
TOP	6,460	322	354	338	515	470	562	611	586	1,947	755
TOTAL	30,693	931	1,772	1,969	2,925	2,520	2,894	3,096	2,909	8,202	3,475
WESTERN RED CEDAR											
BOLE	21,341	930	1,373	1,853	1,956	2,065	1,728	1,742	1,754	4,312	3,628
TOP	6,472	550	679	740	668	677	490	490	443	1,125	610
TOTAL	27,813	1,480	2,052	2,593	2,624	2,742	2,218	2,232	2,197	5,437	4,238

LODGEPOLE PINE											
BOLE	51,209	9,024	13,391	12,206	8,174	4,280	2,280	1,104	378	360	12
TOP	15,025	5,112	3,445	2,706	1,994	935	482	205	70	75	1
TOTAL	66,234	14,136	16,836	14,912	10,168	5,215	2,762	1,309	448	435	13
OTHER SOFTWOODS											
BOLE	4,827	804	2,354	288	268	305	340	128	134	158	48
TOP	885	141	155	128	107	103	105	33	50	51	12
TOTAL	5,712	945	2,509	416	375	408	445	161	184	209	60
TOTAL SOFTWOODS											
BOLE	436,664	26,665	42,641	46,814	45,789	45,255	38,839	34,377	29,358	79,153	47,773
TOP	110,756	15,113	13,932	13,365	11,867	10,610	8,437	7,048	5,755	16,317	8,312
TOTAL	547,420	41,778	56,573	60,179	57,656	55,865	47,276	41,425	35,113	95,470	56,085
ASPEN & COTTONWOOD											
BOLE	1,953	216	288	266	295	236	150	115	84	201	102
TOP	495	49	95	83	78	65	40	27	17	32	9
TOTAL	2,448	265	383	349	373	301	190	142	101	233	111
OTHER HARDWOODS											
BOLE	1,159	491	292	204	58	23	2	11	0	11	67
TOP	120	34	24	33	20	6	0	1	0	1	1
TOTAL	1,279	525	316	237	78	29	2	12	0	12	68
TOTAL HARDWOODS											
BOLE	3,112	707	580	470	353	259	152	126	84	212	169
TOP	615	83	119	116	98	71	40	28	17	33	10
TOTAL	3,727	790	699	586	451	330	192	154	101	245	179
TOTAL ALL SPECIES											
BOLE	439,776	27,372	43,221	47,284	46,142	45,514	38,991	34,503	29,442	79,365	47,942
TOP	111,371	15,196	14,051	13,481	11,965	10,681	8,477	7,076	5,772	16,350	8,322
TOTAL	551,147	42,568	57,272	60,765	58,107	56,195	47,468	41,579	35,214	95,715	56,264

Table B-4.—Dry weight of growing stock by species, tree component, and diameter class, Montana, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	131,147	10,022	14,764	16,611	17,470	16,882	14,357	11,979	9,647	16,090	3,325
TOP	38,919	5,211	5,963	5,764	5,504	4,589	3,588	2,691	2,017	3,111	481
TOTAL	170,066	15,233	20,727	22,375	22,974	21,471	17,945	14,670	11,664	19,201	3,806
PONDEROSA PINE											
BOLE	33,370	1,859	2,723	3,262	3,909	3,641	3,607	2,962	2,667	6,199	2,541
TOP	14,869	1,376	1,214	1,120	1,442	1,524	1,553	1,352	1,212	3,252	824
TOTAL	48,239	3,235	3,937	4,382	5,351	5,165	5,160	4,314	3,879	9,451	3,365
TRUE FIRS											
BOLE	24,571	3,975	5,060	4,739	3,642	2,759	1,773	1,113	621	812	77
TOP	10,415	2,846	2,524	1,874	1,201	829	475	281	147	221	17
TOTAL	34,986	6,821	7,584	6,613	4,843	3,588	2,248	1,394	768	1,033	94
ENGELMANN SPRUCE											
BOLE	24,462	1,369	2,186	2,791	3,200	3,054	2,935	2,416	1,797	3,687	1,027
TOP	7,723	1,084	1,037	1,026	994	877	754	569	401	808	173
TOTAL	32,185	2,453	3,223	3,817	4,194	3,931	3,689	2,985	2,198	4,495	1,200
WESTERN LARCH											
BOLE	37,356	2,526	3,191	3,881	3,827	3,685	3,460	3,254	3,046	7,528	2,958
TOP	10,639	1,758	1,312	1,348	1,147	980	844	725	616	1,493	416
TOTAL	47,995	4,284	4,503	5,229	4,974	4,665	4,304	3,979	3,662	9,021	3,374
WESTERN HEMLOCK											
BOLE	4,715	279	681	467	594	435	516	342	279	893	229
TOP	1,261	226	248	139	143	112	107	61	49	145	31
TOTAL	5,976	505	929	606	737	547	623	403	328	1,038	260
WESTERN WHITE PINE											
BOLE	3,283	122	228	411	429	411	310	250	330	577	215
TOP	1,264	123	89	133	154	136	110	85	109	247	78
TOTAL	4,547	245	317	544	583	547	420	335	439	824	293
WESTERN RED CEDAR											
BOLE	3,185	366	411	308	348	287	186	128	175	454	522
TOP	1,629	356	255	184	179	129	87	48	63	190	138
TOTAL	4,814	722	666	492	527	416	273	176	238	644	660

LODGEPOLE PINE											
BOLE	116,577	29,090	34,757	25,287	15,097	7,373	3,081	1,110	505	271	6
TOP	37,213	15,902	8,896	6,068	3,706	1,641	626	222	89	62	1
TOTAL	153,790	44,992	43,653	31,355	18,803	9,014	3,707	1,332	594	333	7
OTHER SOFTWOODS											
BOLE	9,753	1,098	1,836	1,993	1,801	1,207	726	457	264	316	55
TOP	3,379	557	690	681	558	360	221	126	74	102	10
TOTAL	13,132	1,655	2,526	2,674	2,359	1,567	947	583	338	418	65
TOTAL SOFTWOODS											
BOLE	388,419	50,706	65,837	59,750	50,317	39,734	30,951	24,011	19,331	36,827	10,955
TOP	127,311	29,439	22,228	18,337	15,028	11,177	8,365	6,160	4,777	9,631	2,169
TOTAL	515,730	80,145	88,065	78,087	65,345	50,911	39,316	30,171	24,108	46,458	13,124
ASPEN & COTTONWOOD											
BOLE	3,216	172	261	269	381	349	401	359	255	755	14
TOP	1,060	36	59	84	139	145	161	137	97	199	3
TOTAL	4,276	208	320	353	520	494	562	496	352	954	17
OTHER HARDWOODS											
BOLE	515	97	104	107	63	97	19	0	14	3	11
TOP	90	15	19	21	10	21	2	0	2	0	0
TOTAL	605	112	123	128	73	118	21	0	16	3	11
TOTAL HARDWOODS											
BOLE	3,731	269	365	376	444	446	420	359	269	758	25
TOP	1,150	51	78	105	149	166	163	137	99	199	3
TOTAL	4,881	320	443	481	593	612	583	496	368	957	28
TOTAL ALL SPECIES											
BOLE	392,150	50,975	66,202	60,126	50,761	40,180	31,371	24,370	19,600	37,585	10,980
TOP	128,461	29,490	22,306	18,442	15,177	11,343	8,528	6,297	4,876	9,830	2,172
TOTAL	520,611	80,465	88,508	78,568	65,938	51,523	39,899	30,667	24,476	47,415	13,152

Table B-5.—Dry weight of growing stock by species, tree component, and diameter class, Nevada, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
PONDEROSA PINE											
BOLE	1,212	6	24	41	65	79	102	111	106	353	325
TOP	516	22	18	18	27	32	42	47	46	167	97
TOTAL	1,728	28	42	59	92	111	144	158	152	520	422
TRUE FIRS											
BOLE	1,243	22	23	42	36	46	63	71	75	319	546
TOP	268	18	13	22	15	18	19	19	19	70	55
TOTAL	1,511	40	36	64	51	64	82	90	94	389	601
ENGELMANN SPRUCE											
BOLE	231	6	13	18	21	9	28	11	19	87	19
TOP	62	3	6	7	7	3	8	3	4	18	3
TOTAL	293	9	19	25	28	12	36	14	23	105	22
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	150	1	2	1	3	5	5	4	8	45	76
TOP	64	1	1	0	1	3	2	2	4	23	27
TOTAL	214	2	3	1	4	8	7	6	12	68	103
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	261	4	12	19	26	31	25	17	24	72	31
TOP	75	3	4	6	10	10	6	5	5	20	6
TOTAL	336	7	16	25	36	41	31	22	29	92	37
OTHER SOFTWOODS											
BOLE	245	18	7	6	10	7	13	25	13	78	68
TOP	76	10	4	3	4	3	5	8	5	23	11
TOTAL	321	28	11	9	14	10	18	33	18	101	79
TOTAL SOFTWOODS											
BOLE	3,342	57	81	127	161	177	236	239	245	954	1,065
TOP	1,061	57	46	56	64	69	82	84	83	321	199
TOTAL	4,403	114	127	183	225	246	318	323	328	1,275	1,264
ASPEN & COTTONWOOD											
BOLE	178	41	30	29	53	23	1	1	0	0	0
TOP	50	7	6	9	19	9	0	0	0	0	0
TOTAL	228	48	36	38	72	32	1	1	0	0	0
OTHER HARDWOODS											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
TOTAL HARDWOODS											
BOLE	178	41	30	29	53	23	1	1	0	0	0
TOP	50	7	6	9	19	9	0	0	0	0	0
TOTAL	228	48	36	38	72	32	1	1	0	0	0
TOTAL ALL SPECIES											
BOLE	3,520	98	111	156	214	200	237	240	245	954	1,065
TOP	1,111	64	52	65	83	78	82	84	83	321	199
TOTAL	4,631	162	163	221	297	278	319	324	328	1,275	1,264

Table B-6.—Dry weight of growing stock by species, tree component, and diameter class, New Mexico, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	15,496	1,206	1,414	1,203	1,458	1,702	1,512	1,449	1,411	2,900	1,241
TOP	5,372	730	836	698	600	643	406	341	321	624	173
TOTAL	20,868	1,936	2,250	1,901	2,058	2,345	1,918	1,790	1,732	3,524	1,414
PONDEROSA PINE											
BOLE	47,494	2,397	2,647	2,390	3,279	3,843	5,864	6,032	5,347	13,610	2,085
TOP	17,969	2,539	1,501	1,398	1,408	1,520	1,773	1,743	1,426	4,106	555
TOTAL	65,463	4,936	4,148	3,788	4,687	5,363	7,637	7,775	6,773	17,716	2,640
TRUE FIRS											
BOLE	8,692	1,344	906	996	1,089	976	801	658	455	1,117	350
TOP	2,876	485	391	455	387	321	216	154	110	289	68
TOTAL	11,568	1,829	1,297	1,451	1,476	1,297	1,017	812	565	1,406	418
ENGELMANN SPRUCE											
BOLE	6,843	630	628	814	997	797	929	791	481	706	70
TOP	2,466	335	307	458	404	256	245	193	97	155	16
TOTAL	9,309	965	935	1,272	1,401	1,053	1,174	984	578	861	86
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
OTHER SOFTWOODS											
BOLE	2,211	222	345	175	434	291	264	110	127	196	47
TOP	901	97	172	95	207	134	69	30	37	53	7
TOTAL	3,112	319	517	270	641	425	333	140	164	249	54
TOTAL SOFTWOODS											
BOLE	80,736	5,799	5,940	5,578	7,257	7,609	9,370	9,040	7,821	18,529	3,793
TOP	29,584	4,186	3,207	3,104	3,006	2,874	2,709	2,461	1,991	5,227	819
TOTAL	110,320	9,985	9,147	8,682	10,263	10,483	12,079	11,501	9,812	23,756	4,612
ASPEN & COTTONWOOD											
BOLE	8,308	1,412	1,663	1,507	1,317	909	672	447	247	134	0
TOP	1,688	192	297	330	317	226	160	95	48	23	0
TOTAL	9,996	1,604	1,960	1,837	1,634	1,135	832	542	295	157	0
OTHER HARDWOODS											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
TOTAL HARDWOODS											
BOLE	8,308	1,412	1,663	1,507	1,317	909	672	447	247	134	0
TOP	1,688	192	297	330	317	226	160	95	48	23	0
TOTAL	9,996	1,604	1,960	1,837	1,634	1,135	832	542	295	157	0
TOTAL ALL SPECIES											
BOLE	89,044	7,211	7,603	7,085	8,574	8,518	10,042	9,487	8,068	18,663	3,793
TOP	31,272	4,378	3,504	3,434	3,323	3,100	2,869	2,556	2,039	5,250	819
TOTAL	120,316	11,589	11,107	10,519	11,897	11,618	12,911	12,043	10,107	23,913	4,612

Table B-7.—Dry weight of growing stock by species, tree component, and diameter class, western South Dakota, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS								
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
PONDEROSA PINE											
BOLE	22,080	1,786	3,283	3,977	3,822	3,197	2,394	1,643	1,033	921	24
TOP	8,121	1,761	1,157	1,112	1,105	977	748	530	336	385	10
TOTAL	30,201	3,547	4,440	5,089	4,927	4,174	3,142	2,173	1,369	1,306	34
TRUE FIRS											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
ENGELMANN SPRUCE											
BOLE	717	79	107	118	110	92	82	53	37	39	0
TOP	241	38	46	44	35	26	21	14	8	9	0
TOTAL	958	117	153	162	145	118	103	67	45	48	0
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
OTHER SOFTWOODS											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
TOTAL SOFTWOODS											
BOLE	22,797	1,865	3,390	4,095	3,932	3,289	2,476	1,696	1,070	960	24
TOP	8,362	1,799	1,203	1,156	1,140	1,003	769	544	344	394	10
TOTAL	31,159	3,664	4,593	5,251	5,072	4,292	3,245	2,240	1,414	1,354	34
ASPEN & COTTONWOOD											
BOLE	131	64	32	18	3	0	0	1	0	5	8
TOP	27	13	7	5	1	0	0	0	0	1	0
TOTAL	158	77	39	23	4	0	0	1	0	6	8
OTHER HARDWOODS											
BOLE	111	38	22	16	9	3	2	6	3	7	5
TOP	20	6	6	3	1	1	1	1	0	1	0
TOTAL	131	44	28	19	10	4	3	7	3	8	5
TOTAL HARDWOODS											
BOLE	242	102	54	34	12	3	2	7	3	12	13
TOP	47	19	13	8	2	1	1	1	0	2	0
TOTAL	289	121	67	42	14	4	3	8	3	14	13
TOTAL ALL SPECIES											
BOLE	23,039	1,967	3,444	4,129	3,944	3,292	2,478	1,703	1,073	972	37
TOP	8,409	1,818	1,216	1,164	1,142	1,004	770	545	344	396	10
TOTAL	31,448	3,785	4,660	5,293	5,086	4,296	3,248	2,248	1,417	1,368	47

Table B-8.—Dry weight of growing stock by species, tree component, and diameter class, Utah, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	10,133	810	832	815	1,008	1,114	1,252	1,128	940	1,591	643
TOP	3,019	340	442	358	357	321	309	272	190	341	89
TOTAL	13,152	1,150	1,274	1,173	1,365	1,435	1,561	1,400	1,130	1,932	732
PONDEROSA PINE											
BOLE	4,334	62	136	224	320	346	416	321	397	1,213	899
TOP	2,215	178	102	99	142	154	171	141	192	638	398
TOTAL	6,549	240	238	323	462	500	587	462	589	1,851	1,297
TRUE FIRS											
BOLE	9,584	1,263	1,266	1,403	1,242	1,035	795	799	487	932	362
TOP	3,877	789	639	641	481	378	259	236	138	253	63
TOTAL	13,461	2,052	1,905	2,044	1,723	1,413	1,054	1,035	625	1,185	425
ENGELMANN SPRUCE											
BOLE	10,424	763	997	1,069	1,163	1,237	1,021	1,055	799	1,796	524
TOP	3,353	431	460	437	412	380	280	256	188	416	93
TOTAL	13,777	1,194	1,457	1,506	1,575	1,617	1,301	1,311	987	2,212	617
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	11,007	2,129	2,277	2,179	1,584	1,342	758	393	177	159	9
TOP	3,596	1,141	720	596	454	343	179	86	38	38	1
TOTAL	14,603	3,270	2,997	2,775	2,038	1,685	937	479	215	197	10
OTHER SOFTWOODS											
BOLE	731	104	61	96	59	80	94	57	33	131	16
TOP	232	24	15	34	20	28	33	17	11	46	4
TOTAL	963	128	76	130	79	108	127	74	44	177	20
TOTAL SOFTWOODS											
BOLE	46,213	5,131	5,569	5,786	5,376	5,154	4,336	3,753	2,833	5,822	2,453
TOP	16,292	2,903	2,378	2,165	1,866	1,604	1,231	1,008	757	1,732	648
TOTAL	62,505	8,034	7,947	7,951	7,242	6,758	5,567	4,761	3,590	7,554	3,101
ASPEN & COTTONWOOD											
BOLE	12,179	2,797	3,232	2,330	1,857	1,042	491	243	68	119	0
TOP	2,609	506	602	531	481	284	123	53	13	16	0
TOTAL	14,788	3,303	3,834	2,861	2,338	1,326	614	296	81	135	0
OTHER HARDWOODS											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
TOTAL HARDWOODS											
BOLE	12,179	2,797	3,232	2,330	1,857	1,042	491	243	68	119	0
TOP	2,609	506	602	531	481	284	123	53	13	16	0
TOTAL	14,788	3,303	3,834	2,861	2,338	1,326	614	296	81	135	0
TOTAL ALL SPECIES											
BOLE	58,392	7,928	8,801	8,116	7,233	6,196	4,827	3,996	2,901	5,941	2,453
TOP	18,901	3,409	2,980	2,696	2,347	1,888	1,354	1,061	770	1,748	648
TOTAL	77,293	11,337	11,781	10,812	9,580	8,084	6,181	5,057	3,671	7,689	3,101

Table B-9.—Dry weight of growing stock by species, tree component, and diameter class, Wyoming 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	9,819	1,007	754	1,559	885	960	831	800	721	1,750	552
TOP	2,737	467	329	469	253	238	188	176	144	374	99
TOTAL	12,556	1,474	1,083	2,028	1,138	1,198	1,019	976	865	2,124	651
PONDEROSA PINE											
BOLE	11,598	686	1,362	1,990	2,281	1,866	1,411	876	585	479	62
TOP	5,702	1,315	820	656	731	648	550	370	253	318	41
TOTAL	17,300	2,001	2,182	2,646	3,012	2,514	1,961	1,246	838	797	103
TRUE FIRS											
BOLE	9,004	1,677	1,660	1,701	1,160	915	702	574	242	354	19
TOP	3,534	772	728	694	422	312	218	171	81	131	5
TOTAL	12,538	2,449	2,388	2,395	1,582	1,227	920	745	323	485	24
ENGELMANN SPRUCE											
BOLE	18,722	972	1,332	1,523	2,002	2,126	2,198	1,907	1,742	3,834	1,086
TOP	5,315	513	597	571	608	588	568	439	390	848	193
TOTAL	24,037	1,485	1,929	2,094	2,610	2,714	2,766	2,346	2,132	4,682	1,279
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	35,888	5,043	6,677	7,991	6,407	4,707	2,277	1,516	789	448	33
TOP	11,858	3,388	2,048	2,120	1,820	1,227	572	369	183	124	7
TOTAL	47,746	8,431	8,725	10,111	8,227	5,934	2,849	1,885	972	572	40
OTHER SOFTWOODS											
BOLE	4,313	236	559	660	840	678	456	314	205	321	44
TOP	1,498	123	267	234	278	206	135	91	56	96	12
TOTAL	5,811	359	826	894	1,118	884	591	405	261	417	56
TOTAL SOFTWOODS											
BOLE	89,344	9,621	12,344	15,424	13,575	11,252	7,875	5,987	4,284	7,186	1,796
TOP	30,644	6,578	4,789	4,744	4,112	3,219	2,231	1,616	1,107	1,891	357
TOTAL	119,988	16,199	17,133	20,168	17,687	14,471	10,106	7,603	5,391	9,077	2,153
ASPEN & COTTONWOOD											
BOLE	3,122	763	810	704	445	262	104	32	1	1	0
TOP	759	141	185	192	130	76	29	6	0	0	0
TOTAL	3,881	904	995	896	575	338	133	38	1	1	0
OTHER HARDWOODS											
BOLE	19	5	3	2	0	0	2	2	0	3	2
TOP	3	1	1	1	0	0	0	0	0	0	0
TOTAL	22	6	4	3	0	0	2	2	0	3	2
TOTAL HARDWOODS											
BOLE	3,141	768	813	706	445	262	106	34	1	4	2
TOP	762	142	186	193	130	76	29	6	0	0	0
TOTAL	3,903	910	999	899	575	338	135	40	1	4	2
TOTAL ALL SPECIES											
BOLE	92,485	10,389	13,157	16,130	14,020	11,514	7,981	6,021	4,285	7,190	1,798
TOP	31,406	6,720	4,975	4,937	4,242	3,295	2,260	1,622	1,107	1,891	357
TOTAL	123,891	17,109	18,132	21,067	18,262	14,809	10,241	7,643	5,392	9,081	2,155

Table B-10.—Dry weight of growing stock by species, tree component, and diameter class, Northern Rocky Mountains, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	279,127	17,070	24,904	30,473	32,184	34,248	29,351	25,225	21,492	46,948	17,232
TOP	72,435	8,664	9,748	9,918	9,265	8,434	6,567	5,142	4,043	8,323	2,331
TOTAL	351,562	25,734	34,652	40,391	41,449	42,682	35,918	30,367	25,535	55,271	19,563
PONDEROSA PINE											
BOLE	110,517	4,928	8,425	11,231	12,693	11,979	10,348	8,193	6,680	18,416	17,624
TOP	42,886	5,369	3,778	3,615	4,233	4,260	3,880	3,173	2,609	7,485	4,484
TOTAL	153,403	10,297	12,203	14,846	16,926	16,239	14,228	11,366	9,289	25,901	22,108
TRUE FIRS											
BOLE	118,983	10,921	14,777	16,203	14,361	13,030	10,828	9,190	6,719	15,686	7,268
TOP	36,161	6,963	6,559	5,764	4,155	3,339	2,453	1,906	1,282	2,846	894
TOTAL	155,144	17,884	21,336	21,967	18,516	16,369	13,281	11,096	8,001	18,532	8,162
ENGELMANN SPRUCE											
BOLE	68,560	3,076	4,858	6,108	7,454	7,791	7,799	6,909	6,062	13,943	4,560
TOP	18,916	2,047	2,207	2,186	2,208	2,086	1,885	1,504	1,239	2,853	701
TOTAL	87,476	5,123	7,065	8,294	9,662	9,877	9,684	8,413	7,301	16,796	5,261
WESTERN LARCH											
BOLE	63,850	4,531	6,142	7,069	6,762	6,604	5,790	5,297	4,661	11,934	5,060
TOP	15,859	2,557	2,209	2,126	1,731	1,491	1,217	1,017	825	2,084	602
TOTAL	79,709	7,088	8,351	9,195	8,493	8,095	7,007	6,314	5,486	14,018	5,662
WESTERN HEMLOCK											
BOLE	21,578	1,009	2,102	2,371	2,429	2,515	2,309	2,023	1,572	3,727	1,521
TOP	5,133	755	773	661	576	515	410	346	262	623	212
TOTAL	26,711	1,764	2,875	3,032	3,005	3,030	2,719	2,369	1,834	4,350	1,733
WESTERN WHITE PINE											
BOLE	27,516	731	1,646	2,042	2,839	2,461	2,642	2,735	2,653	6,832	2,935
TOP	7,724	445	443	471	669	606	672	696	695	2,194	833
TOTAL	35,240	1,176	2,089	2,513	3,508	3,067	3,314	3,431	3,348	9,026	3,768
WESTERN RED CEDAR											
BOLE	24,526	1,296	1,784	2,161	2,304	2,352	1,914	1,870	1,929	4,766	4,150
TOP	8,101	906	934	924	847	806	577	538	506	1,315	748
TOTAL	32,627	2,202	2,718	3,085	3,151	3,158	2,491	2,408	2,435	6,081	4,898

LODGEPOLE PINE											
BOLE	203,674	43,157	54,825	45,484	29,678	16,360	7,638	3,730	1,672	1,079	51
TOP	64,096	24,402	14,389	10,894	7,520	3,803	1,680	796	342	261	9
TOTAL	267,770	67,559	69,214	56,378	37,198	20,163	9,318	4,526	2,014	1,340	60
OTHER SOFTWOODS											
BOLE	18,893	2,138	4,749	2,941	2,909	2,190	1,522	899	603	795	147
TOP	5,762	821	1,112	1,043	943	669	461	250	180	249	34
TOTAL	24,655	2,959	5,861	3,984	3,852	2,859	1,983	1,149	783	1,044	181
TOTAL SOFTWOODS											
BOLE	937,224	88,857	124,212	126,083	113,613	99,530	80,141	66,071	54,043	124,126	60,548
TOP	277,073	52,929	42,152	37,602	32,147	26,009	19,802	15,368	11,983	28,233	10,848
TOTAL	1,214,297	141,786	166,364	163,685	145,760	125,539	99,943	81,439	66,026	152,359	71,396
ASPEN & COTTONWOOD											
BOLE	8,422	1,215	1,391	1,257	1,124	847	655	507	340	962	124
TOP	2,341	239	346	364	348	286	230	170	114	232	12
TOTAL	10,763	1,454	1,737	1,621	1,472	1,133	885	677	454	1,194	136
OTHER HARDWOODS											
BOLE	1,804	631	421	329	130	123	25	19	17	24	85
TOP	233	56	50	58	31	28	3	2	2	2	1
TOTAL	2,037	687	471	387	161	151	28	21	19	26	86
TOTAL HARDWOODS											
BOLE	10,226	1,846	1,812	1,586	1,254	970	680	526	357	986	209
TOP	2,574	295	396	422	379	314	233	172	116	234	13
TOTAL	12,800	2,141	2,208	2,008	1,633	1,284	913	698	473	1,220	222
TOTAL ALL SPECIES											
BOLE	947,450	90,703	126,024	127,669	114,867	100,500	80,821	66,597	54,400	125,112	60,757
TOP	279,647	53,224	42,548	38,024	32,526	26,323	20,035	15,540	12,099	28,467	10,861
TOTAL	1,227,097	143,927	168,572	165,693	147,393	126,823	100,856	82,137	66,499	153,579	71,618

Table B-11.—Dry weight of growing stock by species, tree component, and diameter class, Southern Rocky Mountains, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons										
DOUGLAS-FIR											
BOLE	49,148	5,938	4,640	4,370	4,554	4,915	4,962	4,368	3,875	7,936	3,590
TOP	15,468	2,004	2,368	2,123	1,786	1,655	1,340	1,070	864	1,740	518
TOTAL	64,616	7,942	7,008	6,493	6,340	6,570	6,302	5,438	4,739	9,676	4,108
PONDEROSA PINE											
BOLE	119,816	5,154	6,262	7,200	9,393	10,296	12,423	12,816	12,113	35,218	8,941
TOP	52,878	5,996	3,830	3,812	4,234	4,378	4,601	4,571	4,312	13,911	3,233
TOTAL	172,694	11,150	10,092	11,012	13,627	14,674	17,024	17,387	16,425	49,129	12,174
TRUE FIRS											
BOLE	46,509	7,121	6,369	6,496	5,696	4,809	4,029	3,318	2,237	4,467	1,967
TOP	16,473	2,853	2,872	2,850	2,116	1,618	1,190	902	571	1,184	317
TOTAL	62,982	9,974	9,241	9,346	7,812	6,427	5,219	4,220	2,808	5,651	2,284
ENGELMANN SPRUCE											
BOLE	82,602	6,259	7,062	8,975	10,188	9,991	9,766	8,510	6,527	13,083	2,241
TOP	24,700	2,649	3,113	3,618	3,405	2,860	2,452	1,965	1,379	2,861	398
TOTAL	107,302	8,908	10,175	12,593	13,593	12,851	12,218	10,475	7,906	15,944	2,639
WESTERN LARCH											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE											
BOLE	150	1	2	1	3	5	5	4	8	45	76
TOP	64	1	1	0	1	3	2	2	4	23	27
TOTAL	214	2	3	1	4	8	7	6	12	68	103
WESTERN RED CEDAR											
BOLE	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE											
BOLE	50,544	11,983	10,673	9,550	7,561	5,426	2,768	1,439	661	443	40
TOP	14,733	4,638	3,015	2,450	2,076	1,348	646	309	134	110	7
TOTAL	65,277	16,621	13,688	12,000	9,637	6,774	3,414	1,748	795	553	47
OTHER SOFTWOODS											
BOLE	5,503	789	692	565	770	621	550	362	296	644	214
TOP	2,148	301	334	277	356	264	176	112	90	201	37
TOTAL	7,651	1,090	1,026	842	1,126	885	726	474	386	845	251
TOTAL SOFTWOODS											
BOLE	354,272	37,245	35,700	37,157	38,165	36,063	34,503	30,817	25,717	61,836	17,069
TOP	126,464	18,442	15,533	15,130	13,974	12,126	10,407	8,931	7,354	20,030	4,537
TOTAL	480,736	55,687	51,233	52,287	52,139	48,189	44,910	39,748	33,071	81,866	21,606
ASPEN & COTTONWOOD											
BOLE	56,993	9,332	14,332	12,356	8,919	5,387	3,114	1,857	925	770	1
TOP	12,068	1,970	2,604	2,646	2,103	1,320	735	395	175	120	0
TOTAL	69,061	11,302	16,936	15,002	11,022	6,707	3,849	2,252	1,100	890	1
OTHER HARDWOODS											
BOLE	18	0	4	8	6	0	0	0	0	0	0
TOP	6	0	1	2	3	0	0	0	0	0	0
TOTAL	24	0	5	10	9	0	0	0	0	0	0
TOTAL HARDWOODS											
BOLE	57,011	9,332	14,336	12,364	8,925	5,387	3,114	1,857	925	770	1
TOP	12,074	1,970	2,605	2,648	2,106	1,320	735	395	175	120	0
TOTAL	69,085	11,302	16,941	15,012	11,031	6,707	3,849	2,252	1,100	890	1
TOTAL ALL SPECIES											
BOLE	411,283	46,577	50,036	49,521	47,090	41,450	37,617	32,674	26,642	62,606	17,070
TOP	138,538	20,412	18,138	17,778	16,080	13,446	11,142	9,326	7,529	20,150	4,537
TOTAL	549,821	66,989	68,174	67,299	63,170	54,896	48,759	42,000	34,171	82,756	21,607

Table B-12.—Dry weight of growing stock by species, tree component, and diameter class, Rocky Mountains, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS									
		6	8	10	12	14	16	18	20	22-28	30+
						Thousand tons					
DOUGLAS-FIR											
BOLE	328,275	23,008	29,544	34,843	36,738	39,163	34,313	29,593	25,367	54,884	20,822
TOP	87,903	10,668	12,116	12,041	11,051	10,089	7,907	6,212	4,907	10,063	2,849
TOTAL	416,178	33,676	41,660	46,884	47,789	49,252	42,220	35,805	30,274	64,947	23,671
PONDEROSA PINE											
BOLE	230,333	10,082	14,687	18,431	22,086	22,275	22,771	21,009	18,793	53,634	26,565
TOP	95,764	11,365	7,608	7,427	8,467	8,638	8,481	7,744	6,921	21,396	7,717
TOTAL	326,097	21,447	22,295	25,858	30,553	30,913	31,252	28,753	25,714	75,030	34,282
TRUE FIRS											
BOLE	165,492	18,042	21,146	22,699	20,057	17,839	14,857	12,508	8,956	20,153	9,235
TOP	52,634	9,816	9,431	8,614	6,271	4,957	3,643	2,808	1,853	4,030	1,211
TOTAL	218,126	27,858	30,577	31,313	26,328	22,796	18,500	15,316	10,809	24,183	10,446
ENGELMANN SPRUCE											
BOLE	151,162	9,335	11,920	15,083	17,642	17,782	17,565	15,419	12,589	27,026	6,801
TOP	43,616	4,696	5,320	5,804	5,613	4,946	4,337	3,469	2,618	5,714	1,099
TOTAL	194,778	14,031	17,240	20,887	23,255	22,728	21,902	18,888	15,207	32,740	7,900
WESTERN LARCH											
BOLE	63,850	4,531	6,142	7,069	6,762	6,604	5,790	5,297	4,661	11,934	5,060
TOP	15,859	2,557	2,209	2,126	1,731	1,491	1,217	1,017	825	2,084	602
TOTAL	79,709	7,088	8,351	9,195	8,493	8,095	7,007	6,314	5,486	14,018	5,662
WESTERN HEMLOCK											
BOLE	21,578	1,009	2,102	2,371	2,429	2,515	2,309	2,023	1,572	3,727	1,521
TOP	5,133	755	773	661	576	515	410	346	262	623	212
TOTAL	26,711	1,764	2,875	3,032	3,005	3,030	2,719	2,369	1,834	4,350	1,733
WESTERN WHITE PINE											
BOLE	27,666	732	1,648	2,043	2,842	2,466	2,647	2,739	2,661	6,877	3,011
TOP	7,788	446	444	471	670	609	674	698	699	2,217	860
TOTAL	35,454	1,178	2,092	2,514	3,512	3,075	3,321	3,437	3,360	9,094	3,871
WESTERN RED CEDAR											
BOLE	24,526	1,296	1,784	2,161	2,304	2,352	1,914	1,870	1,929	4,766	4,150
TOP	8,101	906	934	924	847	806	577	538	506	1,315	748
TOTAL	32,627	2,202	2,718	3,085	3,151	3,158	2,491	2,408	2,435	6,081	4,898

LODGEPOLE PINE											
BOLE	254,218	55,140	65,498	55,034	37,239	21,786	10,406	5,169	2,333	1,522	91
TOP	78,829	29,040	17,404	13,344	9,596	5,151	2,326	1,105	476	371	16
TOTAL	333,047	84,180	82,902	68,378	46,835	26,937	12,732	6,274	2,809	1,893	107
OTHER SOFTWOODS											
BOLE	24,396	2,927	5,441	3,506	3,679	2,811	2,072	1,261	899	1,439	361
TOP	7,910	1,122	1,446	1,320	1,299	933	637	362	270	450	71
TOTAL	32,306	4,049	6,887	4,826	4,978	3,744	2,709	1,623	1,169	1,889	432
TOTAL SOFTWOODS											
BOLE	1,291,496	126,102	159,912	163,240	151,778	135,593	114,644	96,888	79,760	185,962	77,617
TOP	403,537	71,371	57,685	52,732	46,121	38,135	30,209	24,299	19,337	48,263	15,385
TOTAL	1,695,033	197,473	217,597	215,972	197,899	173,728	144,853	121,187	99,097	234,225	93,002
ASPEN & COTTONWOOD											
BOLE	65,415	10,547	15,723	13,613	10,043	6,234	3,769	2,364	1,265	1,732	125
TOP	14,409	2,209	2,950	3,010	2,451	1,606	965	565	289	352	12
TOTAL	79,824	12,756	18,673	16,623	12,494	7,840	4,734	2,929	1,554	2,084	137
OTHER HARDWOODS											
BOLE	1,822	631	425	337	136	123	25	19	17	24	85
TOP	239	56	51	60	34	28	3	2	2	2	1
TOTAL	2,061	687	476	397	170	151	28	21	19	26	86
TOTAL HARDWOODS											
BOLE	67,237	11,178	16,148	13,950	10,179	6,357	3,794	2,383	1,282	1,756	210
TOP	14,648	2,265	3,001	3,070	2,485	1,634	968	567	291	354	13
TOTAL	81,885	13,443	19,149	17,020	12,664	7,991	4,762	2,950	1,573	2,110	223
TOTAL ALL SPECIES											
BOLE	1,358,733	137,280	176,060	177,190	161,957	141,950	118,438	99,271	81,042	187,718	77,827
TOP	418,185	73,636	60,686	55,802	48,606	39,769	31,177	24,866	19,628	48,617	15,398
TOTAL	1,776,918	210,916	236,746	232,992	210,563	181,719	149,615	124,137	100,670	236,335	93,225

Table B-13.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Arizona, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	104	0	0	10	13	2	4	4	4	4	10	22	31
TOP	766	214	473	18	17	2	3	2	5	1	5	11	15
TOTAL	870	214	473	28	30	4	7	6	9	5	15	33	46
PONDEROSA PINE													
BOLE	1,014	0	0	146	179	37	80	92	88	75	68	200	49
TOP	7,460	2,062	4,171	359	207	30	56	60	102	50	47	193	123
TOTAL	8,474	2,062	4,171	505	386	67	136	152	190	125	115	393	172
TRUE FIRS													
BOLE	61	0	0	15	12	2	4	7	1	3	2	5	10
TOP	391	92	230	28	18	2	2	4	2	2	0	3	8
TOTAL	452	92	230	43	30	4	6	11	3	5	2	8	18
ENGELMANN SPRUCE													
BOLE	73	0	0	7	9	5	9	7	8	7	6	13	2
TOP	360	84	200	16	20	6	8	3	9	3	2	7	2
TOTAL	433	84	200	23	29	11	17	10	17	10	8	20	4
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER SOFTWOODS													
BOLE	830	0	0	38	49	34	39	65	51	58	43	208	245
TOP	726	72	122	79	68	35	33	45	32	32	22	99	87
TOTAL	1,556	72	122	117	117	69	72	110	83	90	65	307	332
TOTAL SOFTWOODS													
BOLE	2,082	0	0	216	262	80	136	175	152	147	129	448	337
TOP	9,703	2,524	5,196	500	330	75	102	114	150	88	76	313	235
TOTAL	11,785	2,524	5,196	716	592	155	238	289	302	235	205	761	572
ASPEN & COTTONWOOD													
BOLE	1,192	0	0	187	109	41	129	91	238	22	186	158	31
TOP	717	35	117	63	57	41	72	53	125	14	76	55	9
TOTAL	1,909	35	117	250	166	82	201	144	363	36	262	213	40
OTHER HARDWOODS													
BOLE	888	0	0	174	126	124	118	93	83	48	50	63	9
TOP	839	85	188	80	68	84	86	75	63	37	33	37	3
TOTAL	1,727	85	188	254	194	208	204	168	146	85	83	100	12
TOTAL HARDWOODS													
BOLE	2,080	0	0	361	235	165	247	184	321	70	236	221	40
TOP	1,556	120	305	143	125	125	158	128	188	51	109	92	12
TOTAL	3,636	120	305	504	360	290	405	312	509	121	345	313	52
TOTAL ALL SPECIES													
BOLE	4,162	0	0	577	497	245	383	359	473	217	365	669	377
TOP	11,259	2,644	5,501	643	455	200	260	242	338	139	185	405	247
TOTAL	15,421	2,644	5,501	1,220	952	445	643	601	811	356	550	1,074	624

Table B-14.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Colorado, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	799	0	0	116	134	102	53	64	64	61	64	94	47
TOP	2,497	538	1,539	79	89	73	32	31	27	24	23	31	11
TOTAL	3,296	538	1,539	195	223	175	85	95	91	85	87	125	58
PONDEROSA PINE													
BOLE	471	0	0	40	62	71	51	31	52	36	32	62	34
TOP	2,152	380	1,302	108	66	65	40	24	41	29	25	53	19
TOTAL	2,623	380	1,302	148	128	136	91	55	93	65	57	115	53
TRUE FIRS													
BOLE	1,460	0	0	263	192	168	160	150	121	80	108	155	63
TOP	6,339	1,811	3,684	189	132	115	93	80	59	36	45	72	23
TOTAL	7,799	1,811	3,684	452	324	283	253	230	180	116	153	227	86
ENGELMANN SPRUCE													
BOLE	2,703	0	0	223	280	231	199	218	214	336	244	584	174
TOP	6,738	1,785	3,715	174	187	143	100	95	84	121	82	203	49
TOTAL	9,441	1,785	3,715	397	467	374	299	313	298	457	326	787	223
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	1,703	0	0	424	369	219	180	179	114	110	62	46	0
TOP	7,105	1,684	4,549	360	158	92	78	69	41	37	19	18	0
TOTAL	8,808	1,684	4,549	784	527	311	258	248	155	147	81	64	0
OTHER SOFTWOODS													
BOLE	404	0	0	50	71	44	39	40	53	25	51	31	0
TOP	684	97	304	39	53	36	30	28	35	14	25	23	0
TOTAL	1,088	97	304	89	124	80	69	68	88	39	76	54	0
TOTAL SOFTWOODS													
BOLE	7,540	0	0	1,116	1,108	835	682	682	618	648	561	972	318
TOP	25,515	6,295	15,093	949	685	524	373	327	287	261	219	400	102
TOTAL	33,055	6,295	15,093	2,065	1,793	1,359	1,055	1,009	905	909	780	1,372	420
ASPEN & COTTONWOOD													
BOLE	12,665	0	0	3,586	3,595	2,474	1,005	709	503	414	213	156	10
TOP	9,504	1,586	4,817	730	824	686	303	217	148	108	50	33	2
TOTAL	22,169	1,586	4,817	4,316	4,419	3,160	1,308	926	651	522	263	189	12
OTHER HARDWOODS													
BOLE	41	0	0	12	10	8	3	8	0	0	0	0	0
TOP	40	2	21	5	4	3	1	4	0	0	0	0	0
TOTAL	81	2	21	17	14	11	4	12	0	0	0	0	0
TOTAL HARDWOODS													
BOLE	12,706	0	0	3,598	3,605	2,482	1,008	717	503	414	213	156	10
TOP	9,544	1,588	4,838	735	828	689	304	221	148	108	50	33	2
TOTAL	22,250	1,588	4,838	4,333	4,433	3,171	1,312	938	651	522	263	189	12
TOTAL ALL SPECIES													
BOLE	20,246	0	0	4,714	4,713	3,317	1,690	1,399	1,121	1,062	774	1,128	328
TOP	35,059	7,883	19,931	1,684	1,513	1,213	677	548	435	369	269	433	104
TOTAL	55,305	7,883	19,931	6,398	6,226	4,530	2,367	1,947	1,556	1,431	1,043	1,561	432

Table B-15.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Idaho, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	3,002	0	0	173	185	197	210	178	281	274	219	796	489
TOP	9,039	1,763	5,935	172	141	123	112	84	117	105	77	281	129
TOTAL	12,041	1,763	5,935	345	326	320	322	262	398	379	296	1,077	618
PONDEROSA PINE													
BOLE	769	0	0	22	25	41	49	49	53	67	45	174	244
TOP	1,957	214	1,174	68	28	29	35	33	39	52	34	134	117
TOTAL	2,726	214	1,174	90	53	70	84	82	92	119	79	308	361
TRUE FIRS													
BOLE	2,619	0	0	115	154	164	176	162	222	247	163	698	518
TOP	11,646	3,295	7,132	148	133	113	98	81	98	101	62	252	133
TOTAL	14,265	3,295	7,132	263	287	277	274	243	320	348	225	950	651
ENGELMANN SPRUCE													
BOLE	369	0	0	13	13	11	18	26	41	27	37	120	63
TOP	1,257	412	675	17	12	8	10	12	18	11	14	49	19
TOTAL	1,626	412	675	30	25	19	28	38	59	38	51	169	82
WESTERN LARCH													
BOLE	558	0	0	50	55	46	42	34	44	44	29	134	80
TOP	1,382	154	1,009	36	34	24	17	13	15	14	9	41	16
TOTAL	1,940	154	1,009	86	89	70	59	47	59	58	38	175	96
WESTERN HEMLOCK													
BOLE	605	0	0	17	31	37	37	37	65	69	61	181	70
TOP	1,887	607	1,009	26	24	22	19	16	24	24	22	66	28
TOTAL	2,492	607	1,009	43	55	59	56	53	89	93	83	247	98
WESTERN WHITE PINE													
BOLE	740	0	0	14	24	22	37	23	52	63	60	254	191
TOP	796	119	238	13	13	9	17	11	26	34	31	170	115
TOTAL	1,536	119	238	27	37	31	54	34	78	97	91	424	306
WESTERN RED CEDAR													
BOLE	911	0	0	29	32	40	45	43	59	66	69	255	273
TOP	3,411	986	1,926	31	33	32	31	28	34	38	34	137	101
TOTAL	4,322	986	1,926	60	65	72	76	71	93	104	103	392	374

LODGEPOLE PINE													
BOLE	1,204	0	0	295	223	425	115	58	40	26	10	12	0
TOP	8,244	1,237	6,200	358	122	202	60	27	18	11	4	5	0
TOTAL	9,448	1,237	6,200	653	345	627	175	85	58	37	14	17	0
OTHER SOFTWOODS													
BOLE	208	0	0	38	29	13	20	27	22	13	17	25	4
TOP	481	99	257	14	16	12	14	17	13	8	10	18	3
TOTAL	689	99	257	52	45	25	34	44	35	21	27	43	7
TOTAL SOFTWOODS													
BOLE	10,985	0	0	766	771	996	749	637	879	896	710	2,649	1,932
TOP	40,100	8,886	25,555	883	556	574	413	322	402	398	297	1,153	661
TOTAL	51,085	8,886	25,555	1,649	1,327	1,570	1,162	959	1,281	1,294	1,007	3,802	2,593
ASPEN & COTTONWOOD													
BOLE	550	0	0	155	153	113	52	27	18	10	8	13	1
TOP	474	46	226	47	72	43	16	9	6	3	2	4	0
TOTAL	1,024	46	226	202	225	156	68	36	24	13	10	17	1
OTHER HARDWOODS													
BOLE	468	0	0	270	107	85	2	0	0	1	2	0	1
TOP	283	59	161	27	13	23	0	0	0	0	0	0	0
TOTAL	751	59	161	297	120	108	2	0	0	1	2	0	1
TOTAL HARDWOODS													
BOLE	1,018	0	0	425	260	198	54	27	18	11	10	13	2
TOP	757	105	387	74	85	66	16	9	6	3	2	4	0
TOTAL	1,775	105	387	499	345	264	70	36	24	14	12	17	2
TOTAL ALL SPECIES													
BOLE	12,003	0	0	1,191	1,031	1,194	803	664	897	907	720	2,662	1,934
TOP	40,857	8,991	25,942	957	641	640	429	331	408	401	299	1,157	661
TOTAL	52,860	8,991	25,942	2,148	1,672	1,834	1,232	995	1,305	1,308	1,019	3,819	2,595

Table B-16.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Montana, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	3,204	0	0	446	398	456	228	285	252	228	188	514	209
TOP	20,475	6,500	12,654	288	244	245	92	104	80	61	45	124	38
TOTAL	23,679	6,500	12,654	734	642	701	320	389	332	289	233	638	247
PONDEROSA PINE													
BOLE	965	0	0	104	98	128	56	78	74	51	44	218	114
TOP	3,814	613	2,582	93	62	62	26	43	41	31	26	167	68
TOTAL	4,779	613	2,582	197	160	190	82	121	115	82	70	385	182
TRUE FIRS													
BOLE	813	0	0	129	89	157	106	84	91	59	35	58	5
TOP	10,066	3,980	5,712	101	68	80	35	26	25	14	8	16	1
TOTAL	10,879	3,980	5,712	230	157	237	141	110	116	73	43	74	6
ENGELMANN SPRUCE													
BOLE	559	0	0	39	38	153	35	42	42	37	27	94	52
TOP	3,205	1,415	1,557	38	31	63	14	16	14	11	7	26	13
TOTAL	3,764	1,415	1,557	77	69	216	49	58	56	48	34	120	65
WESTERN LARCH													
BOLE	804	0	0	89	56	91	48	56	57	51	47	184	125
TOP	4,948	982	3,575	102	48	59	19	22	19	15	12	58	37
TOTAL	5,752	982	3,575	191	104	150	67	78	76	66	59	242	162
WESTERN HEMLOCK													
BOLE	536	0	0	12	31	39	61	49	91	69	57	103	24
TOP	1,079	564	398	13	12	12	12	11	17	11	9	17	3
TOTAL	1,615	564	398	25	43	51	73	60	108	80	66	120	27
WESTERN WHITE PINE													
BOLE	58	0	0	4	5	12	6	6	6	3	5	8	3
TOP	523	124	366	6	3	7	3	3	2	1	1	6	1
TOTAL	581	124	366	10	8	19	9	9	8	4	6	14	4
WESTERN RED CEDAR													
BOLE	263	0	0	13	7	26	26	15	13	10	14	61	78
TOP	1,985	905	962	17	9	15	10	6	5	3	5	25	23
TOTAL	2,248	905	962	30	16	41	36	21	18	13	19	86	101

LODGEPOLE PINE													
BOLE	3,666	0	0	1,564	594	555	767	112	48	13	9	4	0
TOP	29,426	6,509	21,301	981	224	180	187	28	11	3	1	1	0
TOTAL	33,092	6,509	21,301	2,545	818	735	954	140	59	16	10	5	0
OTHER SOFTWOODS													
BOLE	184	0	0	33	32	40	24	17	12	8	6	6	6
TOP	1,185	361	760	10	12	16	8	6	4	2	2	3	1
TOTAL	1,369	361	760	43	44	56	32	23	16	10	8	9	7
TOTAL SOFTWOODS													
BOLE	11,052	0	0	2,433	1,348	1,657	1,357	744	686	529	432	1,250	616
TOP	76,706	21,953	49,867	1,649	713	739	406	265	218	152	116	443	185
TOTAL	87,758	21,953	49,867	4,082	2,061	2,396	1,763	1,009	904	681	548	1,693	801
ASPEN & COTTONWOOD													
BOLE	437	0	0	121	81	8	8	10	27	0	103	67	12
TOP	223	35	27	30	22	14	3	21	11	0	39	18	3
TOTAL	660	35	27	151	103	22	11	31	38	0	142	85	15
OTHER HARDWOODS													
BOLE	80	0	0	29	21	12	7	7	2	0	0	0	2
TOP	279	67	191	6	6	4	3	2	0	0	0	0	0
TOTAL	359	67	191	35	27	16	10	9	2	0	0	0	2
TOTAL HARDWOODS													
BOLE	517	0	0	150	102	20	15	17	29	0	103	67	14
TOP	502	102	218	36	28	18	6	23	11	0	39	18	3
TOTAL	1,019	102	218	186	130	38	21	40	40	0	142	85	17
TOTAL ALL SPECIES													
BOLE	11,569	0	0	2,583	1,450	1,677	1,372	761	715	529	535	1,317	630
TOP	77,208	22,055	50,085	1,685	741	757	412	288	229	152	155	461	188
TOTAL	88,777	22,055	50,085	4,268	2,191	2,434	1,784	1,049	944	681	690	1,778	818

Table B-17.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Nevada, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
PONDEROSA PINE													
BOLE	43	0	0	0	1	5	1	2	7	1	4	16	6
TOP	79	6	29	4	3	5	1	2	5	2	3	15	4
TOTAL	122	6	29	4	4	10	2	4	12	3	7	31	10
TRUE FIRS													
BOLE	26	0	0	1	2	1	1	4	2	0	2	4	9
TOP	59	13	32	3	1	1	1	2	1	0	1	2	2
TOTAL	85	13	32	4	3	2	2	6	3	0	3	6	11
ENGELMANN SPRUCE													
BOLE	8	0	0	0	0	8	0	0	0	0	0	0	0
TOP	11	3	3	0	0	5	0	0	0	0	0	0	0
TOTAL	19	3	3	0	0	13	0	0	0	0	0	0	0
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	3	0	0	0	0	0	0	0	0	0	0	1	2
TOP	7	1	3	0	0	0	0	0	0	0	0	1	2
TOTAL	10	1	3	0	0	0	0	0	0	0	0	2	4
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	6	0	0	0	1	0	0	0	0	0	0	2	3
TOP	9	1	5	1	0	0	0	0	0	0	0	1	1
TOTAL	15	1	5	1	1	0	0	0	0	0	0	3	4
OTHER SOFTWOODS													
BOLE	20	0	0	0	0	0	0	0	2	3	2	3	10
TOP	29	4	17	0	0	0	0	0	1	2	1	1	3
TOTAL	49	4	17	0	0	0	0	0	3	5	3	4	13
TOTAL SOFTWOODS													
BOLE	106	0	0	1	4	14	2	6	11	4	8	26	30
TOP	194	28	89	8	4	11	2	4	7	4	5	20	12
TOTAL	300	28	89	9	8	25	4	10	18	8	13	46	42
ASPEN & COTTONWOOD													
BOLE	138	0	0	46	41	22	24	1	1	1	0	2	0
TOP	29	1	5	6	6	5	6	0	0	0	0	0	0
TOTAL	167	1	5	52	47	27	30	1	1	1	0	2	0
OTHER HARDWOODS													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL HARDWOODS													
BOLE	138	0	0	46	41	22	24	1	1	1	0	2	0
TOP	29	1	5	6	6	5	6	0	0	0	0	0	0
TOTAL	167	1	5	52	47	27	30	1	1	1	0	2	0
TOTAL ALL SPECIES													
BOLE	244	0	0	47	45	36	26	7	12	5	8	28	30
TOP	223	29	94	14	10	16	8	4	7	4	5	20	12
TOTAL	467	29	94	61	55	52	34	11	19	9	13	48	42

Table B-18.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, New Mexico, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	516	0	0	77	92	30	43	55	49	37	43	54	36
TOP	2,522	639	1,484	89	99	37	40	40	26	16	19	23	10
TOTAL	3,038	639	1,484	166	191	67	83	95	75	53	62	77	46
PONDEROSA PINE													
BOLE	1,320	0	0	153	151	50	96	74	218	151	110	211	106
TOP	6,897	1,673	4,158	311	163	64	85	58	114	72	48	116	35
TOTAL	8,217	1,673	4,158	464	314	114	181	132	332	223	158	327	141
TRUE FIRS													
BOLE	570	0	0	121	139	50	59	33	43	26	27	42	30
TOP	2,164	581	1,171	110	126	41	39	20	22	11	12	20	11
TOTAL	2,734	581	1,171	231	265	91	98	53	65	37	39	62	41
ENGELMANN SPRUCE													
BOLE	268	0	0	63	45	22	37	17	36	22	9	13	4
TOP	1,257	291	759	64	41	24	31	10	18	9	3	5	2
TOTAL	1,525	291	759	127	86	46	68	27	54	31	12	18	6
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER SOFTWOODS													
BOLE	1,053	0	0	129	103	93	100	77	106	79	57	161	148
TOP	1,231	184	402	110	87	67	68	49	55	37	30	87	55
TOTAL	2,284	184	402	239	190	160	168	126	161	116	87	248	203
TOTAL SOFTWOODS													
BOLE	3,727	0	0	543	530	245	335	256	452	315	246	481	324
TOP	14,071	3,368	7,974	684	516	233	263	177	235	145	112	251	113
TOTAL	17,798	3,368	7,974	1,227	1,046	478	598	433	687	460	358	732	437
ASPEN & COTTONWOOD													
BOLE	2,201	0	0	408	277	399	239	233	132	309	84	120	0
TOP	1,189	126	515	81	82	120	66	61	34	67	17	20	0
TOTAL	3,390	126	515	489	359	519	305	294	166	376	101	140	0
OTHER HARDWOODS													
BOLE	993	0	0	209	173	108	117	97	88	74	45	73	9
TOP	875	232	361	47	45	34	40	33	29	22	11	19	2
TOTAL	1,868	232	361	256	218	142	157	130	117	96	56	92	11
TOTAL HARDWOODS													
BOLE	3,194	0	0	617	450	507	356	330	220	383	129	193	9
TOP	2,064	358	876	128	127	154	106	94	63	89	28	39	2
TOTAL	5,258	358	876	745	577	661	462	424	283	472	157	232	11
TOTAL ALL SPECIES													
BOLE	6,921	0	0	1,160	980	752	691	586	672	698	375	674	333
TOP	16,135	3,726	8,850	812	643	387	369	271	298	234	140	290	115
TOTAL	23,056	3,726	8,850	1,972	1,623	1,139	1,060	857	970	932	515	964	448

Table B-19.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, western South Dakota, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
PONDEROSA PINE													
BOLE	216	0	0	41	48	43	26	14	21	10	8	5	0
TOP	4,315	1,394	2,752	71	30	21	14	8	12	5	4	4	0
TOTAL	4,531	1,394	2,752	112	78	64	40	22	33	15	12	9	0
TRUE FIRS													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
ENGELMANN SPRUCE													
BOLE	12	0	0	1	0	1	0	1	0	3	0	6	0
TOP	130	48	76	1	0	1	0	0	0	1	0	3	0
TOTAL	142	48	76	2	0	2	0	1	0	4	0	9	0
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER SOFTWOODS													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL SOFTWOODS													
BOLE	228	0	0	42	48	44	26	15	21	13	8	11	0
TOP	4,445	1,442	2,828	72	30	22	14	8	12	6	4	7	0
TOTAL	4,673	1,442	2,828	114	78	66	40	23	33	19	12	18	0
ASPEN & COTTONWOOD													
BOLE	121	0	0	61	30	19	11	0	0	0	0	0	0
TOP	61	5	22	17	8	6	3	0	0	0	0	0	0
TOTAL	182	5	22	78	38	25	14	0	0	0	0	0	0
OTHER HARDWOODS													
BOLE	155	0	0	80	35	18	7	6	2	2	1	3	1
TOP	121	31	51	18	11	4	2	2	0	1	0	1	0
TOTAL	276	31	51	98	46	22	9	8	2	3	1	4	1
TOTAL HARDWOODS													
BOLE	276	0	0	141	65	37	18	6	2	2	1	3	1
TOP	182	36	73	35	19	10	5	2	0	1	0	1	0
TOTAL	458	36	73	176	84	47	23	8	2	3	1	4	1
TOTAL ALL SPECIES													
BOLE	504	0	0	183	113	81	44	21	23	15	9	14	1
TOP	4,627	1,478	2,901	107	49	32	19	10	12	7	4	8	0
TOTAL	5,131	1,478	2,901	290	162	113	63	31	35	22	13	22	1

Table B-20.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Utah, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	517	0	0	39	9	17	33	8	40	56	52	145	118
TOP	1,604	311	824	46	18	33	49	9	33	53	40	123	65
TOTAL	2,121	311	824	85	27	50	82	17	73	109	92	268	183
PONDEROSA PINE													
BOLE	133	0	0	3	2	5	9	3	5	3	6	30	67
TOP	758	131	348	21	7	13	18	6	6	5	12	58	133
TOTAL	891	131	348	24	9	18	27	9	11	8	18	88	200
TRUE FIRS													
BOLE	338	0	0	34	38	20	33	14	13	22	18	57	89
TOP	2,761	759	1,604	68	61	36	53	18	14	23	18	51	56
TOTAL	3,099	759	1,604	102	99	56	86	32	27	45	36	108	145
ENGELMANN SPRUCE													
BOLE	194	0	0	31	14	11	31	12	9	18	18	35	15
TOP	1,125	366	540	48	20	21	41	13	8	16	15	28	9
TOTAL	1,319	366	540	79	34	32	72	25	17	34	33	63	24
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	204	0	0	31	27	33	22	25	22	16	12	16	0
TOP	2,374	486	1,669	54	29	43	21	22	17	12	9	12	0
TOTAL	2,578	486	1,669	85	56	76	43	47	39	28	21	28	0
OTHER SOFTWOODS													
BOLE	37	0	0	5	7	3	1	2	1	4	0	13	1
TOP	90	18	31	4	5	3	2	2	1	4	0	19	1
TOTAL	127	18	31	9	12	6	3	4	2	8	0	32	2
TOTAL SOFTWOODS													
BOLE	1,423	0	0	143	97	89	129	64	90	119	106	296	290
TOP	8,712	2,071	5,016	241	140	149	184	70	79	113	94	291	264
TOTAL	10,135	2,071	5,016	384	237	238	313	134	169	232	200	587	554
ASPEN & COTTONWOOD													
BOLE	4,262	0	0	1,077	1,236	1,038	310	258	188	101	32	22	0
TOP	4,103	464	1,981	361	417	428	159	133	91	48	14	7	0
TOTAL	8,365	464	1,981	1,438	1,653	1,466	469	391	279	149	46	29	0
OTHER HARDWOODS													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL HARDWOODS													
BOLE	4,262	0	0	1,077	1,236	1,038	310	258	188	101	32	22	0
TOP	4,103	464	1,981	361	417	428	159	133	91	48	14	7	0
TOTAL	8,365	464	1,981	1,438	1,653	1,466	469	391	279	149	46	29	0
TOTAL ALL SPECIES													
BOLE	5,685	0	0	1,220	1,333	1,127	439	322	278	220	138	318	290
TOP	12,815	2,535	6,997	602	557	577	343	203	170	161	108	298	264
TOTAL	18,500	2,535	6,997	1,822	1,890	1,704	782	525	448	381	246	616	554

Table B-21.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Wyoming, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	310	0	0	30	28	22	18	27	16	31	30	83	25
TOP	1,439	357	892	32	24	16	11	15	9	15	13	42	13
TOTAL	1,749	357	892	62	52	38	29	42	25	46	43	125	38
PONDEROSA PINE													
BOLE	229	0	0	11	22	12	39	42	28	21	14	26	14
TOP	2,952	591	2,090	41	25	9	29	35	26	22	16	46	22
TOTAL	3,181	591	2,090	52	47	21	68	77	54	43	30	72	36
TRUE FIRS													
BOLE	509	0	0	145	125	35	55	41	25	24	21	37	1
TOP	4,366	1,561	2,370	142	115	31	43	28	17	15	15	29	0
TOTAL	4,875	1,561	2,370	287	240	66	98	69	42	39	36	66	1
ENGELMANN SPRUCE													
BOLE	1,660	0	0	58	46	42	49	55	39	54	70	1,135	112
TOP	2,318	499	947	68	44	34	34	33	23	26	34	533	43
TOTAL	3,978	499	947	126	90	76	83	88	62	80	104	1,668	155
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	1,194	0	0	325	347	119	130	74	62	54	41	42	0
TOP	8,595	2,296	5,297	482	227	67	80	41	34	27	20	24	0
TOTAL	9,789	2,296	5,297	807	574	186	210	115	96	81	61	66	0
OTHER SOFTWOODS													
BOLE	488	0	0	44	115	50	84	62	13	34	12	56	18
TOP	955	177	404	46	109	38	59	41	9	21	6	35	10
TOTAL	1,443	177	404	90	224	88	143	103	22	55	18	91	28
TOTAL SOFTWOODS													
BOLE	4,390	0	0	613	683	280	375	301	183	218	188	1,379	170
TOP	20,625	5,481	12,000	811	544	195	256	193	118	126	104	709	88
TOTAL	25,015	5,481	12,000	1,424	1,227	475	631	494	301	344	292	2,088	258
ASPEN & COTTONWOOD													
BOLE	899	0	0	342	296	118	68	17	7	36	15	0	0
TOP	866	157	525	61	62	26	18	4	2	7	4	0	0
TOTAL	1,765	157	525	403	358	144	86	21	9	43	19	0	0
OTHER HARDWOODS													
BOLE	30	0	0	14	7	2	5	0	2	0	0	0	0
TOP	4	0	0	2	1	1	0	0	0	0	0	0	0
TOTAL	34	0	0	16	8	3	5	0	2	0	0	0	0
TOTAL HARDWOODS													
BOLE	929	0	0	356	303	120	73	17	9	36	15	0	0
TOP	870	157	525	63	63	27	18	4	2	7	4	0	0
TOTAL	1,799	157	525	419	366	147	91	21	11	43	19	0	0
TOTAL ALL SPECIES													
BOLE	5,319	0	0	969	986	400	448	318	192	254	203	1,379	170
TOP	21,495	5,638	12,525	874	607	222	274	197	120	133	108	709	88
TOTAL	26,814	5,638	12,525	1,843	1,593	622	722	515	312	387	311	2,088	258

Table B-22.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Northern Rocky Mountains, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	6,516	0	0	649	611	675	456	490	549	533	437	1,393	723
TOP	30,953	8,620	19,481	492	409	384	215	203	206	181	135	447	180
TOTAL	37,469	8,620	19,481	1,141	1,020	1,059	671	693	755	714	572	1,840	903
PONDEROSA PINE													
BOLE	2,179	0	0	178	193	224	170	183	176	149	111	423	372
TOP	13,038	2,812	8,598	273	145	121	104	119	118	110	80	351	207
TOTAL	15,217	2,812	8,598	451	338	345	274	302	294	259	191	774	579
TRUE FIRS													
BOLE	3,941	0	0	389	368	356	337	287	338	330	219	793	524
TOP	26,078	8,836	15,214	391	316	224	176	135	140	130	85	297	134
TOTAL	30,019	8,836	15,214	780	684	580	513	422	478	460	304	1,090	658
ENGELMANN SPRUCE													
BOLE	2,600	0	0	111	97	207	102	124	122	121	134	1,355	227
TOP	6,910	2,374	3,255	124	87	106	58	61	55	49	55	611	75
TOTAL	9,510	2,374	3,255	235	184	313	160	185	177	170	189	1,966	302
WESTERN LARCH													
BOLE	1,362	0	0	139	111	137	90	90	101	95	76	318	205
TOP	6,330	1,136	4,584	138	82	83	36	35	34	29	21	99	53
TOTAL	7,692	1,136	4,584	277	193	220	126	125	135	124	97	417	258
WESTERN HEMLOCK													
BOLE	1,141	0	0	29	62	76	98	86	156	138	118	284	94
TOP	2,966	1,171	1,407	39	36	34	31	27	41	35	31	83	31
TOTAL	4,107	1,171	1,407	68	98	110	129	113	197	173	149	367	125
WESTERN WHITE PINE													
BOLE	798	0	0	18	29	34	43	29	58	66	65	262	194
TOP	1,319	243	604	19	16	16	20	14	28	35	32	176	116
TOTAL	2,117	243	604	37	45	50	63	43	86	101	97	438	310
WESTERN RED CEDAR													
BOLE	1,174	0	0	42	39	66	71	58	72	76	83	316	351
TOP	5,396	1,891	2,888	48	42	47	41	34	39	41	39	162	124
TOTAL	6,570	1,891	2,888	90	81	113	112	92	111	117	122	478	475

LODGEPOLE PINE													
BOLE	6,064	0	0	2,184	1,164	1,099	1,012	244	150	93	60	58	0
TOP	46,265	10,042	32,798	1,821	573	449	327	96	63	41	25	30	0
TOTAL	52,329	10,042	32,798	4,005	1,737	1,548	1,339	340	213	134	85	88	0
OTHER SOFTWOODS													
BOLE	880	0	0	115	176	103	128	106	47	55	35	87	28
TOP	2,621	637	1,421	70	137	66	81	64	26	31	18	56	14
TOTAL	3,501	637	1,421	185	313	169	209	170	73	86	53	143	42
TOTAL SOFTWOODS													
BOLE	26,655	0	0	3,854	2,850	2,977	2,507	1,697	1,769	1,656	1,338	5,289	2,718
TOP	141,876	37,762	90,250	3,415	1,843	1,530	1,089	788	750	682	521	2,312	934
TOTAL	168,531	37,762	90,250	7,269	4,693	4,507	3,596	2,485	2,519	2,338	1,859	7,601	3,652
ASPEN & COTTONWOOD													
BOLE	2,007	0	0	679	560	258	139	54	52	46	126	80	13
TOP	1,624	243	800	155	164	89	40	34	19	10	45	22	3
TOTAL	3,631	243	800	834	724	347	179	88	71	56	171	102	16
OTHER HARDWOODS													
BOLE	733	0	0	393	170	117	21	13	6	3	3	3	4
TOP	687	157	403	53	31	32	5	4	0	1	0	1	0
TOTAL	1,420	157	403	446	201	149	26	17	6	4	3	4	4
TOTAL HARDWOODS													
BOLE	2,740	0	0	1,072	730	375	160	67	58	49	129	83	17
TOP	2,311	400	1,203	208	195	121	45	38	19	11	45	23	3
TOTAL	5,051	400	1,203	1,280	925	496	205	105	77	60	174	106	20
TOTAL ALL SPECIES													
BOLE	29,395	0	0	4,926	3,580	3,352	2,667	1,764	1,827	1,705	1,467	5,372	2,735
TOP	144,187	38,162	91,453	3,623	2,038	1,651	1,134	826	769	693	566	2,335	937
TOTAL	173,582	38,162	91,453	8,549	5,618	5,003	3,801	2,590	2,596	2,398	2,033	7,707	3,672

Table B-23.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Southern Rocky Mountains, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	1,936	0	0	242	248	151	133	131	157	158	169	315	232
TOP	7,389	1,702	4,320	232	223	145	124	82	91	94	87	188	101
TOTAL	9,325	1,702	4,320	474	471	296	257	213	248	252	256	503	333
PONDEROSA PINE													
BOLE	2,981	0	0	342	395	168	237	202	370	266	220	519	262
TOP	17,346	4,252	10,008	803	446	177	200	150	268	158	135	435	314
TOTAL	20,327	4,252	10,008	1,145	841	345	437	352	638	424	355	954	576
TRUE FIRS													
BOLE	2,455	0	0	434	383	241	257	208	180	131	157	263	201
TOP	11,714	3,256	6,721	398	338	195	188	124	98	72	76	148	100
TOTAL	14,169	3,256	6,721	832	721	436	445	332	278	203	233	411	301
ENGELMANN SPRUCE													
BOLE	3,246	0	0	324	348	277	276	254	267	383	277	645	195
TOP	9,491	2,529	5,217	302	268	199	180	121	119	149	102	243	62
TOTAL	12,737	2,529	5,217	626	616	476	456	375	386	532	379	888	257
WESTERN LARCH													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN HEMLOCK													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
WESTERN WHITE PINE													
BOLE	3	0	0	0	0	0	0	0	0	0	0	1	2
TOP	7	1	3	0	0	0	0	0	0	0	0	1	2
TOTAL	10	1	3	0	0	0	0	0	0	0	0	2	4
WESTERN RED CEDAR													
BOLE	0	0	0	0	0	0	0	0	0	0	0	0	0
TOP	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0

LODGEPOLE PINE													
BOLE	1,913	0	0	455	397	252	202	204	136	126	74	64	3
TOP	9,488	2,171	6,223	415	187	135	99	91	58	49	28	31	1
TOTAL	11,401	2,171	6,223	870	584	387	301	295	194	175	102	95	4
OTHER SOFTWOODS													
BOLE	2,344	0	0	222	230	174	179	184	213	169	153	416	404
TOP	2,760	375	876	232	213	141	133	124	124	89	78	229	146
TOTAL	5,104	375	876	454	443	315	312	308	337	258	231	645	550
TOTAL SOFTWOODS													
BOLE	14,878	0	0	2,019	2,001	1,263	1,284	1,183	1,323	1,233	1,050	2,223	1,299
TOP	58,195	14,286	33,368	2,382	1,675	992	924	692	758	611	506	1,275	726
TOTAL	73,073	14,286	33,368	4,401	3,676	2,255	2,208	1,875	2,081	1,844	1,556	3,498	2,025
ASPEN & COTTONWOOD													
BOLE	20,458	0	0	5,304	5,258	3,974	1,707	1,292	1,062	847	515	458	41
TOP	15,542	2,212	7,435	1,241	1,386	1,280	606	464	398	237	157	115	11
TOTAL	36,000	2,212	7,435	6,545	6,644	5,254	2,313	1,756	1,460	1,084	672	573	52
OTHER HARDWOODS													
BOLE	1,922	0	0	395	309	240	238	198	171	122	95	136	18
TOP	1,754	319	570	132	117	121	127	112	92	59	44	56	5
TOTAL	3,676	319	570	527	426	361	365	310	263	181	139	192	23
TOTAL HARDWOODS													
BOLE	22,380	0	0	5,699	5,567	4,214	1,945	1,490	1,233	969	610	594	59
TOP	17,296	2,531	8,005	1,373	1,503	1,401	733	576	490	296	201	171	16
TOTAL	39,676	2,531	8,005	7,072	7,070	5,615	2,678	2,066	1,723	1,265	811	765	75
TOTAL ALL SPECIES													
BOLE	37,258	0	0	7,718	7,568	5,477	3,229	2,673	2,556	2,202	1,660	2,817	1,358
TOP	75,491	16,817	41,373	3,755	3,178	2,393	1,657	1,268	1,248	907	707	1,446	742
TOTAL	112,749	16,817	41,373	11,473	10,746	7,870	4,886	3,941	3,804	3,109	2,367	4,263	2,100

Table B-24.—Dry weight of small trees and rough and rotten trees by species, tree component, and diameter class, Rocky Mountains, 1977

SPECIES AND TREE COMPONENT	TOTAL	TWO INCH DIAMETER CLASS											
		2	4	6	8	10	12	14	16	18	20	22-28	30+
	Thousand tons												
DOUGLAS-FIR													
BOLE	8,452	0	0	891	859	826	589	621	706	691	606	1,708	955
TOP	38,342	10,322	23,801	724	632	529	339	285	297	275	222	635	281
TOTAL	46,794	10,322	23,801	1,615	1,491	1,355	928	906	1,003	966	828	2,343	1,236
PONDEROSA PINE													
BOLE	5,160	0	0	520	588	392	407	385	546	415	331	942	634
TOP	30,384	7,064	18,606	1,076	591	298	304	269	386	268	215	786	521
TOTAL	35,544	7,064	18,606	1,596	1,179	690	711	654	932	683	546	1,728	1,155
TRUE FIRS													
BOLE	6,396	0	0	823	751	597	594	495	518	461	376	1,056	725
TOP	37,792	12,092	21,935	789	654	419	364	259	238	202	161	445	234
TOTAL	44,188	12,092	21,935	1,612	1,405	1,016	958	754	756	663	537	1,501	959
ENGELMANN SPRUCE													
BOLE	5,846	0	0	435	445	484	378	378	389	504	411	2,000	422
TOP	16,401	4,903	8,472	426	355	305	238	182	174	198	157	854	137
TOTAL	22,247	4,903	8,472	861	800	789	616	560	563	702	568	2,854	559
WESTERN LARCH													
BOLE	1,362	0	0	139	111	137	90	90	101	95	76	318	205
TOP	6,330	1,136	4,584	138	82	83	36	35	34	29	21	99	53
TOTAL	7,692	1,136	4,584	277	193	220	126	125	135	124	97	417	258
WESTERN HEMLOCK													
BOLE	1,141	0	0	29	62	76	98	86	156	138	118	284	94
TOP	2,966	1,171	1,407	39	36	34	31	27	41	35	31	83	31
TOTAL	4,107	1,171	1,407	68	98	110	129	113	197	173	149	367	125
WESTERN WHITE PINE													
BOLE	801	0	0	18	29	34	43	29	58	66	65	263	196
TOP	1,326	244	607	19	16	16	20	14	28	35	32	177	118
TOTAL	2,127	244	607	37	45	50	63	43	86	101	97	440	314
WESTERN RED CEDAR													
BOLE	1,174	0	0	42	39	66	71	58	72	76	83	316	351
TOP	5,396	1,891	2,888	48	42	47	41	34	39	41	39	162	124
TOTAL	6,570	1,891	2,888	90	81	113	112	92	111	117	122	478	475

LODGEPOLE PINE													
BOLE	7,977	0	0	2,639	1,561	1,351	1,214	448	286	219	134	122	3
TOP	55,753	12,213	39,021	2,236	760	584	426	187	121	90	53	61	1
TOTAL	63,730	12,213	39,021	4,875	2,321	1,935	1,640	635	407	309	187	183	4
OTHER SOFTWOODS													
BOLE	3,224	0	0	337	406	277	307	290	260	224	188	503	432
TOP	5,381	1,012	2,297	302	350	207	214	188	150	120	96	285	160
TOTAL	8,605	1,012	2,297	639	756	484	521	478	410	344	284	788	592
TOTAL SOFTWOODS													
BOLE	41,533	0	0	5,873	4,851	4,240	3,791	2,880	3,092	2,889	2,388	7,512	4,017
TOP	200,071	52,048	123,618	5,797	3,518	2,522	2,013	1,480	1,508	1,293	1,027	3,587	1,660
TOTAL	241,604	52,048	123,618	11,670	8,369	6,762	5,804	4,360	4,600	4,182	3,415	11,099	5,677
ASPEN & COTTONWOOD													
BOLE	22,465	0	0	5,983	5,818	4,232	1,846	1,346	1,114	893	641	538	54
TOP	17,166	2,455	8,235	1,396	1,550	1,369	646	498	417	247	202	137	14
TOTAL	39,631	2,455	8,235	7,379	7,368	5,601	2,492	1,844	1,531	1,140	843	675	68
OTHER HARDWOODS													
BOLE	2,655	0	0	788	479	357	259	211	177	125	98	139	22
TOP	2,441	476	973	185	148	153	132	116	92	60	44	57	5
TOTAL	5,096	476	973	973	627	510	391	327	269	185	142	196	27
TOTAL HARDWOODS													
BOLE	25,120	0	0	6,771	6,297	4,589	2,105	1,557	1,291	1,018	739	677	76
TOP	19,607	2,931	9,208	1,581	1,698	1,522	778	614	509	307	246	194	19
TOTAL	44,727	2,931	9,208	8,352	7,995	6,111	2,883	2,171	1,800	1,325	985	871	95
TOTAL ALL SPECIES													
BOLE	66,653	0	0	12,644	11,148	8,829	5,896	4,437	4,383	3,907	3,127	8,189	4,093
TOP	219,678	54,979	132,826	7,378	5,216	4,044	2,791	2,094	2,017	1,600	1,273	3,781	1,679
TOTAL	286,331	54,979	132,826	20,022	16,364	12,873	8,687	6,531	6,400	5,507	4,400	11,970	5,772

Table B-25.—Dry weight of timber by ownership and softwoods and hardwoods, and by type of timber, Arizona, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER						
				GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	71,213	46,541	24,672	62,519	45,037	17,482	2,809	1,504	1,305	5,885
HARDWOOD	4,223	2,856	1,367	2,184	1,839	345	1,709	1,017	692	330
TOTAL	75,436	49,397	26,039	64,703	46,876	17,827	4,518	2,521	1,997	6,215
OTHER PUBLIC										
SOFTWOOD	33,369	20,636	12,733	30,477	20,093	10,384	1,180	543	637	1,712
HARDWOOD	1,752	1,248	504	873	663	210	827	585	242	52
TOTAL	35,121	21,884	13,237	31,350	20,756	10,594	2,007	1,128	879	1,764
TOTAL, PUBLIC										
SOFTWOOD	104,582	67,177	37,405	92,996	65,130	27,866	3,989	2,047	1,942	7,597
HARDWOOD	5,975	4,104	1,871	3,057	2,502	555	2,536	1,602	934	382
TOTAL	110,557	71,281	39,276	96,053	67,632	28,421	6,525	3,649	2,876	7,979
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	0	0	0	0	0	0	0	0	0	0
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0
FARMER & OTHER										
SOFTWOOD	2,419	1,498	921	2,220	1,463	757	76	35	41	123
HARDWOOD	1,433	1,020	413	715	542	173	675	478	197	43
TOTAL	3,852	2,518	1,334	2,935	2,005	930	751	513	238	166
TOTAL, PRIVATE										
SOFTWOOD	2,419	1,498	921	2,220	1,463	757	76	35	41	123
HARDWOOD	1,433	1,020	413	715	542	173	675	478	197	43
TOTAL	3,852	2,518	1,334	2,935	2,005	930	751	513	238	166
TOTAL, ALL OWNERS										
SOFTWOOD	107,001	68,675	38,326	95,216	66,593	28,623	4,065	2,082	1,983	7,720
HARDWOOD	7,408	5,124	2,284	3,772	3,044	728	3,211	2,080	1,131	425
TOTAL	114,409	73,799	40,610	98,988	69,637	29,351	7,276	4,162	3,114	8,145

Table B-26.—Dry weight of timber by ownership and [illegible]

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER: GROWING STOCK			TYPE OF TIMBER: ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	176,689	122,064	54,625	152,376	116,182	36,194	9,030	5,882	3,148	15,283
HARDWOOD	40,807	30,469	10,338	27,349	22,702	4,647	9,798	7,767	2,031	3,660
TOTAL	217,496	152,533	64,963	179,725	138,884	40,841	18,828	13,649	5,179	18,943
OTHER PUBLIC										
SOFTWOOD	14,677	9,733	4,944	12,692	9,354	3,338	599	379	220	1,386
HARDWOOD	4,200	3,000	1,200	2,501	2,046	455	1,165	954	211	534
TOTAL	18,877	12,733	6,144	15,193	11,400	3,793	1,764	1,333	431	1,920
TOTAL, PUBLIC										
SOFTWOOD	191,366	131,797	59,569	165,068	125,536	39,532	9,629	6,261	3,368	16,669
HARDWOOD	45,007	33,469	11,538	29,850	24,748	5,102	10,963	8,721	2,242	4,194
TOTAL	236,373	165,266	71,107	194,918	150,284	44,634	20,592	14,982	5,610	20,863
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	429	289	140	384	286	98	3	3	0	42
HARDWOOD	20	15	5	12	10	2	5	5	0	3
TOTAL	449	304	145	396	296	100	8	8	0	45
FARMER & OTHER										
SOFTWOOD	49,552	32,842	16,710	42,840	31,566	11,274	2,035	1,276	759	4,677
HARDWOOD	17,524	12,524	5,000	10,439	8,544	1,895	4,856	3,980	876	2,229
TOTAL	67,076	45,366	21,710	53,279	40,110	13,169	6,891	5,256	1,635	6,906
TOTAL, PRIVATE										
SOFTWOOD	49,981	33,131	16,850	43,224	31,852	11,372	2,038	1,279	759	4,719
HARDWOOD	17,544	12,539	5,005	10,451	8,554	1,897	4,861	3,985	876	2,232
TOTAL	67,525	45,670	21,855	53,675	40,406	13,269	6,899	5,264	1,635	6,951
TOTAL, ALL OWNERS										
SOFTWOOD	241,347	164,928	76,419	208,292	157,388	50,904	11,667	7,540	4,127	21,388
HARDWOOD	62,551	46,008	16,543	40,301	33,302	6,999	15,824	12,706	3,118	6,426
TOTAL	303,898	210,936	92,962	248,593	190,690	57,903	27,491	20,246	7,245	27,814

Table B-27.—Dry weight of timber by ownership and soft woods and hardwoods, and by type of timber, Idaho, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER: GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	396,250	302,629	93,621	367,278	296,513	70,765	9,215	6,116	3,099	19,757
HARDWOOD	1,777	1,348	429	1,147	958	189	500	390	110	130
TOTAL	398,027	303,977	94,050	368,425	297,471	70,954	9,715	6,506	3,209	19,887
OTHER PUBLIC										
SOFTWOOD	65,528	46,981	18,547	58,365	45,405	12,960	2,405	1,576	829	4,758
HARDWOOD	1,167	874	293	807	676	131	247	198	49	113
TOTAL	66,695	47,855	18,840	59,172	46,081	13,091	2,652	1,774	878	4,871
TOTAL, PUBLIC										
SOFTWOOD	461,778	349,610	112,168	425,643	341,918	83,725	11,620	7,692	3,928	24,515
HARDWOOD	2,944	2,222	722	1,954	1,634	320	747	588	159	243
TOTAL	464,722	351,832	112,890	427,597	343,552	84,045	12,367	8,280	4,087	24,758
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	58,449	41,911	16,538	52,059	40,505	11,554	2,146	1,406	740	4,244
HARDWOOD	662	493	169	460	382	78	138	111	27	64
TOTAL	59,111	42,404	16,707	52,519	40,887	11,632	2,284	1,517	767	4,308
FARMER & OTHER										
SOFTWOOD	78,278	56,128	22,150	69,718	54,241	15,477	2,878	1,887	991	5,682
HARDWOOD	1,896	1,415	481	1,313	1,096	217	398	319	79	185
TOTAL	80,174	57,543	22,631	71,031	55,337	15,694	3,276	2,206	1,070	5,867
TOTAL, PRIVATE										
SOFTWOOD	136,727	98,039	38,688	121,777	94,746	27,031	5,024	3,293	1,731	9,926
HARDWOOD	2,558	1,908	650	1,773	1,478	295	536	430	106	249
TOTAL	139,285	99,947	39,338	123,550	96,224	27,326	5,560	3,723	1,837	10,175
TOTAL, ALL OWNERS										
SOFTWOOD	598,505	447,649	150,856	547,420	436,664	110,756	16,644	10,985	5,659	34,441
HARDWOOD	5,502	4,130	1,372	3,727	3,112	615	1,283	1,018	265	492
TOTAL	604,007	451,779	152,228	551,147	439,776	111,371	17,927	12,003	5,924	34,933

Table B-28.—Dry weight of timber by ownership and softwoods and hardwoods, and by type of timber, Montana, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER: GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	364,416	255,687	108,729	319,743	250,157	69,586	7,160	5,530	1,630	37,513
HARDWOOD	969	760	209	785	688	97	96	72	24	88
TOTAL	365,385	256,447	108,938	320,528	250,845	69,683	7,256	5,602	1,654	37,601
OTHER PUBLIC										
SOFTWOOD	63,362	38,105	25,257	51,940	36,640	15,300	2,331	1,465	866	9,091
HARDWOOD	1,268	896	372	1,053	782	271	156	114	42	59
TOTAL	64,630	39,001	25,629	52,993	37,422	15,571	2,487	1,579	908	9,150
TOTAL, PUBLIC										
SOFTWOOD	427,778	293,792	133,986	371,683	286,797	84,886	9,491	6,995	2,496	46,604
HARDWOOD	2,237	1,656	581	1,838	1,470	368	252	186	66	147
TOTAL	430,015	295,448	134,567	373,521	288,267	85,254	9,743	7,181	2,562	46,751
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	52,114	31,344	20,770	42,727	30,142	12,585	1,906	1,202	704	7,481
HARDWOOD	121	88	33	101	76	25	14	12	2	6
TOTAL	52,235	31,432	20,803	42,828	30,218	12,610	1,920	1,214	706	7,487
FARMER & OTHER										
SOFTWOOD	123,596	74,335	49,261	101,320	71,480	29,840	4,541	2,855	1,686	17,735
HARDWOOD	3,542	2,504	1,038	2,942	2,185	757	433	319	114	167
TOTAL	127,138	76,839	50,299	104,262	73,665	30,597	4,974	3,174	1,800	17,902
TOTAL, PRIVATE										
SOFTWOOD	175,710	105,679	70,031	144,047	101,622	42,425	6,447	4,057	2,390	25,216
HARDWOOD	3,663	2,592	1,071	3,043	2,261	782	447	331	116	173
TOTAL	179,373	108,271	71,102	147,090	103,883	43,207	6,894	4,388	2,506	25,389
TOTAL, ALL OWNERS										
SOFTWOOD	603,488	399,471	204,017	515,730	388,419	127,311	15,938	11,052	4,886	71,820
HARDWOOD	5,900	4,248	1,652	4,881	3,731	1,150	699	517	182	320
TOTAL	609,388	403,719	205,669	520,611	392,150	128,461	16,637	11,569	5,068	72,140

Table B-29.—Dry weight of timber by ownership and soft woods and hardwoods, and by type of timber, Nevada, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER						
				GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	1,675	1,193	482	1,505	1,113	392	127	80	47	43
HARDWOOD	395	316	79	228	178	50	161	138	23	6
TOTAL	2,070	1,509	561	1,733	1,291	442	288	218	70	49
OTHER PUBLIC										
SOFTWOOD	161	121	40	157	121	36	0	0	0	4
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	161	121	40	157	121	36	0	0	0	4
TOTAL, PUBLIC										
SOFTWOOD	1,836	1,314	522	1,662	1,234	428	127	80	47	47
HARDWOOD	395	316	79	228	178	50	161	138	23	6
TOTAL	2,231	1,630	601	1,890	1,412	478	288	218	70	53
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	275	211	64	269	210	59	1	1	0	5
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	275	211	64	269	210	59	1	1	0	5
FARMER & OTHER										
SOFTWOOD	2,592	1,923	669	2,472	1,898	574	55	25	30	65
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	2,592	1,923	669	2,472	1,898	574	55	25	30	65
TOTAL, PRIVATE										
SOFTWOOD	2,867	2,134	733	2,741	2,108	633	56	26	30	70
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	2,867	2,134	733	2,741	2,108	633	56	26	30	70
TOTAL, ALL OWNERS										
SOFTWOOD	4,703	3,448	1,255	4,403	3,342	1,061	183	106	77	117
HARDWOOD	395	316	79	228	178	50	161	138	23	6
TOTAL	5,098	3,764	1,334	4,631	3,520	1,111	344	244	100	123

ownership and softwoods and hardwoods, and by type of timber, New Mexico, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER: GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	64,152	42,220	21,932	55,040	40,022	15,018	3,773	2,198	1,575	5,339
HARDWOOD	6,720	4,783	1,937	3,943	3,333	610	1,929	1,450	479	848
TOTAL	70,872	47,003	23,869	58,983	43,355	15,628	5,702	3,648	2,054	6,187
OTHER PUBLIC										
SOFTWOOD	29,493	19,477	10,016	25,482	18,770	6,712	1,243	707	536	2,768
HARDWOOD	759	597	162	538	442	96	187	155	32	34
TOTAL	30,252	20,074	10,178	26,020	19,212	6,808	1,430	862	568	2,802
TOTAL, PUBLIC										
SOFTWOOD	93,645	61,697	31,948	80,522	58,792	21,730	5,016	2,905	2,111	8,107
HARDWOOD	7,479	5,380	2,099	4,481	3,775	706	2,116	1,605	511	882
TOTAL	101,124	67,077	34,047	85,003	62,567	22,436	7,132	4,510	2,622	8,989
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	0	0	0	0	0	0	0	0	0	0
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0
FARMER & OTHER										
SOFTWOOD	34,473	22,766	11,707	29,798	21,944	7,854	1,440	822	618	3,235
HARDWOOD	7,775	6,122	1,653	5,515	4,533	982	1,908	1,589	319	352
TOTAL	42,248	28,888	13,360	35,313	26,477	8,836	3,348	2,411	937	3,587
TOTAL, PRIVATE										
SOFTWOOD	34,473	22,766	11,707	29,798	21,944	7,854	1,440	822	618	3,235
HARDWOOD	7,775	6,122	1,653	5,515	4,533	982	1,908	1,589	319	352
TOTAL	42,248	28,888	13,360	35,313	26,477	8,836	3,348	2,411	937	3,587
TOTAL, ALL OWNERS										
SOFTWOOD	128,118	84,463	43,655	110,320	80,736	29,584	6,456	3,727	2,729	11,342
HARDWOOD	15,254	11,502	3,752	9,996	8,308	1,688	4,024	3,194	830	1,234
TOTAL	143,372	95,965	47,407	120,316	89,044	31,272	10,480	6,921	3,559	12,576

Table B-31.—Dry weight of timber by ownership and soft woods and hardwoods, and by type of timber, western South Dakota, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER						
				GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	28,759	19,023	9,736	25,512	18,855	6,657	287	168	119	2,960
HARDWOOD	421	325	96	165	132	33	246	193	53	10
TOTAL	29,180	19,348	9,832	25,677	18,987	6,690	533	361	172	2,970
OTHER PUBLIC										
SOFTWOOD	1,980	1,118	862	1,579	1,101	478	34	17	17	367
HARDWOOD	35	21	14	13	13	0	10	8	2	12
TOTAL	2,015	1,139	876	1,592	1,114	478	44	25	19	379
TOTAL, PUBLIC										
SOFTWOOD	30,739	20,141	10,598	27,091	19,956	7,135	321	185	136	3,327
HARDWOOD	456	346	110	178	145	33	256	201	55	22
TOTAL	31,195	20,487	10,708	27,269	20,101	7,168	577	386	191	3,349
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	476	270	206	382	267	115	6	3	3	88
HARDWOOD	27	17	10	10	10	0	8	7	1	9
TOTAL	503	287	216	392	277	115	14	10	4	97
FARMER & OTHER										
SOFTWOOD	4,617	2,614	2,003	3,686	2,574	1,112	76	40	36	855
HARDWOOD	264	155	109	101	87	14	85	68	17	78
TOTAL	4,881	2,769	2,112	3,787	2,661	1,126	161	108	53	933
TOTAL, PRIVATE										
SOFTWOOD	5,093	2,884	2,209	4,068	2,841	1,227	82	43	39	943
HARDWOOD	291	172	119	111	97	14	93	75	18	87
TOTAL	5,384	3,056	2,328	4,179	2,938	1,241	175	118	57	1,030
TOTAL, ALL OWNERS										
SOFTWOOD	35,832	23,025	12,807	31,159	22,797	8,362	403	228	175	4,270
HARDWOOD	747	518	229	289	242	47	349	276	73	109
TOTAL	36,579	23,543	13,036	31,448	23,039	8,409	752	504	248	4,379

Table B-32.—Dry weight of timber by ownership and softwoods and hardwoods and by type of timber

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER						
				GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	55,597	36,519	19,078	48,555	35,743	12,812	1,570	776	794	5,472
HARDWOOD	11,660	7,968	3,692	7,518	6,160	1,358	2,668	1,808	860	1,474
TOTAL	67,257	44,487	22,770	56,073	41,903	14,170	4,238	2,584	1,654	6,946
OTHER PUBLIC										
SOFTWOOD	9,303	6,067	3,236	7,614	5,715	1,899	807	352	455	882
HARDWOOD	3,850	2,838	1,012	2,435	2,016	419	1,090	822	268	325
TOTAL	13,153	8,905	4,248	10,049	7,731	2,318	1,897	1,174	723	1,207
TOTAL, PUBLIC										
SOFTWOOD	64,900	42,586	22,314	56,169	41,458	14,711	2,377	1,128	1,249	6,354
HARDWOOD	15,510	10,806	4,704	9,953	8,176	1,777	3,758	2,630	1,128	1,799
TOTAL	80,410	53,392	27,018	66,122	49,634	16,488	6,135	3,758	2,377	8,153
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	0	0	0	0	0	0	0	0	0	0
HARDWOOD	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0
FARMER & OTHER										
SOFTWOOD	7,740	5,050	2,690	6,336	4,755	1,581	671	295	376	733
HARDWOOD	7,643	5,635	2,008	4,835	4,003	832	2,162	1,632	530	646
TOTAL	15,383	10,685	4,698	11,171	8,758	2,413	2,833	1,927	906	1,379
TOTAL, PRIVATE										
SOFTWOOD	7,740	5,050	2,690	6,336	4,755	1,581	671	295	376	733
HARDWOOD	7,643	5,635	2,008	4,835	4,003	832	2,162	1,632	530	646
TOTAL	15,383	10,685	4,698	11,171	8,758	2,413	2,833	1,927	906	1,379
TOTAL, ALL OWNERS										
SOFTWOOD	72,640	47,636	25,004	62,505	46,213	16,292	3,048	1,423	1,625	7,087
HARDWOOD	23,153	16,441	6,712	14,788	12,179	2,609	5,920	4,262	1,658	2,445
TOTAL	95,793	64,077	31,716	77,293	58,392	18,901	8,968	5,685	3,283	9,532

Table B-33.—Dry weight of timber by ownership and softwoods and hardwoods, and by type of timber, Wyoming, 1977

OWNERSHIP AND SPECIES GROUP	TYPE OF TIMBER									
	TOTAL ALL TYPES			GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	111,662	74,217	37,445	93,088	70,257	22,831	6,682	3,960	2,722	11,892
HARDWOOD	2,612	1,877	735	1,337	1,101	236	921	776	145	354
TOTAL	114,274	76,094	38,180	94,425	71,358	23,067	7,603	4,736	2,867	12,246
OTHER PUBLIC										
SOFTWOOD	13,767	8,060	5,707	11,107	7,882	3,225	353	178	175	2,307
HARDWOOD	1,185	841	344	984	782	202	75	59	16	126
TOTAL	14,952	8,901	6,051	12,091	8,664	3,427	428	237	191	2,433
TOTAL, PUBLIC										
SOFTWOOD	125,429	82,277	43,152	104,195	78,139	26,056	7,035	4,138	2,897	14,199
HARDWOOD	3,797	2,718	1,079	2,321	1,883	438	996	835	161	480
TOTAL	129,226	84,995	44,231	106,516	80,022	26,494	8,031	4,973	3,058	14,679
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	1,458	851	607	1,183	837	346	29	14	15	246
HARDWOOD	69	50	19	58	47	11	3	3	0	8
TOTAL	1,527	901	626	1,241	884	357	32	17	15	254
FARMER & OTHER										
SOFTWOOD	18,116	10,606	7,510	14,610	10,368	4,242	470	238	232	3,036
HARDWOOD	1,836	1,302	534	1,524	1,211	313	118	91	27	194
TOTAL	19,952	11,908	8,044	16,134	11,579	4,555	588	329	259	3,230
TOTAL, PRIVATE										
SOFTWOOD	19,574	11,457	8,117	15,793	11,205	4,588	499	252	247	3,282
HARDWOOD	1,905	1,352	553	1,582	1,258	324	121	94	27	202
TOTAL	21,479	12,809	8,670	17,375	12,463	4,912	620	346	274	3,484
TOTAL, ALL OWNERS										
SOFTWOOD	145,003	93,734	51,269	119,988	89,344	30,644	7,534	4,390	3,144	17,481
HARDWOOD	5,702	4,070	1,632	3,903	3,141	762	1,117	929	188	682
TOTAL	150,705	97,804	52,901	123,891	92,485	31,406	8,651	5,319	3,332	18,163

...by ownership and softwood and hardwoods, and by type of timber, Northern Rocky Mountains, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			TYPE OF TIMBER						
				GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	901,087	651,556	249,531	805,621	635,782	169,839	23,344	15,774	7,570	72,122
HARDWOOD	5,779	4,310	1,469	3,434	2,879	555	1,763	1,431	332	582
TOTAL	906,866	655,866	251,000	809,055	638,661	170,394	25,107	17,205	7,902	72,704
OTHER PUBLIC										
SOFTWOOD	144,637	94,264	50,373	122,991	91,028	31,963	5,123	3,236	1,887	16,523
HARDWOOD	3,655	2,632	1,023	2,857	2,253	604	488	379	109	310
TOTAL	148,292	96,896	51,396	125,848	93,281	32,567	5,611	3,615	1,996	16,833
TOTAL, PUBLIC										
SOFTWOOD	1,045,724	745,820	299,904	928,612	726,810	201,802	28,467	19,010	9,457	88,645
HARDWOOD	9,434	6,942	2,492	6,291	5,132	1,159	2,251	1,810	441	892
TOTAL	1,055,158	752,762	302,396	934,903	731,942	202,961	30,718	20,820	9,898	89,537
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	112,497	74,376	38,121	96,351	71,751	24,600	4,087	2,625	1,462	12,059
HARDWOOD	879	648	231	629	515	114	163	133	30	87
TOTAL	113,376	75,024	38,352	96,980	72,266	24,714	4,250	2,758	1,492	12,146
FARMER & OTHER										
SOFTWOOD	224,607	143,683	80,924	189,334	138,663	50,671	7,965	5,020	2,945	27,308
HARDWOOD	7,538	5,376	2,162	5,880	4,579	1,301	1,034	797	237	624
TOTAL	232,145	149,059	83,086	195,214	143,242	51,972	8,999	5,817	3,182	27,932
TOTAL, PRIVATE										
SOFTWOOD	337,104	218,059	119,045	285,685	210,414	75,271	12,052	7,645	4,407	39,367
HARDWOOD	8,417	6,024	2,393	6,509	5,094	1,415	1,197	930	267	711
TOTAL	345,521	224,083	121,438	292,194	215,508	76,686	13,249	8,575	4,674	40,078
TOTAL, ALL OWNERS										
SOFTWOOD	1,382,828	963,879	418,949	1,214,297	937,224	277,073	40,519	26,655	13,864	128,012
HARDWOOD	17,851	12,966	4,885	12,800	10,226	2,574	3,448	2,740	708	1,603
TOTAL	1,400,679	976,845	423,834	1,227,097	947,450	279,647	43,967	29,395	14,572	129,615

Table B-35.—Dry weight of timber by ownership and softwoods and hardwoods, and by type of timber, Southern Rocky Mountains, 1977

OWNERSHIP AND SPECIES GROUP	TYPE OF TIMBER									
	TOTAL ALL TYPES			GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	369,326	248,537	120,789	319,995	238,097	81,898	17,309	10,440	6,869	32,022
HARDWOOD	63,805	46,392	17,413	41,222	34,212	7,010	16,265	12,180	4,085	6,318
TOTAL	433,131	294,929	138,202	361,217	272,309	88,908	33,574	22,620	10,954	38,340
OTHER PUBLIC										
SOFTWOOD	87,003	56,034	30,969	76,422	54,053	22,369	3,829	1,981	1,848	6,752
HARDWOOD	10,561	7,683	2,878	6,347	5,167	1,180	3,269	2,516	753	945
TOTAL	97,564	63,717	33,847	82,769	59,220	23,549	7,098	4,497	2,601	7,697
TOTAL, PUBLIC										
SOFTWOOD	456,329	304,571	151,758	396,417	292,150	104,267	21,138	12,421	8,717	38,774
HARDWOOD	74,366	54,075	20,291	47,569	39,379	8,190	19,534	14,696	4,838	7,263
TOTAL	530,695	358,646	172,049	443,986	331,529	112,457	40,672	27,117	13,555	46,037
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	704	500	204	653	496	157	4	4	0	47
HARDWOOD	20	15	5	12	10	2	5	5	0	3
TOTAL	724	515	209	665	506	159	9	9	0	50
FARMER & OTHER										
SOFTWOOD	96,776	64,079	32,697	83,666	61,626	22,040	4,277	2,453	1,824	8,833
HARDWOOD	34,375	25,301	9,074	21,504	17,622	3,882	9,601	7,679	1,922	3,270
TOTAL	131,151	89,380	41,771	105,170	79,248	25,922	13,878	10,132	3,746	12,103
TOTAL, PRIVATE										
SOFTWOOD	97,480	64,579	32,901	84,319	62,122	22,197	4,281	2,457	1,824	8,880
HARDWOOD	34,395	25,316	9,079	21,516	17,632	3,884	9,606	7,684	1,922	3,273
TOTAL	131,875	89,895	41,980	105,835	79,754	26,081	13,887	10,141	3,746	12,153
TOTAL, ALL OWNERS										
SOFTWOOD	553,809	369,150	184,659	480,736	354,272	126,464	25,419	14,878	10,541	47,654
HARDWOOD	108,761	79,391	29,370	69,085	57,011	12,074	29,140	22,380	6,760	10,536
TOTAL	662,570	448,541	214,029	549,821	411,283	138,538	54,559	37,258	17,301	58,190

Table B-23 ... and by type of timber, Rocky Mountains, 1977

OWNERSHIP AND SPECIES GROUP	TOTAL ALL TYPES			GROWING STOCK			ROUGH & ROTTEN			SMALL TREES
	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL	BOLE	TOP	TOTAL
	Thousand tons									
PUBLIC:										
NATIONAL FOREST										
SOFTWOOD	1,270,413	900,093	370,320	1,125,616	873,879	251,737	40,653	26,214	14,439	104,144
HARDWOOD	69,584	50,702	18,882	44,656	37,091	7,565	18,028	13,611	4,417	6,900
TOTAL	1,339,997	950,795	389,202	1,170,272	910,970	259,302	58,681	39,825	18,856	111,044
OTHER PUBLIC										
SOFTWOOD	231,640	150,298	81,342	199,413	145,081	54,332	8,952	5,217	3,735	23,275
HARDWOOD	14,216	10,315	3,901	9,204	7,420	1,784	3,757	2,895	862	1,255
TOTAL	245,856	160,613	85,243	208,617	152,501	56,116	12,709	8,112	4,597	24,530
TOTAL, PUBLIC										
SOFTWOOD	1,502,053	1,050,391	451,662	1,325,029	1,018,960	306,069	49,605	31,431	18,174	127,419
HARDWOOD	83,800	61,017	22,783	53,860	44,511	9,349	21,785	16,506	5,279	8,155
TOTAL	1,585,853	1,111,408	474,445	1,378,889	1,063,471	315,418	71,390	47,937	23,453	135,574
PRIVATE:										
FOREST INDUSTRY										
SOFTWOOD	113,201	74,876	38,325	97,004	72,247	24,757	4,091	2,629	1,462	12,106
HARDWOOD	899	663	236	641	525	116	168	138	30	90
TOTAL	114,100	75,539	38,561	97,645	72,772	24,873	4,259	2,767	1,492	12,196
FARMER & OTHER										
SOFTWOOD	321,383	207,762	113,621	273,000	200,289	72,711	12,242	7,473	4,769	36,141
HARDWOOD	41,913	30,677	11,236	27,384	22,201	5,183	10,635	8,476	2,159	3,894
TOTAL	363,296	238,439	124,857	300,384	222,490	77,894	22,877	15,949	6,928	40,035
TOTAL, PRIVATE										
SOFTWOOD	434,584	282,638	151,946	370,004	272,536	97,468	16,333	10,102	6,231	48,247
HARDWOOD	42,812	31,340	11,472	28,025	22,726	5,299	10,803	8,614	2,189	3,984
TOTAL	477,396	313,978	163,418	398,029	295,262	102,767	27,136	18,716	8,420	52,231
TOTAL, ALL OWNERS										
SOFTWOOD	1,936,637	1,333,029	603,608	1,695,033	1,291,496	403,537	65,938	41,533	24,405	175,666
HARDWOOD	126,612	92,357	34,255	81,885	67,237	14,648	32,588	25,120	7,468	12,139
TOTAL	2,063,249	1,425,386	637,863	1,776,918	1,358,733	418,185	98,526	66,653	31,873	187,805

☆ U.S. GOVERNMENT PRINTING OFFICE: 1983—676-032/50 REGION No

Van Hooser, Dwane D., Chojnacky, David C. Whole tree volume estimates for the Rocky Mountain States. Resour. Bull. INT-29 . Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1983. 69 p.

Presents factors for converting current estimates of merchantable volume to weight, and models for predicting weights and volumes of tops and limbs, for important tree species in the Rocky Mountain States. Converts timber statistics from cubic foot volume to dry weight for tree components, such as bole, limbs, and top. Includes State-by-State data summaries.

KEYWORDS: forest inventory, biomass, wood fiber, fuelwood, utilization

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

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Provo, Utah (in cooperation with Brigham Young University)

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Forest Service

**Intermountain
Forest and Range
Experiment Station
Ogden, UT 84401**

Resource
Bulletin
INT-30

May 1983

Utah's Forest Resources, 1978

**Dwane D. Van Hooser
Alan W. Green**

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ALAN W. GREEN is principal resources analyst in the Forest Survey Research Work Unit at Intermountain Station. His career has included research in silviculture and regeneration, economics of timber production, and foreign forestry resources. In addition to a degree in economics, he holds both B.S. and M.S. degrees in forestry from Purdue University.

ACKNOWLEDGMENTS

The Intermountain Station gratefully acknowledges the cooperation of the Utah Department of Natural Resources, Division of State Lands and Forestry; and USDA Forest Service, Intermountain Region. Appreciation is also expressed for the cooperation of other public agencies and private landowners in providing information and access to the sample locations.

RESEARCH SUMMARY

This resource bulletin presents the principal findings of the second forest survey of Utah's forest resources. Fieldwork began during the summer of 1975 and was completed in the fall of 1978. The Intermountain Forest and Range Experiment Station's Forest Survey Research Work Unit sampled the lands other than the National Forests. Data for National Forest System lands were provided by the Intermountain Region. Forest Survey then combined these data into a State-wide compilation for use in this report.

Originally, Forest Survey was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978. The primary objective of Forest Survey, which is a continuing nationwide undertaking conducted by the USDA Forest Service, is to provide an assessment of the renewable resource situation on the Nation's forests and rangelands. Fundamental to the accomplishment of this objective are the State-by-State resource inventories, which are conducted periodically.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and South Dakota west of the 103d, meridian, and Oklahoma and Texas west of the 100th meridian, are conducted by the Intermountain Forest and Range Experiment Station, headquartered in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, rates of timber growth, mortality, and removals. These data, when combined with similar information on federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

Highlights of the report are as follows:

- Utah holds 16,066,600 acres of forest land, including pinyon-juniper, which is the most extensive forest type.
- About 3,151,300 acres are classified as commercial timberland.
- More than 83 percent of the forest land is administered by public agencies, most of it federal.
- Nearly 70 percent of the commercial timberland is sawtimber stands.
- The spruce-fir and aspen types occupy the most acres of commercial timberland.
- Utah's commercial timberlands contain about 4.4 billion cubic feet of wood, including 15.7 billion board feet[1] of sawtimber.
- Net annual growth averaged only about 21 cubic feet per acre in 1977, less than half the land potential.
- Mortality was about 35 percent of total gross growth, largely from insects, disease, and fire.
- Timber removals amounted to a little more than 13 million cubic feet, or 79 million board feet.
- For most species growth exceeded removals.
- Nontimber uses of Utah's forests are substantial and of high value: they produce 8 million acre-feet of water during a normal year; provided 660,000 Animal Unit Months of grazing in 1978; and provided for over 14 million days of recreation just on the National Forests alone.
- The Wasatch National Forest is the most heavily used National Forest in the Nation for recreation.
- Utah has an enormous mineral estate. The value of mineral production in 1976 was estimated at nearly $966.5 million, primarily from petroleum, copper, coal, and gold.

[1]All estimates of board foot volume in this bulletin are in the International 1/4-inch rule.

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Utah's Forest Resources, 1978

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THE FOREST

Utah's scenic forests are part of a complex of surface and subsurface resources.

The 16 million acres of forests in Utah are as varied as they are scenic. Also varied are the uses to which the forested acres are put. They not only provide raw material for the region's forest industries, but also they provide valuable soil-holding properties for the State's watersheds, forage and cover for the State's abundant wildlife and domestic livestock, and recreation for millions of visitors annually. Utah's forests also overlay much of the State's valuable mineral deposits as well as extensive oil and gas reserves, coal, tar sands, and oil shale that may play a signficant role in determining the Nation's future energy policies.

Over 30 percent of the State is forested.

More than 30 percent of the State's total land area is occupied by woody vegetation. The composition of the cover is determined by many factors such as elevation, aspect (direction the slope faces, i.e., north, south, east, or west), soils, climate, and past fire history. Much of the forest land occurs in a zone about 60 miles wide along a line roughly paralleling Interstate 15. Additional acreage is found in and around the Manti-LaSal National Forest in southeastern Utah, the Uinta Mountains in northeastern Utah, and a small amount in the Raft River Mountains in the northwestern corner of the State (fig. 1).

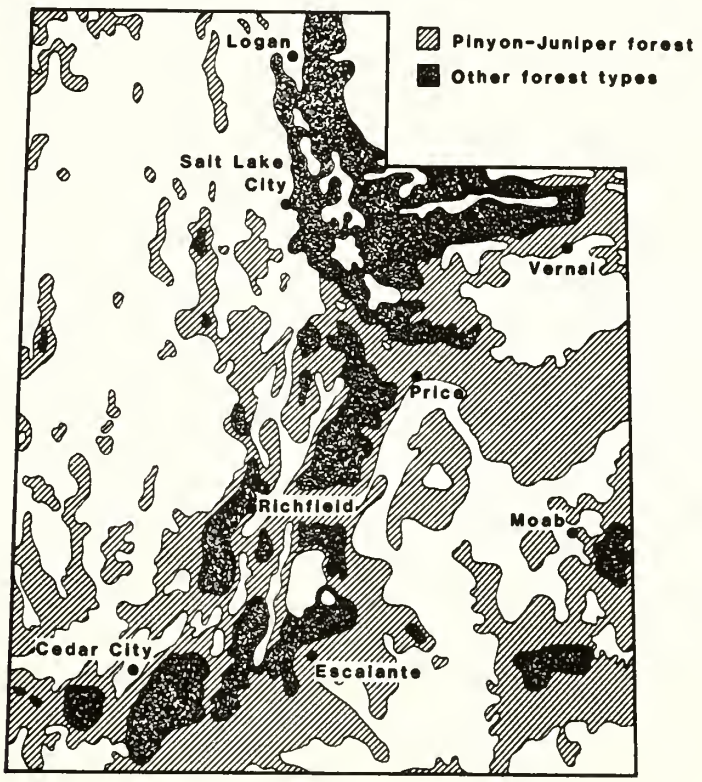


Figure 1.—Distribution of forest land, Utah, 1978.

Elevational Range

Elevation and soil moisture are major influences on where tree species grow.

The occurrence of a predominant tree species is highly correlated with elevation (fig. 2). At the lowest elevation, about 5,000 feet, the vegetation is composed primarily of desert shrub. As altitude increases, the species mix changes to that of pinyon pine (*Pinus edulis* Engelm.) and juniper (*Juniperus osteosperma* [Torr.] Little). Beyond the P-J zone, the next species likely to be encountered is ponderosa pine (*Pinus ponderosa* Laws.) and mountain brush, then Douglas-fir (*Pseudotsuga menziesii* [Mirb.] Franco) mixed with lodgepole pine (*Pinus contorta* Dougl.) and white fir (*Abies concolor* [Gord. and Glend.] Lindl.). Engelmann spruce (*Picea engelmannii* Parry) and subalpine fir (*Abies lasiocarpa* [Hook.] Nutt.) are next on the elevation progression scale. Finally at 10,000 to 11,000 feet, in northern or southern Utah, limber pine (*Pinus flexilis* James) and mountain mahogany (*Cercocarpus* spp.) become the dominant species.

The elevation zones vary considerably. For example, one of the largest limber pines in Utah is found near Bear Lake summit at about 8,500 feet. The species/elevation relationships, however, will generally hold true.

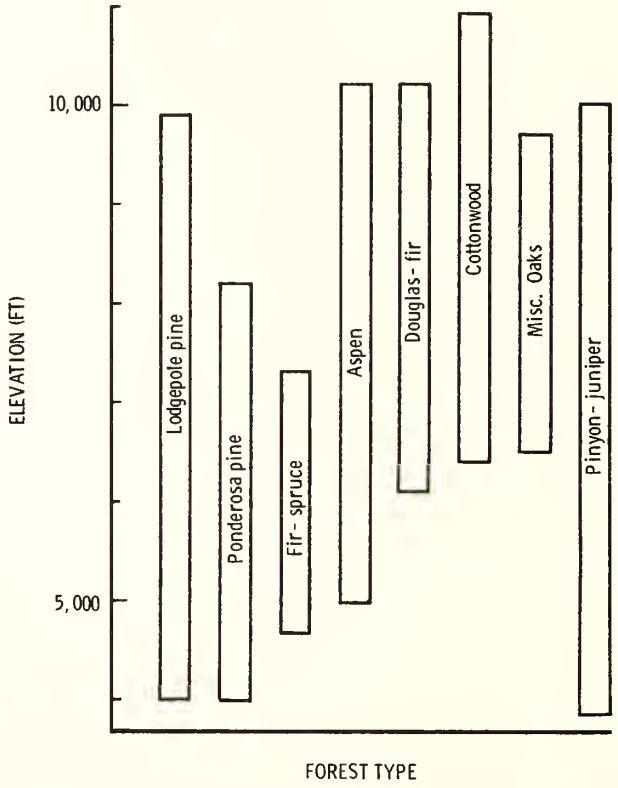


Figure 2.—Occurrence of forest land by forest type and elevation, Utah, 1978.

Forest Land Classes

Forest land classes identify forest productivity and availability of wood for industrial use.

For purposes of inventory, forest land traditionally has been classified by its inherent ability to produce industrial wood products. Those acres that are capable of producing at least 20 cubic feet of industrial wood per acre per year at culmination of average annual increment are classified as productive forest land. Lands that do not meet this minimum productivity standard are placed in the "other" forest land category.

Productive forest land that is publicly owned is further subdivided: areas being considered for inclusion in the wilderness system are classified as productive **deferred;** land that meets or exceeds the minimum productivity standard but already has been **withdrawn** from timber production through statute, ordinance, or administrative order, is classified as productive **reserved** forest land.

Forest land that meets the minimum productivity standard but is not reserved or deferred is classified as commercial timberland. On these acres detailed measurements of the timber resource are taken and are reported here. Only minimal information such as forest type and ownership is presented for productive reserved, productive deferred, and other forest land.

Productive forest land.—Those lands classed as productive forest land account for slightly more than one-fifth of the total forest acres in Utah, and all but 282,000 acres are considered commercial timberland (table 1).

About one-fifth of Utah's forests are productive... and nearly all of it is available for timber harvesting.

Table 1.—Area of forest land by type of land, Utah, 1978

Type of forest land	Thousand acres
Productive:	
Commercial timberland	3,151.3
Deferred	157.3
Reserved	124.3
Total	3,432.9
Other forest land:	
Reserved	428.7
Nonreserved	12,205.0
Total	12,633.7
Total forest land	16,066.6

Although some of the commercial timberlands occur at lower elevation, most are found between 6,500 and 11,000 feet.

Other forest land.—Nearly 13 million acres or 79 percent of the 16.1 million acres of forest land in Utah is classified as other than commercial timberland. By far the largest

There is more pinyon-juniper than any other type...

over 9 million acres...

and about 90 percent is on public lands.

component of "other" forest land is the area occupied by pinyon-juniper (fig. 3). This forest type covers more than 9 million acres and accounts for more than 70 percent of the other forest land in Utah. Almost 90 percent of these acres is in public ownership.

Another 12 percent of other forest land consists of mountain brush and other hardwood types. Ownership of these acres is about equally divided between the public and private sectors.

The remaining 17 percent of the other forest acres are in the aspen, fir-spruce, lodgepole pine, Douglas-fir, and miscellaneous types. The majority of these lands are administered by public agencies.

But these lands have high value for nontimber uses.

But while these lands are not considered to be capable of producing economic timber crops, they are of considerable importance for grazing and cover by both wildlife and domestic livestock. These lands are also becoming a signficant source of fuelwood supporting both commercial and permit use operations. Moreover, pinyon and juniper has long been a common source for firewood, Christmas trees, and fenceposts. All of these demands are very likely to increase in the future.

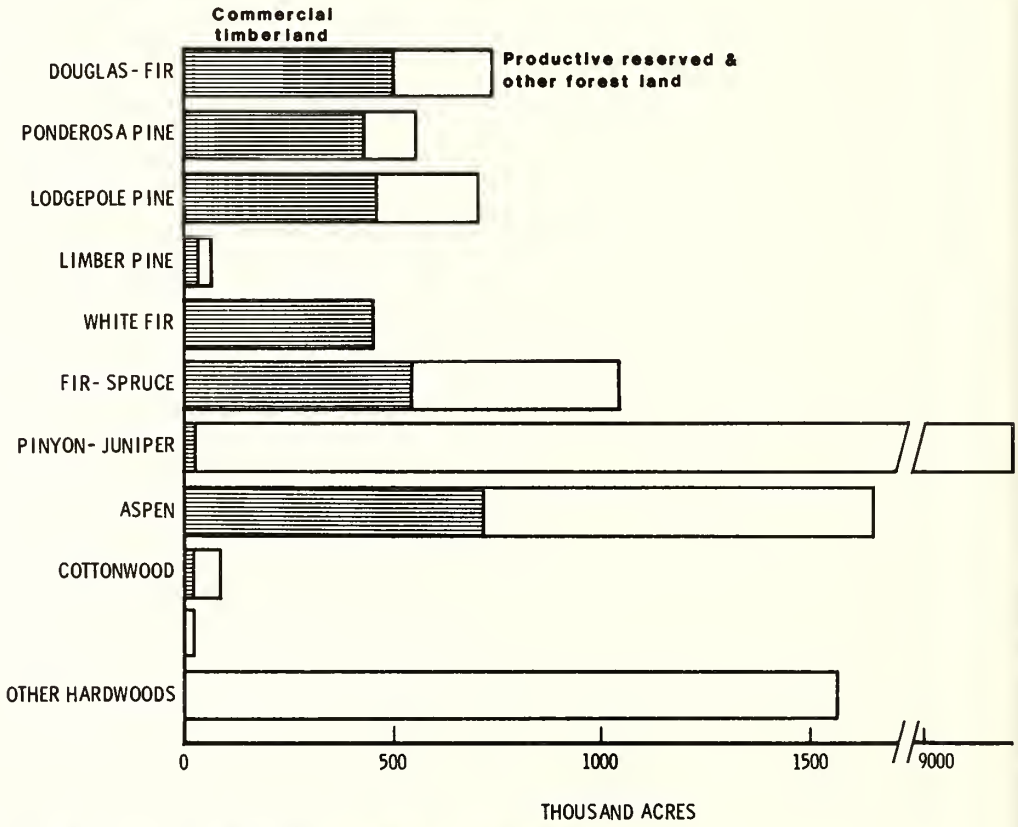


Figure 3.—Area of forest land by forest type and land type, Utah, 1978.

Major Forest Types on Commercial Timberland

Fir-spruce.—One of the most abundant types in the State is fir-spruce, occupying 837,000 acres (fig. 4 and appendix table 8). Stands within the type in which Engelmann spruce dominates amount to 549,000 acres. Subalpine fir is the principal species on 288,000 acres. These stands are usually found above 6,000 feet elevation, with the heaviest concentration between 9,000 and 11,000 feet. Species commonly associated with this type are Douglas-fir, white fir, and lodgepole pine.

Fir-spruce is the most abundant commercial forest type...

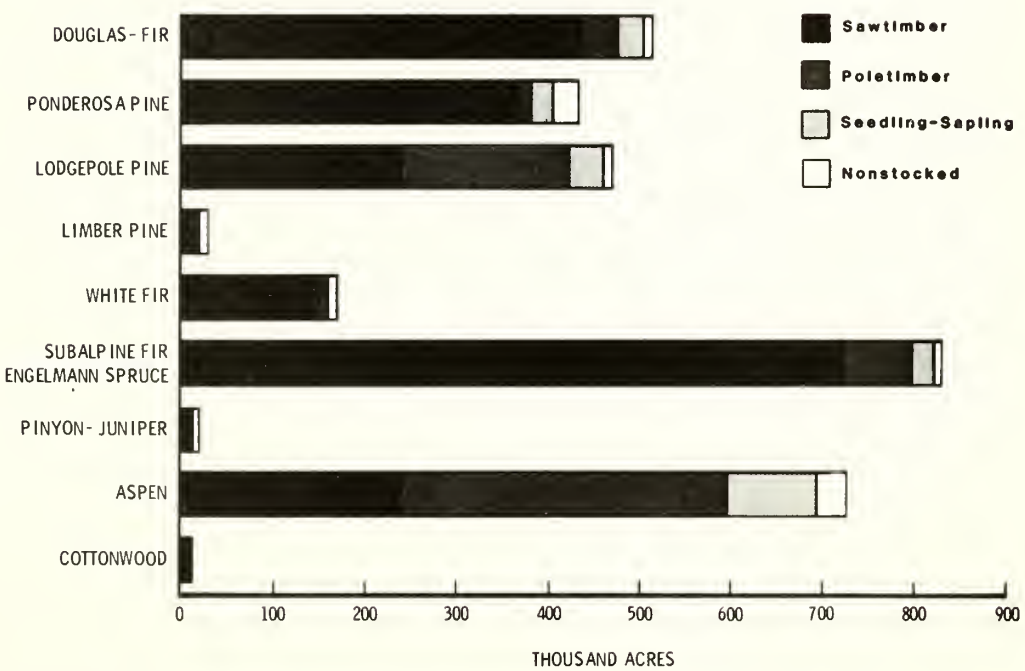


Figure 4.—Area of commercial timberland by forest type and stand-size, Utah, 1978.

and most of it is sawtimber and...

About 87 percent of this type are sawtimber-size stands. This apparent lopsided distribution of area by stand-size may be cause for concern if forest industry's dependence on Engelmann spruce continues.

is on the better sites.

This type occupies the most productive sites in the State, some areas having a growth potential of up to 164 cubic feet per acre per year. But, 776,000 acres of this type have a production capability less than 85 cubic feet per acre per year.

Douglas-fir.—The Douglas-fir type covers slightly more than 500,000 acres and accounts for about 16 percent of commercial timberland in Utah. Like the fir-spruce type, Douglas-fir is fairly well distributed thoughout the forest regions of the State. This type has a tendency to grow in an elevational zone that is just above the upper level of the oak brush zone and just below the zone dominated by fir-spruce. Although some stands do occur as low as 5,000 feet and as high as 10,000 feet, most of the Douglas-fir type is found at elevations between about 6,800 and 9,200 feet.

There are one-half million acres of the Douglas-fir type...

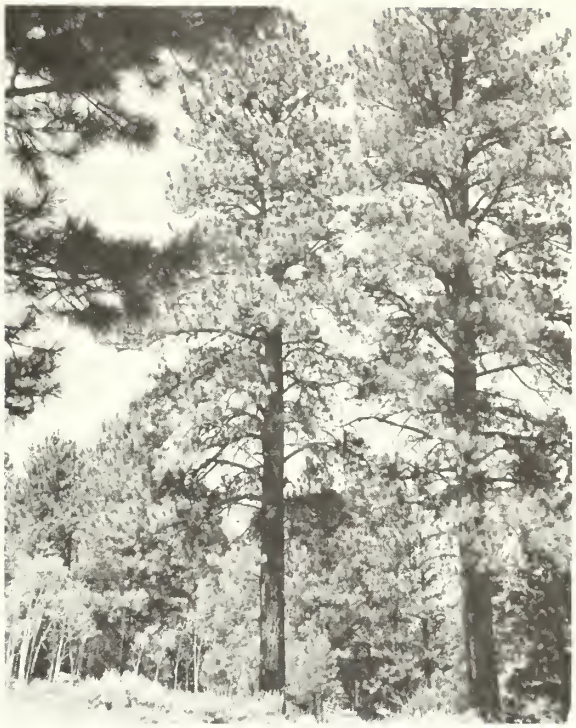
most of it sawtimber.

As with most of the other softwood types in Utah, the Douglas-fir type is dominated by sawtimber-size trees. Nearly 85 percent or 427,000 acres of this type are classed as sawtimber stands, with more than two-thirds of these being more than 100 years old.

Potential productivity of the Douglas-fir type could be classed as moderate to low for commercial timberland. More than three-fourths of the area in this type could produce up to 49 cubic feet per acre per year under the best of natural conditions. Another one-fifth would, under similar circumstances, produce between 50 and 85 cubic feet.

Ponderosa and lodgepole pine.—The ponderosa pine and lodgepole pine forest types together account for almost 890,000 acres or 28 percent of the timberlands in Utah. Generally speaking, where lodgepole occurs, ponderosa does not. Practically all of the lodgepole growing in Utah is concentrated in the Uinta Mountains in the northeastern portion of the State, and most of it (about 92 percent) is found on National Forest land.

Ponderosa and lodgepole pine make up over 25 percent of the forest...



with most of the lodgepole in the Uinta Mountains and ponderosa in the south.

Similarly, three-quarters of the area in the ponderosa pine type is in the Dixie and Manti-LaSal National Forests in the southern portion of the State. Although some of the ponderosa pine forest type occurs in northern Utah, these acres account for less than 10 percent of the total occurring in the type.

The ponderosa pine type is also dominated by sawtimber size stands, with some 360,000 acres in this classification. Only half of the area in the lodgepole pine type, on the other hand, is classified as sawtimber size, with poletimber size stands making up 40 percent. Lodgepole pine stands are frequently overcrowded, with thousands of stems per acre. In such stands trees seldom, if ever, reach sawtimber size.

The lodgepole pine are frequently overcrowded and the trees smaller.

In terms of potential productivity, both the ponderosa pine and lodgepole pine types would be classified as low. Virtually all the area in these types has a productivity potential of less than 50 cubic feet per acre per year. Both, however, provide a significant amount of the annual timber harvest taken from Utah's forests.

White fir.—The remaining major forest type, white fir, covers 151,000 acres in Utah. This forest type is usually found below 8,000 feet and is mainly concentrated in a narrow band running south through the central portion of the State.

White fir also is largely in sawtimber stands on moderate to low sites.

The white fir type also has a high percentage (nearly 92 percent) in sawtimber-size stands. And like the Douglas-fir type, the productive potential for white fir type could be classed as moderate to low. About one-third of the acres in this type has the natural potential to produce, on the average, more than 50 cubic feet per acre per year. The remaining two-thirds can produce something less than 50 cubic feet per acre per year.

The coniferous forest types, when combined, account for more than three-quarters of the commercial timberland in Utah.

The remaining 23 percent of the commercial acreage is occupied by hardwoods, with aspen being the only species of any significance.

Aspen is second only to fir-spruce in abundance on commercial timberland.

Aspen.—The aspen forest type covers 717,000 acres of Utah's commercial timberland. Stands of "quakie" are found throughout the timber zones in the State, beginning around 6,000 feet and continuing to 10,000 feet and higher.

Although aspen is considered to have useful industrial properties such as straight grain, uniform texture, and workability, the acreage occupied by this type also has considerable value for uses other than production of timber products. The areas supporting stands of aspen are literally invaluable to the State's watersheds. Aspen also provides an important source of browse and cover for big game and other wildlife. And, finally, no discussion of this forest type is complete without mentioning its esthetic value. The golden hue that aspen's autumn foliage imparts to the mountains of Utah is unsurpassed in scenic beauty. This display of autumn grandeur is internationally famous and draws thousands of visitors to Utah annually.

Aspen's wood value is equaled by its value to wildlife,...

watershed protection, and Utah scenery.

About one-half of this type is classed as poletimber stands, while the other forest types in Utah have well over half of their area in sawtimber-size stands. This is partly due to the definition of poletimber and sawtimber as related to various species. Hardwood poletimber trees, including aspen, are those between 5 and 10.9 inches d.b.h. Softwood poletimber trees, on the other hand, range from 5 to only 8.9 inches d.b.h. This results in a difference in classification of area by stand-size class, with hardwoods having a smaller relative percentage of area in sawtimber stands.

On harsh sites aspen stands frequently do not reach sawtimber size.

Another contributing factor is that on more harsh sites aspen tends to stagnate and may well succumb to pathogens and snow damage before attaining the 11-inch d.b.h. sawtimber threshold. In terms of productivity, the aspen type is about average for the State. Slightly more than three-fourths of the area in this type has the potential to produce between 20 and 49 cubic feet per acre per year. The remaining one-fifth generally has a productive potential of between 50 and 84 cubic feet per acre per year. And in a few areas, stands have the inherent ability to produce wood at the rate of 85 to 119 cubic feet per acre per year.

Owners

About 83 percent of Utah's forest land is administered by public agencies... with Federal agencies responsible for most of it.

A considerable amount of Utah's land is administered by federal agencies (fig. 5). In all, federal agencies, including the USDA Forest Service, USDI Bureau of Land Management, Department of Defense, and others, administer more than 76 percent of the forests. State and local governments administer about 7 percent of the total forest land base. Land management policies on these publicly administered acres are legislatively mandated and politically controlled. In most cases, management objectives are multiple-use oriented and designed to provide maximum benefit to all users.

The remaining 2.7 million acres are privately owned.

Farmers, ranchers, and other private owners, which comprise a diverse group that includes housewives, doctors, lawyers, and numerous other occupations, control some 2.7 million acres (17 percent) of Utah's forest land. Many of these ownerships are small, some under 10 acres, and may not be necessarily managed for maximum wood production. While size, objectives, and proximity to potential industrial users may constrain managing some of these areas as timber units, all of these acres are currently producing wood. Past experience suggests that nearly all of these acres will eventaully be used either for industrial products or firewood.

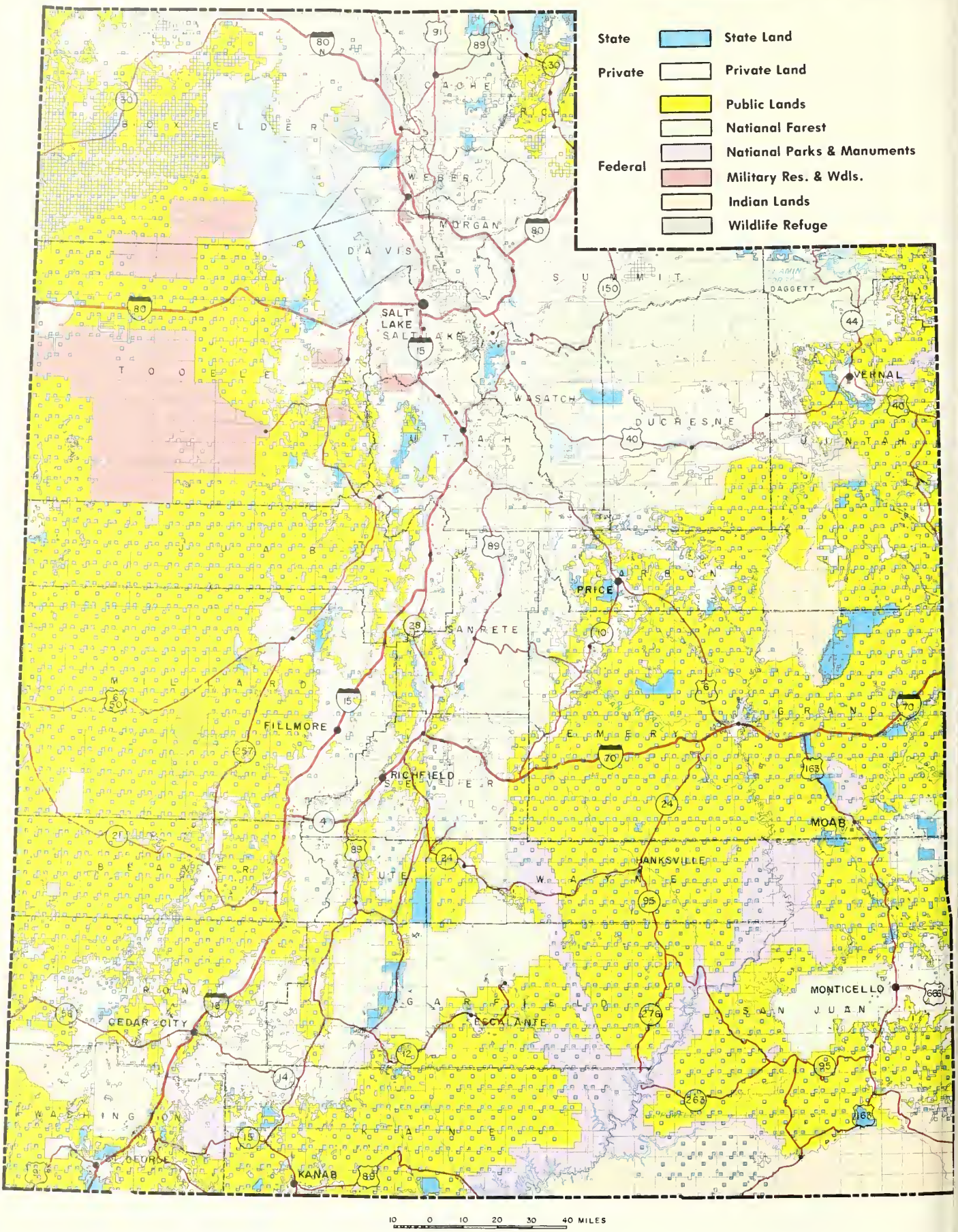


Figure 5.—Ownership of Utah's forest lands (source: Bureau of Land Management).

Nearly three-fourths of the commercial timberland is on National Forests...

As with other forest land, most of the commercial timberland is administered by public agencies. Nearly three-quarters of these acres are in the National Forest System. Other public agencies manage an additional 12 percent. Farmers, ranchers, and other private individuals or corporations own the remaining 16 percent (fig. 6).

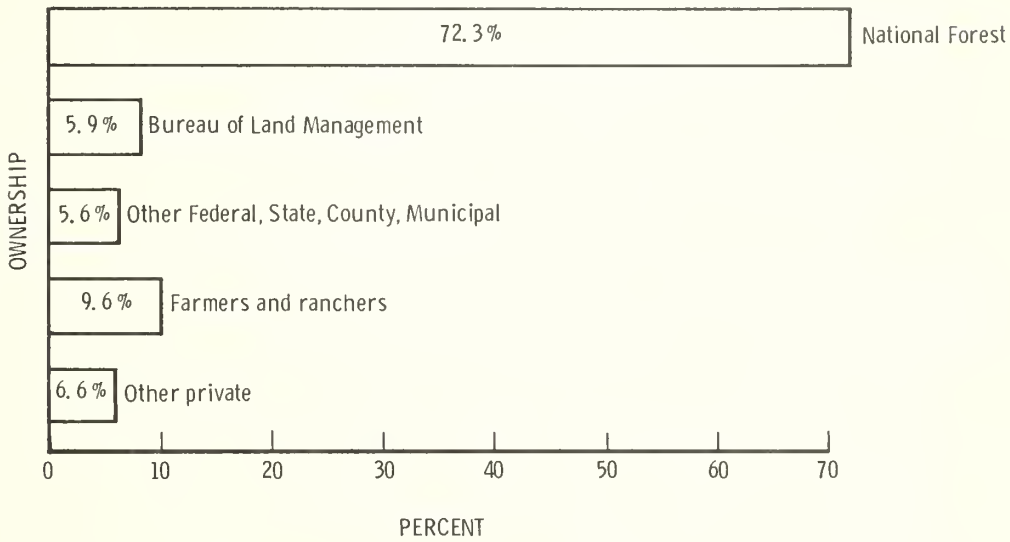


Figure 6.—Distribution of commercial timberland by ownership, Utah, 1978.

Eight National Forests are partially or wholly within the State of Utah (fig. 7) and are found largely down through the center of the State and in the Uinta Mountains. Six of them account for nearly all the 2.3 million acres of the commercial timberland administered by the National Forest System. These lands, which were removed from the public domain at the turn of the century, are by law managed for multiple use. They are especially important as watersheds and for recreation. In fact, the Wasatch National Forest ranks among the highest for recreational use of any National Forest in the United States.

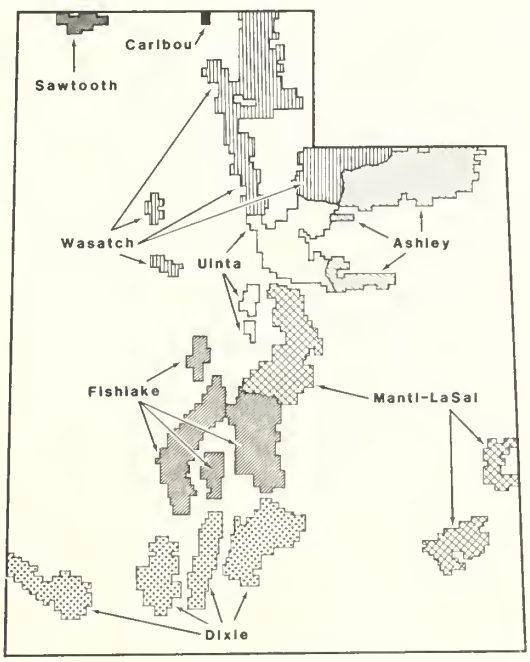


Figure 7.—National Forests located wholly or partly in Utah.

The other public ownership, which is principally Bureau of Land Management and State controlled, is concentrated in the west-central and southeastern portions of the State. The BLM holdings are important for grazing as well as timber production and account for some 186 thousand acres.

State-owned land is scattered...

The State lands originally included Sections 2, 16, 32, and 36 in every township and were to be used in support of the schools, resulting in scattered and fragmented ownerships. Some consolidation did occur, however, as a result of replacement of lands that had already been disposed of by the United States. Nearly 40 percent of the 115,000 acres of commercial timberland owned by the State is found in the southeastern portion of Utah.

but most of State-owned commercial timberland is in southern Utah...

and private land is largely in the north.

Almost 40 percent of the 512,000 acres of commercial timberland in private ownership is found in the northeastern portion of the State (fig. 8). Another one-fourth is located along the Bear River and Wasatch Front. More than 100,000 acres of this ownership is in the southeastern counties of Carbon, Emery, Grand, and San Juan.

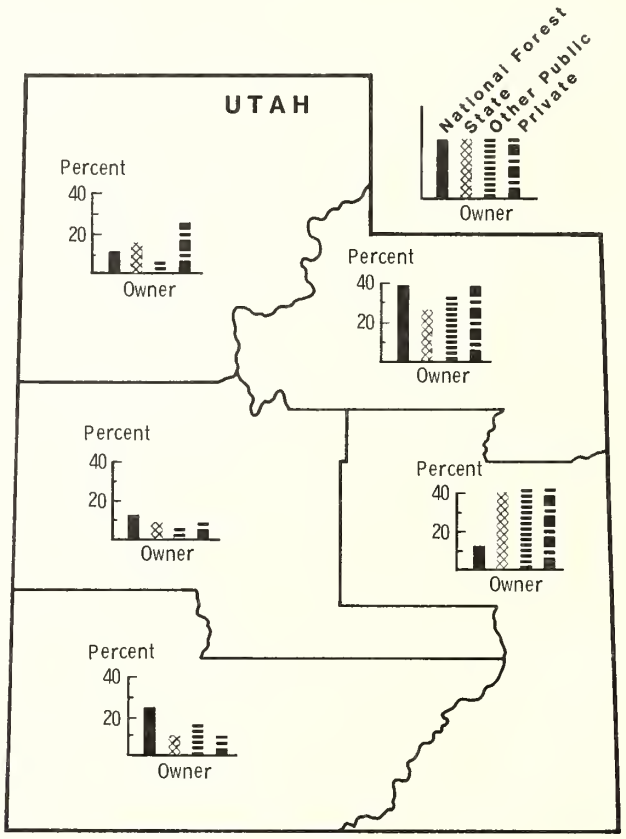


Figure 8.—Distribution of commercial timberland within ownership by survey unit, Utah, 1978. (Since National Forests do not conform to survey unit boundaries, the acreage is included in the survey unit that contains the majority of each individual forest.)

THE TIMBER RESOURCE

Stand-Size Classes

About 70 percent of the commercial timberland is in sawtimber stands, a third of which are old growth,...

Sawtimber stands (see appendix A for definition) predominate in Utah's forests. Nearly 70 percent of the commercial timberland is classified as sawtimber stands (table 2 and fig. 4). And, as would be expected, the distribution of this stand-size throughout the State is essentially the same as the distribution of commercial timberland: 30 percent of the commercial timberland and 30 percent of the sawtimber-size stands occur in southeastern Utah. Moreover, the distribution of these stands in State and private ownership indicates that fully one-third are more than 100 years old.

Table 2.—Area of commercial timberland by stand-size, Utah, 1978

Stand-size class	Thousand acres
Sawtimber	2,174.7
Poletimber	674.1
Seedling and sapling	225.4
Nonstocked	77.1
Total	3,151.3

20 percent is in poletimber...

Poletimber-size stands make up slightly more than one-fifth of the State's commercial timberland. On the surface, this would seem to augur well for future timber supplies. But the majority of these stands do not lend themselves to sustained timber production. For example, many of the 184,000 acres of poletimber lodgepole are so overstocked that trees will never reach sawtimber size.

and 2 percent has almost no trees.

Of the remaining 9 percent of commercial timberland, 7 percent is in seedling and sapling stands and 2 percent is insufficiently stocked to allow classification by predominant tree size.

How Much Wood?

The commercial timberland has 4.7 billion cubic feet of wood...
including 15.7 billion board feet of sawtimber.

Altogether Utah's 3.2 million acres of commercial timberland supports 4.7 billion cubic feet of timber of which 4.4 billion is classified as growing stock. This includes some 15.7 billion board feet that is classified as sawtimber. In addition, there are some 400 million cubic feet in trees that are salvable dead or of such poor quality that they cannot meet the minimum requirement for growing stock. This component of the stand accounts for about 10 percent of total cubic foot volume.

About 80 percent of the volume is on public lands...
75 percent is on National Forests.

More than four-fifths of Utah's growing stock and sawtimber volumes is on land administered by public agencies (fig. 9). The National Forest System contains the largest proportion—nearly 75 percent of both growing stock and sawtimber.

More than two-thirds of the timber volume in Utah's forests is in trees classed as sawtimber (fig. 10). Poletimber-size trees account for 29 percent of the total volume.

Eighty to ninety percent of the volume is in softwood species...

Softwood species dominate Utah's forests. As a group they account for more than 80 percent of the State's growing stock volume (fig. 10), and nine-tenths of the sawtimber inventory. Hardwoods, with aspen being the only species of significance, comprise less than one-fifth of the cubic volume.

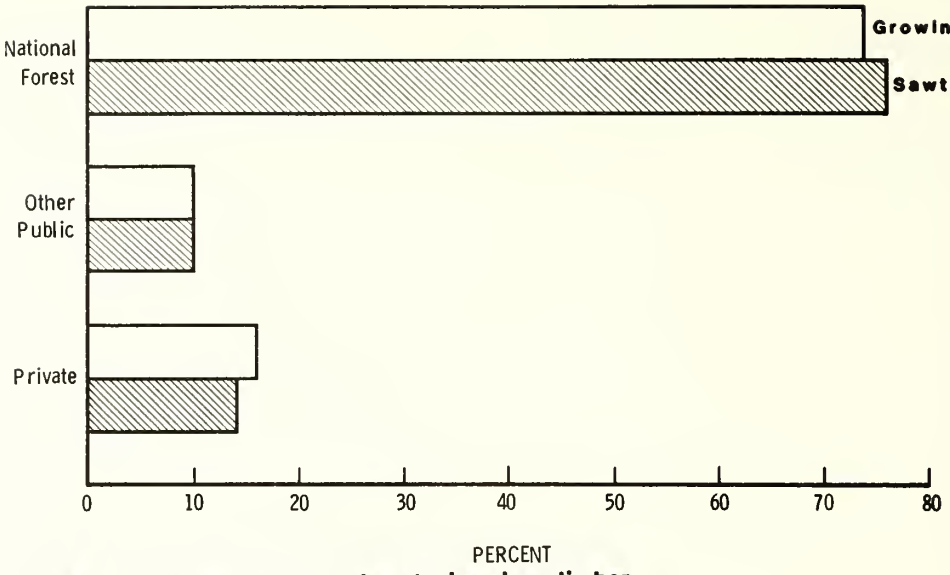


Figure 9.—Distribution of growing stock and sawtimber volume on commercial timberland by ownership, Utah, 1978.

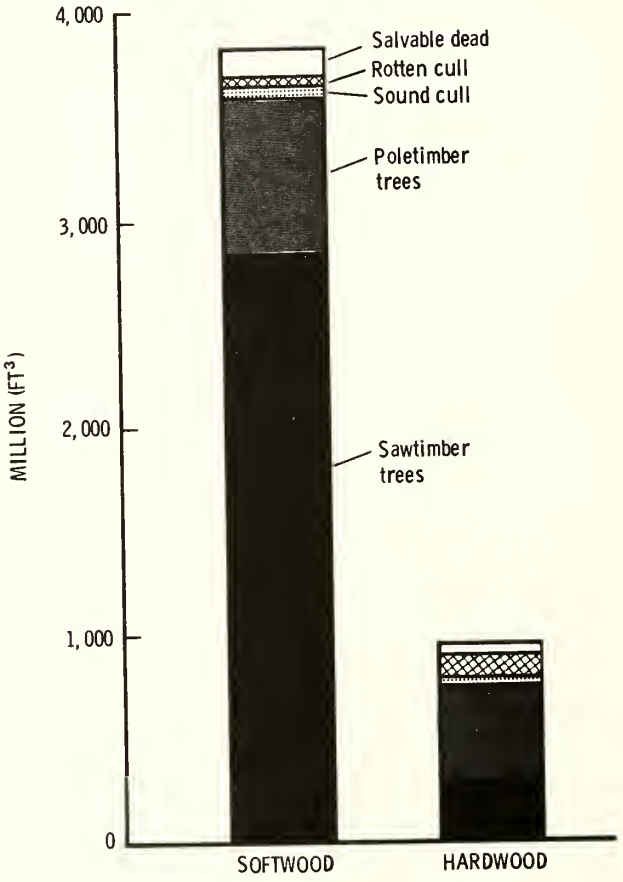


Figure 10.—Net volume of timber on commercial timberland by class of timber, and softwoods and hardwoods, Utah, 1978.

Engelmann spruce, lodgepole pine, subalpine fir, and Douglas-fir have the most volume... but volume by tree size varies.

If individual species are considered, the predmoninant conifer is Engelmann spruce (fig. 11), accounting for 21 percent of the growing stock volume and 26 percent of the sawtimber volume in Utah. Not far behind is lodgepole pine, with about a fifth of the growing stock inventory, followed by subalpine fir and Douglas-fir. However, variations in tree size distribution among the other species tend to scramble the ranking of sawtimber volume (appendix tables 15 and 16) tabulated below:

Species	Growing Stock Volume	Sawtimber Volume
Englemann spruce	1	1
Lodgepole pine	2	3
Subalpine fir	3	4
Douglas-fir	4	2
Ponderosa pine	5	5
White fir	6	6

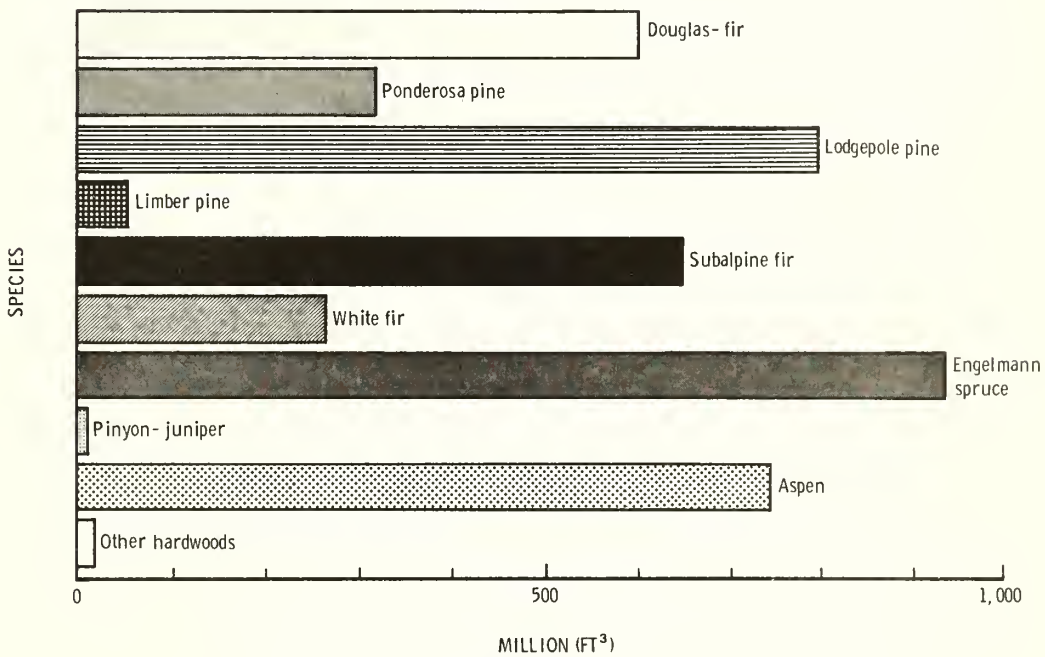


Figure 11.—Growing-stock volume on commercial timberland by species, Utah, 1978.

About 87 percent of lodgepole pine volume is in trees less than 17 inches d.b.h... but 77 percent of the ponderosa pine volume is in trees 17 inches d.b.h. and larger.

Sawtimber volume of both Douglas-fir and Engelmann spruce is consistently distributed over all diameter classes (fig. 12 and appendix table 16). But the volume of lodgepole pine and subalpine fir begins to decline quite rapidly at the 18- to 20-inch d.b.h. class. In fact some 87 percent of the lodgepole pine sawtimber volume is in trees less than 17 inches d.b.h. (appendix table 16). In contrast, although the total volume is not as great as lodgepole pine, about 77 percent of the ponderosa pine sawtimber volume is in trees 17 inches d.b.h. and larger.

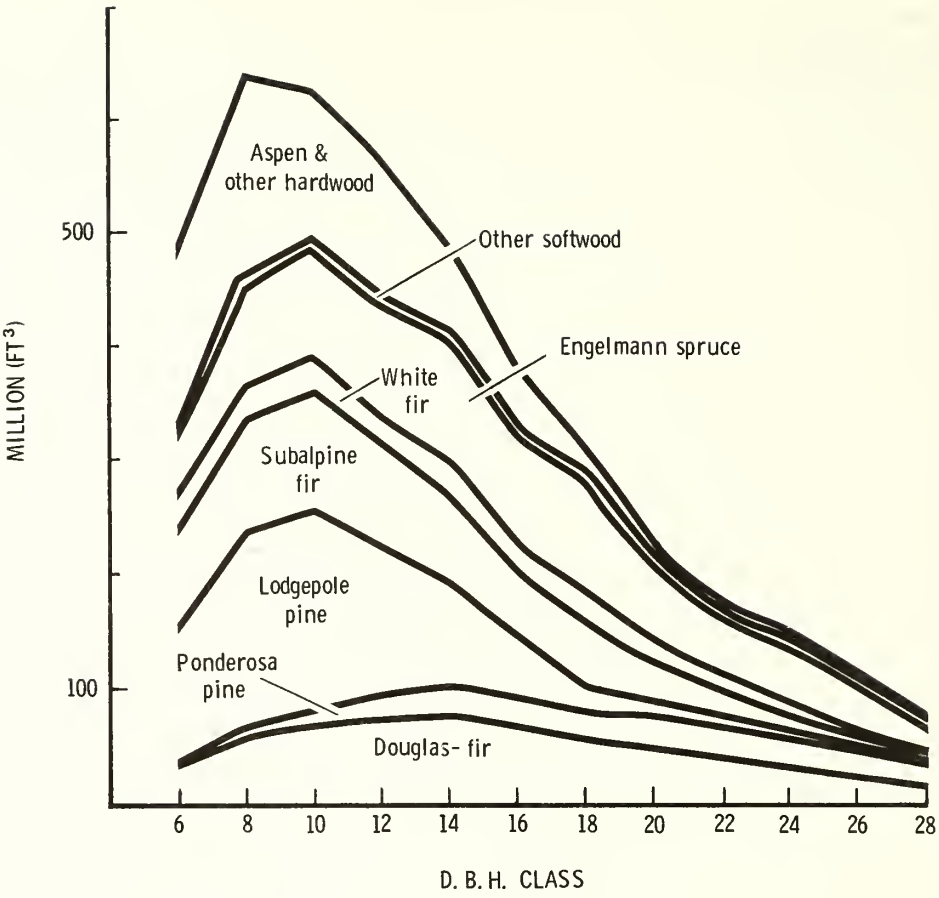


Figure 12.—Growing-stock volume on commercial timberland by species and diameter class, Utah, 1978.

Components of Change

Removals, growth, and mortality combined to increase the stock inventory of wood volume.

The current condition of Utah's forests is determined by the dynamics within the forest over time. The major components of change—growth, removals, and mortality—are displayed in table 3 for 1977.

Table 3.—Summary of components of change, Utah, 1977

Component	Growing stock			Sawtimber		
	Total	Softwood	Hardwood	Total	Softwood	Hardwood
	Thousand cubic feet			*Thousand board feet*		
Gross growth	100,710	77,545	23,165	411,028	348,333	62,695
Mortality	35,396	26,090	9,306	123,710	103,010	20,700
Net growth	65,314	51,455	13,859	287,318	245,323	41,995
Timber removals	13,057	12,401	656	79,212	77,092	2,120
Net change	+52,257	+39,054	+13,203	+208,106	+168,231	+39,875
Net change as percent of inventory	+1.2	+1.1	+1.8	+1.3	+1.2	+2.9

In 1977, growth was about 101 million cubic feet; sawtimber 411 million board feet... but trees having 35.4 million cubic feet and 124 million board feet died... leaving a net increase of 65 million cubic feet and 287 million board feet of sawtimber.

Growth.—In 1977, the growing stock inventory in Utah increased by 52 million cubic feet, with softwoods accounting for about 75 percent of the increment. The State's sawtimber inventory increased by 208 million board feet. The largest component of change is growth and, for meaningful discussion of stand dynamics, must be discussed as gross growth and net growth. In 1977, gross growth of growing stock was nearly 101 million cubic feet. To determine net growth annual mortality must be subtracted. Thus, in 1977 Utah's forests achieved an average annual net growth of 65 million cubic feet, slightly less than two thirds the total increment.

Net annual growth per acre was only about 21 cubic feet, less than half the potential.

A comparison of net annual growth with potential growth indicates the extent to which the sites are being utilized (fig. 13). Based on the inventory data, Utah's timberlands are capable of producing on the average 43 cubic feet per acre per year. In 1977, actual net annual growth amounted to only 21 cubic feet per acre, less than one-half the potential attainable. This apparent deficit can be partially explained by stocking levels, stand structure, and stand size.

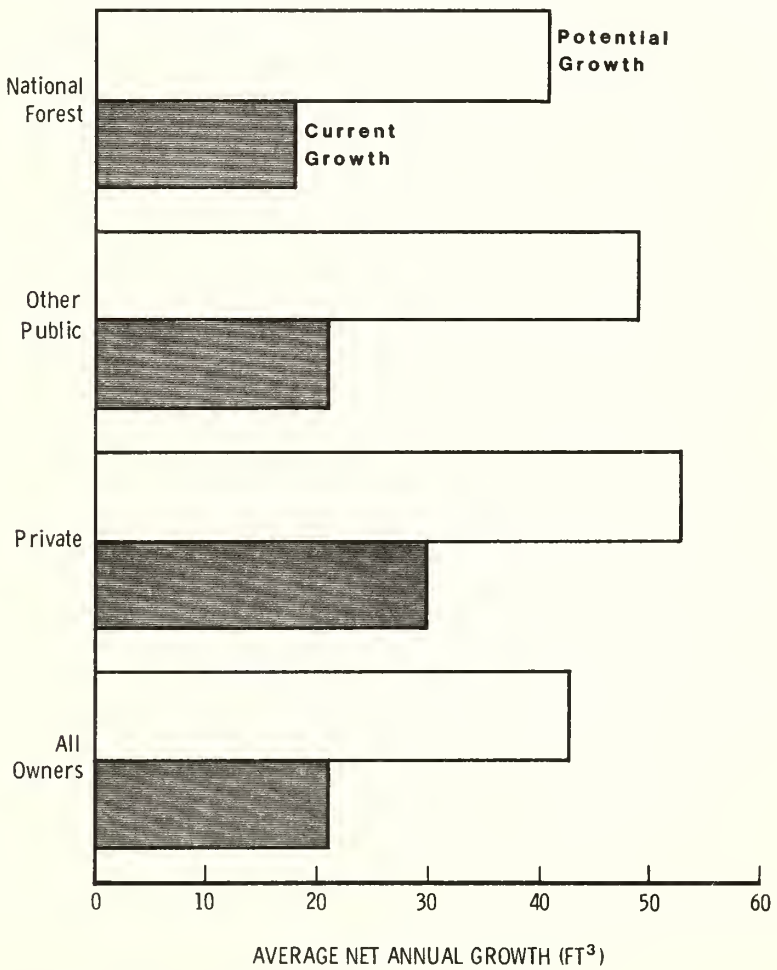


Figure 13.—Current vs. potential growth of growing stock on commercial timberland by ownership, Utah, 1977.

Stocking indicates the extent to which trees utilize the growth potential of a site, and is determined by comparing the stand density—in terms of numbers of trees or basal area—with a specified standard. Full or 100 percent stocking is achieved when there is no increase in growth with an increase in stocking.

Stand stocking and the nature of the trees making up the stand indicates the condition of the forest (table 4). (See definitions of area condition classes.)

Although the data in table 4 cover only "other public" and "private" owner groups, commercial timberland on National Forests is probably similar. Therefore the percentages of area by condition class calculated from table 4 would be essentially the same for all lands.

Old-growth stands occupy 20 percent of commercial timberland.

Old-growth stands (Area Condition Classes 80 and 90) make up nearly 20 percent of the commercial timberland, and well over half is Douglas-fir. Douglas-fir and ponderosa pine together make up nearly 65 percent of the high-risk old-growth stands.

About 75 percent of commercial timberland is understocked with desirable trees.

Excluding old-growth stands, about 75 percent of the commercial timberland is occupied by stands less than fully stocked with desirable trees, including nonstocked areas with virtually no trees. Over half of the nonstocked area is in the ponderosa pine and Douglas-fir types. In many stands, growing space is preempted by rough and rotten trees and brush, which preclude future improvement in stocking.

Large areas of understocked stands, some stagnated stands, some slow-growing old stands, and nonstocked lands are factors in the low growth.

Stand structure or the diameter distribution of stems in the stand in terms of basal area by tree diameter class can also affect net annual growth. Stands in which a large portion of the stand basal area is in trees less than sawlog size often have slow growth because of the overcrowding of small trees. A good example is lodgepole pine stands with several thousand trees per acre.

Slightly more than 300,000 acres are either nonstocked or in seedling or sapling stands. Another 674,000 acres are classed as poletimber. Sawtimber stands occupy 2.2 million acres, and a third of these are classed as old growth. Thus nearly 33 percent of the State's forests are either stocked with small trees or stocked with overmature trees, neither of which contribute much in the way of net annual growth.

Table 4.—Area of commercial timberland by forest type and area condition class; other public, and private owners, Utah, 1978

Forest type	Area condition class									Nonstocked	All classes
	10	20	30	40	50	60	70	80	90		
	Acres										
Douglas-fir	-	1,404	10,173	12,223	18,232	46,295	50,387	30,478	54,309	5,312	228,813
Ponderosa pine	-	-	-	4,056	-	15,153	34,202	3,777	32,533	13,009	102,730
Lodgepole pine	-	7,633	-	-	10,296	10,163	5,071	-	-	2,562	35,725
Limber pine	-	-	-	-	-	-	-	-	2,365	7,249	9,614
Fir-spruce	2,779	6,005	17,265	15,179	26,378	49,539	12,119	16,116	21,495	-	166,875
White fir	-	-	3,159	-	9,130	9,303	3,064	-	6,608	-	31,264
Pinyon-juniper[1]	-	-	-	-	-	2,454	1,403	7,184	3,770	2,365	17,176
Aspen	2,588	12,602	16,772	47,087	69,498	82,769	33,469	-	5,708	1,172	271,665
Cottonwood	-	-	-	-	140	2,483	5,363	-	2,482	-	10,468
All types	5,367	27,644	47,369	78,545	133,674	218,159	145,078	57,555	129,270	31,669	874,330

[1]Pinyon-juniper usually occurs on unproductive forest lands; when mixed with other species on productive sites it is reported in commercial timberland statistics.

Insects, disease, fire, and weather were the primary known causes of death in 1977.

Mortality.—Estimates of net annual growth and the resultant estimates of standing inventory are affected by volume lost to insects, disease, fire, and other destructive agents.

In 1977, more than 35 million cubic feet of growing stock was lost to destructive agents of one sort or another. Mortality of sawtimber amounted to nearly 124 million board feet (table 5).

Table 5.—Annual mortality of growing stock and sawtimber on commercial timberland by cause of death, Utah, 1977

Cause of death	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet*
Insects	5,477	22,898
Disease	4,679	17,257
Fire	4,939	19,021
Animal	908	858
Weather	4,383	17,986
Suppression	667	805
Logging	133	707
Unknown	14,210	44,178
Total	35,396	123,710

Insects were the most damaging agent, accounting for some 5.5 million cubic feet. Another 4.9 million cubic feet was contained in trees killed by fire, and trees containing 4.7 million cubic feet succumed to disease. In many cases, however, the actual cause of death could not be determined because several damaging agents usually work in concert or succession to kill the trees. Some 14.2 million cubic feet died of unknown causes.

Insects got 5.5 million cubic feet, 4.9 million cubic feet went up in smoke,...

and 4.7 million cubic feet died of disease.

Salvaging and utilizing dead trees is usually not economically feasible. Generally, volume is low and salvable only in conjunction with a normal harvest.

Lodgepole pine stands frequently offer the best chance for large salvage operations.

Lodgepole pine salvage operations, however, are economically feasible. There are high concentrations of dead but useable standing trees and good markets for small-diameter stems for house logs, posts, corral poles, and so forth. In addition dead lodgepole trees may stand for several years, reducing breakage and making the trees more useful.

The impact of destructive agents is not limited to just the loss of growing stock described above. These agents kill trees under 5 inches in diameter, destroy seed crops and seedlings, inhibit height and diameter growth, reduce the quality and utility of volume, and even change the stand composition from preferred to less desirable species.

Damage by destructive agents is more than just killing trees.

Much of the damage done by insects and diseases either extends the time required to grow trees to a merchantable size or reduces the utility and quality of the wood produced. Insects, such as shoot and tip moths, and diseases, such as dwarf mistletoe, stunt young trees and slow the growth rate. Defoliating insects reduce growth and also kill trees.

Trees can be stunted, growth reduced, or deformed, lowering quality of products.

Means for reducing and controlling the losses to destructive agents include cultural practices such as thinning and the planting of resistant species. Chemicals to control insects and disease have also been widely used, but in recent years, have become both expensive and subject to environmental constraints.

Removals amounted to 13 million cubic feet in 1977, mostly softwoods including 80 million board feet of sawtimber.

Removals.—The final component of change, removals, can be of the following kinds: (1) roundwood harvests for products such as sawlogs, pulpwood, and poles; (2) logging residues; and (3) pre-commercial thinning and other cultural operations, housing developments, and withdrawal of commercial timberland for parks, wilderness areas, and other nontimber uses.

In 1977, removals from Utah's growing stock inventory amounted to 13 million cubic feet and included nearly 80 million board feet of sawtimber (appendix tables 24 and 25). Removals were mainly softwoods, mostly taken from National Forests.

For every cubic foot removed, 5 cubic feet were grown.

At the present time, removals in Utah are equivalent to less than 1 percent of the growing stock and sawtimber inventories. Moreover, in 1977 Utah's forest increased 5 cubic feet for every cubic foot removed. Similar but smaller gains were found in the sawtimber inventory.

Sixty percent of the removals were lodgepole pine and Engelmann spruce.

Nearly 95 percent of total removals was made up of four species. Lodgepole pine and Engelmann spruce each accounted for some 30 percent. Ponderosa pine added another 22 percent and Douglas-fir accounted for slightly more than 10 percent of all material removed.

Eleven million cubic feet, 70 million board feet of sawtimber were cut from roundwood.

Timber harvested for roundwood products was by far the largest of the removals from the growing stock inventory. In 1977, such removals amounted to more than 11 million cubic feet and included nearly 70 million board feet of sawtimber. Practically all of this material was softwood.

Additional material was harvested from the nongrowing stock portion of the inventory. Slightly more than one-half million cubic feet of material came from rough and rotten trees, dead trees and other nongrowing stock sources.

Sawlogs were the number one product (85 percent of total).

In recent years mine timber production has increased, lumber production has decreased.

Sawlogs were the most important single product harvested from Utah's forests in 1977. Total output accounted for nearly 85 percent of the timber products. In 1977 the output of lumber was about 63 million board feet. But in recent years lumber production has declined and substantial amounts of sawlogs are being converted to dimension mine blocks.

The remaining timber products harvest was mostly for miscellaneous industrial products such as poles, posts, mine timbers, and commercial fuelwood. An additional one-half million cubic feet of aspen was harvested for conversion to excelsior.

In 1977 over 1 million cubic feet of wood were left in the woods after logging.

In 1977 more than 1 million cubic feet of growing stock was left in the woods after logging operations. These logging residues amounted to 9 percent of total removals and consisted of those sections of growing stock trees between a 1-foot stump and a 4-inch top (diameter outside bark) that did not find their way to the mill.

The final category of removals is that material taken out of the standing inventory but not converted to any industrial product. This category was not especially significant in Utah in 1977, accounting for less than 3 percent of the volume removed.

The bottom line...

removals were less than 1 percent of the existing volume for any species...

net annual growth was far greater than removals...

the volume lost to mortality was nearly three times that cut in 1977.

Without exception, removals did not exceed an amount equal to 1 percent of the inventory of any species. In addition, removals were exceeded by net annual growth for each species—usually by a substantial margin (fig. 14). An exception is ponderosa pine where removals were 65 percent of net annual growth.

Removals from growing stock and sawtimber in Utah have far less impact on the standing inventory than the amount of material lost annually to insects, disease, fire, and other destructive agents. Volume lost to mortality, in 1977 at least, was nearly three times that removed during timber harvesting operations. The forest in which less than 1 percent of the standing inventory is harvested annually may be contributing to the excess in mortality. If the growing stock inventory continues to increase it will most certainly produce stands that are overcrowded, stagnated, and highly susceptible to serious insect or disease outbreak.

Increased demands for energy-related wood products could increase removals from Utah's forests.

The relatively low level of harvest from Utah's forest in 1977 could be attributed to such factors as inaccessibility, generally low volumes per acre, long haul distances, and low market demand for some of the species. Increasing accessibility and developing markets for small-size material and species with low product value could improve the utlization. As energy requirements and construction costs mount, shoring for increased subsurface mining operations, fuelwood needs, and composite or particle board manufacture could increase the demand for timber products from Utah's forests.

In the meantime, having to forego the management opportunities afforded by a viable timber harvesting program will most likely result in a continuation of current conditions within Utah's forests, which in turn will contribute to less than optimal growth rates and high mortality levels.

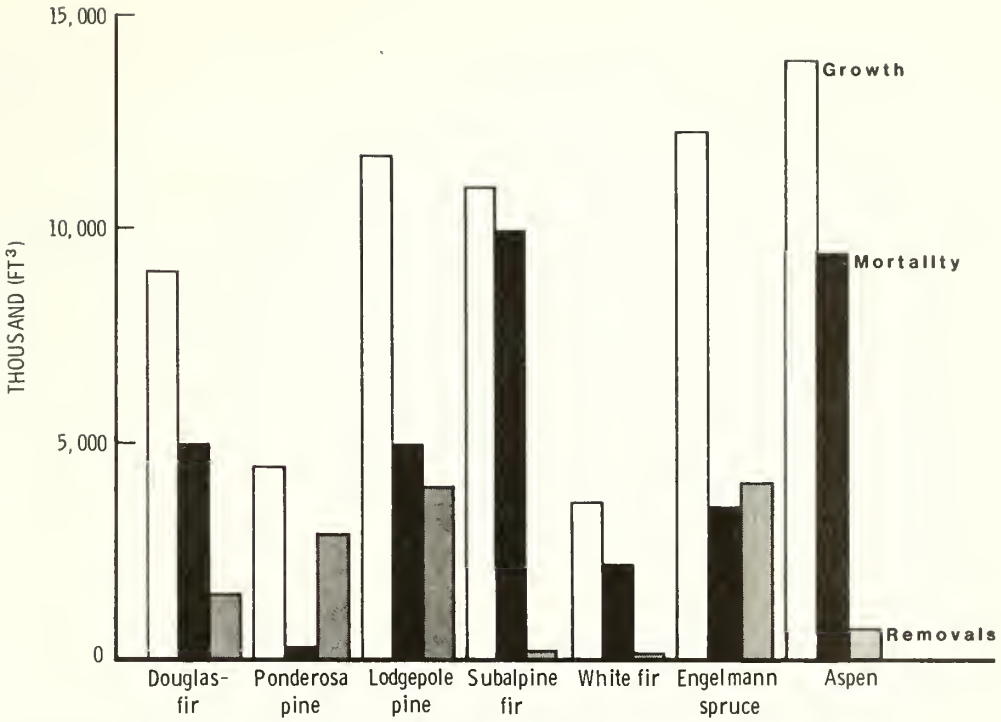


Figure 14.—Net annual growth, mortality, and removals from growing stock on commercial timberland by species, Utah, 1977.

FOREST USES

Utah's forests have high value for nontimber uses.

Utah's forested land provides many values not only to Utah but also the rest of the Nation. Water is fast becoming one of the most valuable, if not the most valuable, output. Much of the forest land provides forage and browse for livestock and big game animals, and almost every acre provides habitat for other species of wildlife. The trees provide a source of timber for commercial use and fuelwood. In addition, most forest land offers some form of outdoor recreation. Moreover, recent developments in energy exploration and development will certainly impact much of the State's forest land.

Water, grazing, recreation, wildlife, and minerals are important to the Nation as well as the State.

Since the mid-1800's when the settlement of Utah really got under way, the water, forage, and timber have been the foundation of economic development of the State. Forest recreation came later. Today even the desert areas are providing recreational opportunities. Minerals underlying much of forest and nonforest land have only recently been tapped. The true value of the mineral resources to the State and the Nation is not really known. But the oil, oil shale, tar sands, and coal deposits are extensive enough to have attracted national attention and significant investment.

Opportunities for more intensive use of forest land are limited in many areas.

In many areas use has reached the limit the land can support. Some areas have been abused and overused. Restoring such lands or preventing further deterioration requires curtailment of some uses.

Water

The water running off Utah's forest (and other lands within the same general elevational range) is a vital source of supply for Utah as well as other western States. It is the principal source of water for irrigation, domestic, and industrial use. Utah-produced water is also essential to Nevada, Arizona, southern California, and Mexico.

The forests and intermingled open lands of the mountains and foothills comprise about half the State's land area, but furnish almost 80 percent of the water runoff. Nonforested lands above and below the forests provide the remaining runoff.

Utah's forests are prime source of water for the Southwest.

The 8 million acre-feet of water generated in Utah is part of 23 million acre-feet of flowing water in or through the State.

Over half the water ends up in the Great Basin area...

and most of the rest goes into the Colorado River at some point before it gets to the Baja.

Utah's average annual precipitation is 13 inches per year. But precipitation varies from 3 inches in the desert to as much as 60 inches in the high mountains. The vast forest watersheds accumulate large amounts of precipitation in the form of snow. The spring runoff feeds the streams and the water storage systems. Although some 23 million acre-feet of water goes into streams flowing in or through Utah, only 8 million acre-feet are derived from Utah watersheds during a year of average precipitation.

The 8 million acre-feet of runoff flows into two major drainage areas. About 56 percent goes into the Great Basin area consisting of the Bear River, Weber River, Jordan River, Sevier River, Beaver River, Provo River, and Great Salt Lake Desert hydrologic areas. About 43 percent goes into the upper and lower Colorado River hydrologic areas (fig. 15). A small amount, about 1 percent of the runoff, from the Raft River Mountains in northwest Utah flows into the Columbia River Basin thru Idaho.

Runoff originating on the forest zones is distributed in about the same proportion as the entire State runoff. The 8 million acre-feet of runoff amounts to about 1.9 inches for the entire State. But there are some large differences in water yield from nonforest and forest areas and from different types of forests during a year of average precipitation:

	Runoff
	Inches
Nonforest	0.8
Pinyon-juniper	1.0
Other forest	7.8
All lands	1.9

Figure 15.—Major river basins and hydrologic areas of Utah.

The increasing demand for water is expected to continue...

by the year 2000, water use is projected to be some 6.4 million acre-feet in Utah, with nearly half going for irrigation and livestock.

Water produced in the forest and high elevation rangelands is of vital importance. The ground water and runoff are the total water supplies for use in homes, industry, agriculture, for recreation, fisheries, and wildlife. Economic development and expansion will bring increased demand for quality water. By the year 2000, water use is expected to increase from 5.7 million acre-feet to nearly 6.4 million acre-feet, with nearly half of it (47.9 percent) to be consumed by irrigation and livestock.[2]

The importance of water to the State underscores the necessity for watershed protection and resource management that enhance production of high quality water. Research to date indicates that water yields from mountain snowpack and the timing of runoff can indeed be influenced by manipulation of the vegetation. But more research is needed on the effects of water management activities on other forest values.

Grazing

The livestock industry heavily contributed to Utah's growth in the 1800's...

The forest ranges of Utah have been heavily grazed since the mid 1800's. Before that the forest land supported large populations of deer, elk, antelope, and buffalo. But by 1880 at least 136,000 head of cattle and an estimated 600,000 sheep grazed Utah's ranges, frequently in conflict. By 1900 the numbers were at 344,000 cattle and nearly 4 million sheep.

[2]Utah Department of Natural Resources. State of Utah water—1980. Salt Lake City, UT: Utah Department of Natural Resources, Division of Water Resources; 1981. 47 p.

but frequently produced disastrous consequences.

In those early years of development, grazing was largely uncontrolled. Overgrazing in the proximity of water or the moving of large herds of sheep between watering places was the rule. By the turn of the century vast areas of forested and other rangeland were badly depleted of forage. With the soil cover gone, the land was unprotected from the frequent high-intensity summer storms and spring and fall showers. The erosion came in many forms and degrees. The most spectacular were the disastrous mud and rock floods pounding down into towns and settlements along the Wasatch Front (particularly in Davis County) and from the Wasatch Plateau into the towns of Ephraim and Manti.

The depleted ranges, the realization of the need for grazing controls, and economic difficulties in the sheep industry all contributed to the decline in grazing on the forest range. From a peak of over 1 million sheep grazing on National Forests in 1913, the numbers fell to 407,000 in 1962. Cattle numbers peaked during World War I at 179,000, but by 1962 only 102,000 were grazing Utah's National Forests.

During Fiscal Year 1978, on the National Forests where much of the forest range is located, 93,083 cattle, 18,074 horses and burros and 254,568 sheep grazed a total of 660,000 animal unit months (AUM's). Cattle accounted for about 60 percent of the AUM's. These are considerably less than even the Statewide populations of 1880.

Livestock grazing is considerably less now than in early Utah.

In 1978, 366,000 animals grazed about 660,000 AUM's, with cattle accounting for 68 percent.

Utah's grazing lands have always been an important resource as they comprise about 92 percent of the State's land. The proper use and development of these lands is critical as a source of water, wildlife habitat, livestock forage, scenery, open space, and many forms of recreation. The conservation, improvement, and maintenance of the State's rangelands for present and future use is important to virtually all segments of the population. It is important to the tourist seeking scenery or open space, the recreationist seeking an enjoyable outdoor experience, the urban resident demanding a high-quality water

supply, the person interested in a healthy wildlife population, and the rural family and community that depend on livestock grazing for their livelihood and economic stability. Under proper management these multiple uses and values are compatible.

The management of forest range is complicated by the necessity of having to consider watershed, wildlife, and recreation values as well as grazing levels when developing management plans.

Competition between big game and livestock has decreased over the last several decades. Although the mountain forest range has ample forage, the lower foothills, which are less productive and more limited in area, are critical winter range for deer and are heavily grazed by domestic livestock during the spring and fall.

Good range management for livestock and big game goes hand-in-hand with watershed production.

But the management of the range has improved considerably over the years. Closer control over numbers of animals, construction of check dams and reservoirs, and conversion of pinyon-juniper and sagebrush to more desirable species of forage and browse have increased the amount and quality of the range. Even watershed rehabilitation measures such as furrowing, trenching, and terracing followed by seeding have improved Utah's livestock and big game range.

Recreation and Wildlife

Utah's forested mountains are some of the most heavily used recreational lands in the West. In 1977 only the National Forests in Colorado and Arizona had more recreational visitor days of use.

Utah's mountain forests are highly prized for recreation.

Campers, hikers, skiers, and hunters from the State, the Nation, and around the world come here to enjoy the many activities available in the vast and varied landscape of the State.

In 1980 the National Forests alone provided over 14 million visitor days...

and the Wasatch was the most heavily used National Forest in the Nation.

A commonly used measure of recreation use is the visitor-day. The National Forest System visitor-day is an aggregate of 12 person hours, which may entail one person for 12 hours, 12 persons for 1 hour, or any combination of individual or group use, either continuous or intermittent. In 1977 the estimated recreational use of Utah's National Forests was 11.3 million visitor-days. In fiscal year 1980 the numbers rose to over 14 million, accounting for about 15 percent of the recreation use on National Forests nationwide. The Wasatch National Forest, with 6.74 million visitor-days, was the most heavily used National Forest in the Nation:

National Forest	Thousands of visitor-days	National rank in use
Wasatch	6,740.8	1
Uinta	2,338.8	34
Ashley	1,579.4	56
Fishlake	1,318.9	61
Dixie	1,232.3	67
Manti-LaSal	982.5	83
Total	14,192.7	--

In 1977 camping and picnicking accounted for 36 percent of the total recreation:

Activity	Thousands of visitor-days
Camping and picnicking	4,070.6
Recreation travel (mechanized)	2,440.8
Fishing	1,240.5
Hunting	689.2
Hiking and mountain climbing	455.3
Winter sports	385.4
Water	294.8
Horseback riding	226.6
Other	1,538.6
Total	11,341.8

Camping, picnicking, and fishing are the favorite activities.

Many recreation sites outside the National Forests are also heavily used. Private enterprises inside and outside the National Forests provide facilities for skiing, boating, float trips, and other activities. The Utah State Park and Recreation Commission, the National Park Service, and other public agencies all provide outdoor recreation opportunities. In 1977, for example, recreation on BLM land in Utah was reported at 1.3 million visitor-days, excluding sightseeing.

The increase in recreational activities in Utah since World War II is due to improved transportation and a more mobile society. The State has made a concerted effort to attract visitors from around the world.

The Lake Powell and Flaming Gorge recreation areas are relatively recent additions to Utah's recreation scene and attract thousands of people annually. Utah's snow provides some of the best skiing anywhere in the world. And big game hunting is not only a local activity, it attracts thousands from out of State, particularly California, as does the fishing.

Wildlife resources help generate much of the recreational use of Utah's forests. Big game animals, always the most spectacular to see in the wild, are abundant and are heavily hunted by several hundred thousand people annually, many from out of State.

Utah's wildlife contributes heavily to Utah's attraction for recreationists...

particularly big game animals,...

Although game populations fluctuate yearly for various reasons, the basic herds apparently are reasonably stable or are increasing. The 1982 estimates of populations of some selected big game species in Utah are:

Species	Number
Bison	150
Antelope	2,500
Bighorn sheep	250
Mule deer	600,000
Elk	20,000
Moose	1,000
Total	623,900

During 1981 well over 200,000 big game permits were sold and hunters harvested some 90,809 deer, 3,456 elk, and 96 moose.

waterfowl, and other migratory birds.

In addition to big game and nongame animals, Utah has a large population of waterfowl and other birds. Also Utah is part of a major flyway for migratory birds of all kinds. The large variety of bird species afford many hours of recreation, both to hunters and sightseers.

The midsummer resident population of waterfowl is about 11,000. Hunters harvested some 367,265 ducks and more than 25,000 geese (mostly Canadian) in 1980. In addition, an estimated 847,730 upland game birds and animals were taken by 100,165 hunters.[3]

Recreation and tourism in Utah is a major component of the economy and will remain so. The opportunities for recreation on the forests and other lands in Utah will be major factors in any land use plan.

Minerals

Utah's mineral estate is vast...

Beneath the forest and rangelands of Utah lies an increasingly valuable mineral estate. In 1975, the value of mineral production in Utah was estimated at $966.5 million, with primary minerals being petroleum, copper, coal, and gold.

especially in the Overthrust Belt area.

Some of the richest deposits of critical energy and mineral resources in the Nation lie in the Overthrust Belt (fig. 16) that runs from Mexico into Canada. The oil, oil shale, tar sands, coal, molybdenum, phosphate rock, and a host of others are being considered for development. But, the forests and rangelands overlaying these deposits have their own mix of high and sometimes conflicting values. In Utah the Overthrust Belt spans the State roughly west of the Green and Colorado Rivers, and east of the Wasatch Front and I-15 (fig. 16). It underlays approximately a third of the land area.

Mineral extraction can disturb the earth's surface to varying degrees...

Some metals and minerals are most efficiently extracted by surface mining with substantial disturbance to surface resources. But any mining, whether from the surface or underground, can cause surface disturbance, i.e. from waste dumps, land subsidence, transportation, and power access corridors.

Oil exploration, drilling, and production can be done in many areas with minimal sustained impact on surface resources.

[3]Unpublished data, Utah Division of Wildlife Resources.

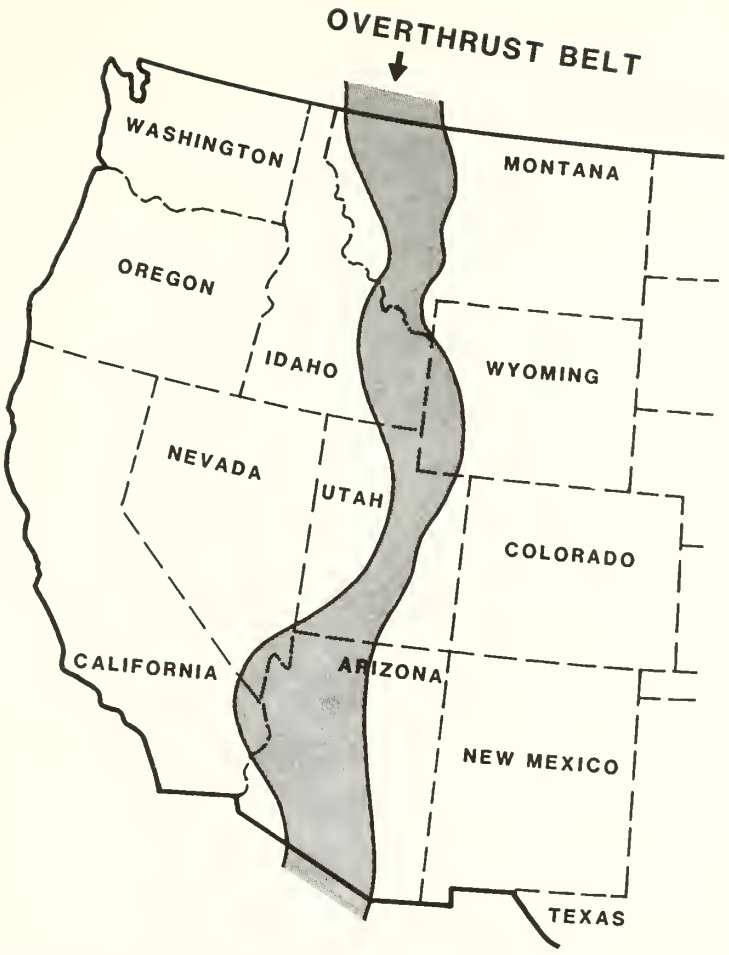


Figure 16.—Overthrust Belt spanning central Utah.

but proper planning can protect the land resource.

Management of forest and rangeland is being planned in concert with mineral development so all resources can be utilized without permanent damage to the land base.

APPENDIX A: TERMINOLOGY

Acceptable trees—Growing-stock trees meeting specified standards of size and quality, but not qualifying as desirable trees.

Area condition class—See stocking.

Bureau of Land Management land—Federal lands administered by the Bureau of Land Management, U.S. Department of the Interior.

Commercial forest land—See commercial timberland.

Commercial species—Tree species suitable for industrial wood products.

Commercial timberland—Forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as commercial timberland have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands. Currently, inaccessible and inoperable areas are included.)

Cord—A pile of stacked wood containing 128 cubic feet within its outside surfaces. The standard dimensions are 4 by 4 by 8 feet.

Cropland—Land under cultivation within the past 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improving crops, but excluding land cultivated in developing improved pasture.

Cull trees—Live trees of sawtimber and poletimber size that are unmerchantable for saw logs now or prospectively because of roughness, rot, or species (also see rotten trees and rough trees).

Deferred forest land—National Forest lands that meet productivity standards for commercial forest, but are under study for possible inclusion in the wilderness system.

Desirable Trees—Growing-stock trees (1) having no serious defect in quality to limit present or prospective use for timber products; (2) of relatively high vigor; and (3) containing no pathogens that may result in death or serious deterioration before rotation age.

Diameter classes—A classification of trees based on diameter outside bark measured at breast height (4½ feet above the ground). D.b.h. is the common abbreviation for "diameter at breast height." When using 2-inch diameter classes, the 6-inch class, for example, includes trees 5.0 through 6.9 inches d.b.h., inclusive.

Ecosystem—A complete, interacting system of organisms considered together with their environment; e.g., a marsh, a watershed, a lake, etc.

Establishment—An economic unit, generally at a single physical location where business is conducted or where services or industrial operations are performed.

Farmer and other private—All private ownerships except industry.

Farmer-owned lands—Lands owned by a person who operates a farm, either doing the work himself or directly supervising the work.

Forest industry lands—Lands owned by companies or individuals operating wood-processing plants.

Forest land—Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. (Also see Commercial timberland, Productive-reserved forest land, and Other forest land.) Forest land includes transition zones, such as areas between heavily forested and nonforested lands that are at least 10 percent stocked with forest trees, and forest areas adjacent to urban and built-up lands. Also included are pinyon-juniper and chaparral areas in the West, and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet in width.

Forest site productivity class—A classification of forest land in terms of potential cubic-foot volume growth per acre at culmination of mean annual increment in fully stocked natural stands.

Forest types—A classification of forest land based upon the tree species presently forming a plurality of stocking. For poletimber-size trees and larger, stocking is determined from basal area occurrence; for trees less than 5.0 inches d.b.h., from number of trees.

Major western forest type groups:

Douglas-fir—Forests in which Douglas-fir comprises a plurality of the stocking. (Common associates include western hemlock, western redcedar, the true firs, redwood, ponderosa pine, and larch.)

Ponderosa pine—Forests in which ponderosa pine comprises a plurality of the stocking. (Common associates include Jeffrey pine, sugar pine, limber pine, Arizona pine, Apache pine, Chihuahua pine, Douglas-fir, incense cedar, and white fir.)

Limber pine—Forests in which limber pine comprises a plurality of the stocking. (Common associates include lodgepole pine, aspen, Engelmann spruce, and subalpine fir.)

Lodgepole pine—Forests in which lodgepole pine comprises a plurality of the stocking. (Common associates are alpine fir, western white pine, Engelmann spruce, aspen, and larch.)

Fir-spruce—Forests in which true firs (*Abies* spp.), Engelmann spruce, or Colorado blue spruce, singly or combination, comprises a plurality of the stocking. (Common associates are mountain hemlock and lodgepole pine.)

White fir—Forests in which white fir comprises a plurality of the stocking. (Common associate is Douglas-fir).

Aspen—Forests in which aspen comprises a plurality of the stocking.

Cottonwood—Forest in which cottonwood comprises a plurality of the stocking. (Common associates are willow and red alder).

Hardwoods—Forests in which red alder or other western hardwoods, singly or in combination, comprises a plurality of the stocking.

Pinyon-juniper—Forests in which pinyon pine or juniper (or both) comprises a plurality of the stocking.

Growing-stock trees—Live sawtimber trees, poletimber trees, saplings, and seedlings meeting specified standards of quality or vigor; excludes cull trees.

Growing-stock volume—Net volume in cubic feet of live sawtimber and poletimber trees, from stump to a minimum 4-inch top (of central stem) outside bark or to the point where the central stem breaks into limbs.

Growth—See definition for "Net annual growth."

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

Indian lands—Tribal lands held in fee by the Federal Government but administered for Indian tribal groups and Indian trust allotments.

Industrial wood—All commercial roundwood products except fuelwood.

Land area—Census definition: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres of area.
Forest Survey definition:
Same as above except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Logging residues—The unused portions of poletimber and sawtimber trees cut or killed by logging.

Mortality—The volume of sound wood in live trees that have died from natural causes during a specified period.

National Forest System land—Federal lands designated by Executive Order or statute as National Forests or purchase units, and other lands under the administration of the Forest Service including experimental areas and Bankhead-Jones Title III lands.

Net annual growth—The net increase in the volume of trees during a specified year. Components of net annual growth include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became rough or rotten trees during the year.

Net volume in board feet—The gross board-foot volume of trees less deductions for rot or other defect affecting use for lumber.

Net volume in cubic feet—Gross volume in cubic feet less deductions for rot, roughness, and poor form. Volume is computed for the central stem from a 1-foot stump to a minimum 4.0-inch top diameter outside bark, or to the point where the central stem breaks into limbs.

Nonforest land—Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline

clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as nonforest land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide, and clearings, etc., more than 1 acre in size, to qualify as nonforest land.)

Nonstocked areas—Commercial timberland less than 10 percent stocked with growing-stock trees.

Other Federal land—Federal land other than lands administered by the Forest Service or the Bureau of Land Management.

Other forest land—Forest land incapable of producing 20 cubic feet per acre of industrial wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Other land—All land area other than forest and range lands.

Other private land—Privately owned land other than forest industry or farmer-owned.

Other public land—Publicly owned land other than National Forest System land.

Other removals—The net volume of growing-stock trees removed from the inventory by cultural operations such as timber-stand improvement, by land clearing, and by changes in land use, such as a shift to wilderness.

Other species—Tree species of typical small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products.

Ownership—The property owned by one owner, including all parcels of land in the United States.

Pasture—Land which is currently improved for grazing by cultivation, seeding, or irrigation.

Plant byproducts—Wood material from primary manufacturing plants (such as slabs, edgings, trimmings, miscuts, sawdust shavings, veneer cores and clippings, and pulp screenings) that are used for some products.

Poletimber stands—Stands at least 10 percent stocked with growing-stock trees, of which half or more of the stocking is sawtimber and/or poletimber trees with poletimber stocking exceeding that of sawtimber. (See definition for Stocking.)

Poletimber trees—Live trees of commercial species at least 5.0 inches in diameter at breast height but smaller than sawtimber size, and of good form and vigor.

Potential growth—The average net annual growth per acre attainable in fully stocked natural stands at culmination of mean annual growth of dominant or codominant trees.

Primary manufacturing plants—Plants using roundwood products such as saw logs, pulpwood bolts, veneer logs, etc.

Productive-reserved forest land—Productive public forest land withdrawn from timber utilization through statute or administrative regulations.

Productivity class—A classification of forest land in terms of potential growth in cubic feet of fully stocked natural stands.

Rangeland—Land on which the potential natural vegetation is predominantly grasses, grass-like plants, forbs, or shrubs, including land revegetated naturally or artificially that is managed like native vegetation. Rangeland includes natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows that are less than 10 percent stocked with forest trees of any size.

Removals—The net volume of growing-stock or sawtimber trees removed from the inventory by harvesting; cultural operations, such as timber stand improvement; land clearings; or changes in land use.

Residues:

Coarse residues—Plant residues suitable for chipping, such as slabs, edgings, and ends.

Fine residues—Plant residues not suitable for chipping, such as sawdust, shavings, and veneer clippings.

Logging residues—The unused portions of sawtimber and poletimber trees cut or killed by logging.

Plant residues—Wood materials from primary manufacturing plants that are not used for any product.

Urban residues—Wood materials from urban areas, such as newspapers, lumber and plywood from building demolition, and used packaging and shipping wood materials.

Rotten trees—Live trees of commercial species that do not contain a saw log, now or prospectively, primarily because of rot (e.g., when rot accounts for more than 50 percent of the total cull volume).

Rough trees—(a) Live trees of commercial species that do not contain a saw log, now or prospectively, primarily because of roughness, poor form, splits, and cracks, and with less than one-third of the gross tree volume in sound material; and (b) all live trees of noncommercial species.

Roundwood equivalent—The volume of logs or other round products required to produce the lumber, plywood, woodpulp, paper, or other similar products.

Roundwood logs—Logs, bolts, or other round sections cut from trees.

Salvable dead trees—Standing or down dead trees that are considered currently or potentially merchantable by regional standards.

Saplings—Live trees of commercial species 1.0 inch to 5.0 inches in diameter at breast height and of good form and vigor.

Sapling and seedling stands—Stands at least 10 percent occupied with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

Saw log—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, and with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods) or other combinations of size and defect specified by regional standards.

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

Saw log top—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7.0 inches d.o.b. for softwoods, and 9.0 inches d.o.b. for hardwoods.

Sawtimber stands—Stands at least 10 percent occupied with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Sawtimber trees—Live trees of commercial species containing at least one 12-foot saw log or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9 inches in diameter and hardwood trees 11 inches in diameter at breast height.

Sawtimber volume—Net volume of the saw log portion of live sawtimber trees in board feet.

Seedlings—Established live trees of commercial species less than 1.0 inch in diameter at breast height and of good form and vigor.

Softwoods—Monocotyledonous trees, usually evergreen, having needle or scalelike leaves.

Special interest areas—Areas described in the Environmental Policy Act of 1970 which include (1) cultural areas—historic or prehistoric sites and places of obvious future historical value—and (2) natural areas—outstanding examples of the Nation's geological and ecological features.

Standard error—An expression of the degree of confidence that can be placed on an estimated total or average obtained by statistical sampling methods. Sampling errors do not include technique errors that could occur in photo classification of areas, measurement of volume, or compilation of data.

Stand improvement—Measures such as thinning, pruning, release cutting, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Stand-size classes—A classification of forest land based on the predominant size of timber present. See Poletimber stands, Sapling seedling stands, and Sawtimber stands.

State, county, and municipal lands—Lands owned by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Stocking—Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range, which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking

has been set at 132 percent. Sites with less than 100-percent stocking represent less than full-site occupancy. Overstocking is characterized by sites with 133 percent or more stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land, and are summarized into the following area condition classes:

Class 10—Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20—Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30—Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees or inhibiting vegetation, or surface conditions that will prevent occupancy by desirable trees.

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

Class 50—Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing-stock trees.

Class 60—Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.

Class 70—Areas nonstocked (less than 16.7 percent) or poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Class 80—Low-risk old-growth stands.

Class 90—High-risk old-growth stands.

Nonstocked—Areas less than 16.7 percent stocked with growing-stock trees.

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

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

Water—Census definition: Streams sloughs, estuaries, and canals more than 1/8 of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Forest Survey definition: Same as above except minimum width of streams, etc. is 120 feet, and minimum size of lakes, etc. is 1 acre.

Wilderness—An area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historic value (from Wilderness Act 1964).

APPENDIX B: INVENTORY TECHNIQUES

The inventory was designed to provide reliable statistics primarily at the State and working circle levels. Procedures were as follows:

1. Initial area estimates were based on the classification of 668,057 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photopoints, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurements recorded at 719 ground sample locations. Sample trees were selected using a 10-point cluster, which includes fixed plots (1/300-acre) for trees less than 5 inches d.b.h. and variable plots (40-BAF) for trees 5 inches d.b.h. or larger.

3. For most species, volume and defect were computed using equations developed for the Ashley National Forest. For other species, Kemp's equations were used.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

APPENDIX C: RELIABILITY OF THE DATA

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard error percentages shown in tables 6 and 7 were calculated at the 67 percent confidence level.

Table 6.--Area of forest land (excluding National Forests) with percent standard error, Utah, 1978

Item	Softwoods		Hardwoods		All types	
	Acres	Percent	Acres	Percent	Acres	Percent
Commercial timberland	592,197	±4.9	282,133	±8.4	874,330	±3.7
Productive reserved[1]	28,241		4,011		32,252	
Other forest land:						
Unproductive reserved[1]	371,495		34,698		406,193	
Unproductive nonreserved	8,133,599	±0.7	1,543,295	±3.7	9,676,894	±0.4

[1]Reserved land areas are estimated from aerial photos without field verification; therefore, standard errors are not calculated.

Table 7.--Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland (excluding National Forests) with percent standard error, Utah

Item	Softwoods		Hardwoods		All species	
	Volume	Percent	Volume	Percent	Volume	Percent
Net volume, 1978:						
Growing stock (M cubic feet)	801,290	±5.7	310,195	±8.7	1,111,485	±4.8
Sawtimber (M board feet[1])	3,138,966	±6.1	568,689	±14.2	3,707,655	±5.7
Net annual growth, 1977:						
Growing stock (cubic feet)	13,728,031	±11.6	9,461,733	±10.7	23,189,764	±8.2
Sawtimber (board feet[1])	68,115,628	±10.6	31,273,739	±22.2	99,389,367	±9.8
Annual mortality, 1977:						
Growing stock (cubic feet)	5,679,847	±21.2	2,090,010	±23.7	7,769,857	±17.0
Sawtimber (board feet[1])	19,599,960	±21.0	2,723,219	±46.8	22,323,179	±19.4

[1]International 1/4-inch rule.

APPENDIX D: FOREST SURVEY TABLES 8-31

Table 8.--Total land and water area by ownership class, Utah, 1978

Land class	Thousand acres
Commercial timberland	3,151.3
Commercial deferred	157.3
Noncommercial forest land:	
Other forest nonreserved	12,205.0
Productive reserved	124.3
Other forest reserved	428.7
Total forest land	16,066.6
Nonforest land	36,460.1
Total land area[1]	52,526.7

[1]Source: Bureau of the Census, land and water area of the United States, 1980.

Table 9.--Area of commercial timberland by ownership class, Utah, 1978

Ownership class	Thousand acres
National Forest	2,277.0
Bureau of Land Management	186.0
Indian	50.7
Miscellaneous Federal	6.3
State	114.8
County and municipal	3.7
Forest industry	.0
Farmer	303.9
Other private	208.9
All ownerships	3,151.3

Table 10.--Area of commercial timberland by forest type, stand-size class, and site class, Utah, 1978

Forest type and stand-size class	Site class					Total acres
	165+	120-164	85-119	50-84	20-49	
	- - - - - - - - - - Thousand acres - - - - - - - - - -					
Douglas-fir:						
Sawtimber	--	([1])	6.1	101.4	319.1	426.6
Poletimber	--	--	--	1.2	38.2	39.4
Sapling and seedling	--	--	--	4.4	24.6	29.0
Nonstocked	--	--	2.7	2.6	1.8	7.1
Total	--	([1])	8.8	109.6	383.7	502.1
Ponderosa pine:						
Sawtimber	--	--	--	14.8	348.4	363.2
Poletimber	--	--	--	--	13.6	13.6
Sapling and seedling	--	--	--	--	26.1	26.1
Nonstocked	--	--	--	7.2	16.7	23.9
Total	--	--	--	22.0	404.8	426.8
Lodgepole pine:						
Sawtimber	--	--	--	8.0	228.9	236.9
Poletimber	--	--	--	1.8	182.3	184.1
Sapling and seedling	--	--	--	--	35.9	35.9
Nonstocked	--	--	--	--	3.5	3.5
Total	--	--	--	9.8	450.6	460.4
Limber pine:						
Sawtimber	--	--	--	([1])	21.0	21.0
Poletimber	--	--	--	--	.7	.7
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	7.2	7.2
Total	--	--	--	([1])	28.9	28.9
White fir:						
Sawtimber	--	--	5.2	33.7	100.1	139.0
Poletimber	--	--	--	--	7.2	7.2
Sapling and seedling	--	--	--	1.9	3.3	5.2
Nonstocked	--	--	--	--	--	--
Total	--	--	5.2	35.6	110.6	151.4
Fir-spruce:						
Sawtimber	--	2.5	55.7	289.9	379.0	727.1
Poletimber	--	--	2.8	18.7	55.0	76.5
Sapling and seedling	--	--	--	10.3	20.2	30.5
Nonstocked	--	--	--	--	3.0	3.0
Total	--	2.5	58.5	318.9	457.2	837.1
Pinyon-juniper:						
Sawtimber	--	--	--	--	14.8	14.8
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	2.3	2.3
Total	--	--	--	--	17.1	17.1
Aspen:						
Sawtimber	--	--	7.0	71.8	156.8	235.6
Poletimber	--	--	8.2	63.7	280.7	352.6
Sapling and seedling	--	--	--	18.0	80.7	98.7
Nonstocked	--	--	--	2.3	27.8	30.1
Total	--	--	15.2	155.8	546.0	717.0
Cottonwood:						
Sawtimber	--	--	--	--	10.5	10.5
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	10.5	10.5
All forest types:						
Sawtimber	--	2.5	74.0	519.6	1,578.6	2,174.7
Poletimber	--	--	11.0	85.4	577.7	674.1
Sapling and seedling	--	--	--	34.6	190.8	225.4
Nonstocked	--	--	2.7	12.1	62.3	77.1
Total	--	2.5	87.7	651.7	2,409.4	3,151.3

[1]Less than 0.05 thousand acres.

Table 11.--Area of commercial timberland in National Forest ownership by forest type, stand-size class, and site class, Utah, 1978

Forest type and stand-size class	Site class					Total acres
	165+	120-164	85-119	50-84	20-49	
	Thousand acres					
Douglas-fir:						
Sawtimber	--	(1)	0.9	48.4	189.4	238.7
Poletimber	--	--	--	1.2	27.9	29.1
Sapling and seedling	--	--	--	(1)	3.7	3.7
Nonstocked	--	--	--	--	1.8	1.8
Total	--	(1)	.9	49.6	222.8	273.3
Ponderosa pine:						
Sawtimber	--	--	--	2.5	273.4	275.9
Poletimber	--	--	--	--	13.6	13.6
Sapling and seedling	--	--	--	--	23.7	23.7
Nonstocked	--	--	--	--	10.9	10.9
Total	--	--	--	2.5	321.6	324.1
Lodgepole pine:						
Sawtimber	--	--	--	8.0	208.5	216.5
Poletimber	--	--	--	1.8	172.1	173.9
Sapling and seedling	--	--	--	--	33.4	33.4
Nonstocked	--	--	--	--	.9	.9
Total	--	--	--	9.8	414.9	424.7
Limber pine:						
Sawtimber	--	--	--	(1)	18.6	18.6
Poletimber	--	--	--	--	.7	.7
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	(1)	19.3	19.3
White fir:						
Sawtimber	--	--	--	18.1	91.5	109.6
Poletimber	--	--	--	--	7.2	7.2
Sapling and seedling	--	--	--	--	3.3	3.3
Nonstocked	--	--	--	--	--	--
Total	--	--	--	18.1	102.0	120.1
Fir-spruce:						
Sawtimber	--	--	23.5	215.2	346.9	585.6
Poletimber	--	--	--	8.3	50.9	59.2
Sapling and seedling	--	--	--	3.4	19.0	22.4
Nonstocked	--	--	--	--	3.0	3.0
Total	--	--	23.5	226.9	419.8	670.2
Pinyon-juniper:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
Aspen:						
Sawtimber	--	--	--	16.9	135.3	152.2
Poletimber	--	--	--	16.1	201.9	218.0
Sapling and seedling	--	--	--	--	46.2	46.2
Nonstocked	--	--	--	2.3	26.6	28.9
Total	--	--	--	35.3	410.0	445.3
Cottonwood:						
Sawtimber	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	--	--
All forest types:						
Sawtimber	--	(1)	24.4	309.1	1,263.6	1,597.1
Poletimber	--	--	--	27.4	474.3	501.7
Sapling and seedling	--	--	--	3.4	129.3	132.7
Nonstocked	--	--	--	2.3	43.2	45.5
Total	--	(1)	24.4	342.2	1,910.4	2,277.0

[1]Less than 0.05 thousand acres.

Table 12.--Area of commercial timberland in other public ownership by forest type, stand-size class, and site class, Utah, 1978

Forest type and stand-size class	Site class					Total acres
	165+	120-164	85-119	50-84	20-49	
	Thousand acres					
Douglas-fir:						
Sawtimber	--	--	1.1	21.8	74.5	97.4
Poletimber	--	--	--	--	3.9	3.9
Sapling and seedling	--	--	--	2.6	11.4	14.0
Nonstocked	--	--	.5	.5	--	1.0
Total	--	--	1.6	24.9	89.8	116.3
Ponderosa pine:						
Sawtimber	--	--	--	8.3	53.6	61.9
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	1.4	1.4
Nonstocked	--	--	--	5.9	2.3	8.2
Total	--	--	--	14.2	57.3	71.5
Lodgepole pine:						
Sawtimber	--	--	--	--	6.7	6.7
Poletimber	--	--	--	--	2.1	2.1
Sapling and seedling	--	--	--	--	.5	.5
Nonstocked	--	--	--	--	1.7	1.7
Total	--	--	--	--	11.0	11.0
Limber pine:						
Sawtimber	--	--	--	--	1.4	1.4
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	6.0	6.0
Total	--	--	--	--	7.4	7.4
White fir:						
Sawtimber	--	--	.9	5.1	1.3	7.3
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	.5	--	.5
Nonstocked	--	--	--	--	--	--
Total	--	--	.9	5.6	1.3	7.8
Fir-spruce:						
Sawtimber	--	.4	13.6	23.5	8.9	46.4
Poletimber	--	--	1.9	4.4	1.4	7.7
Sapling and seedling	--	--	--	2.2	.7	2.9
Nonstocked	--	--	--	--	--	--
Total	--	.4	15.5	30.1	11.0	57.0
Pinyon-juniper:						
Sawtimber	--	--	--	--	9.5	9.5
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	1.3	1.3
Total	--	--	--	--	10.8	10.8
Aspen:						
Sawtimber	--	--	2.1	23.9	6.2	32.2
Poletimber	--	--	2.3	11.0	17.8	31.1
Sapling and seedling	--	--	--	4.2	10.0	14.2
Nonstocked	--	--	--	--	.5	.5
Total	--	--	4.4	39.1	34.5	78.0
Cottonwood:						
Sawtimber	--	--	--	--	1.7	1.7
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	1.7	1.7
All forest types:						
Sawtimber	--	.4	17.7	82.6	163.8	264.5
Poletimber	--	--	4.2	15.4	25.2	44.8
Sapling and seedling	--	--	--	9.5	24.0	33.5
Nonstocked	--	--	.5	6.4	11.8	18.7
Total	--	.4	22.4	113.9	224.8	361.5

Table 13.--Area of commercial timberland in farm and other private ownership by forest type, stand-size class, and site class, Utah, 1978

Forest type and stand-size class	Site class					Total acres
	165+	120-164	85-119	50-84	20-49	
	- - - - - - - - - - Thousand acres - - - - - - - - - -					
Douglas-fir:						
Sawtimber	--	--	4.1	31.2	55.2	90.5
Poletimber	--	--	--	--	6.4	6.4
Sapling and seedling	--	--	--	1.8	9.5	11.3
Nonstocked	--	--	2.2	2.1	--	4.3
Total	--	--	6.3	35.1	71.1	112.5
Ponderosa pine:						
Sawtimber	--	--	--	4.0	21.4	25.4
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	1.0	1.0
Nonstocked	--	--	--	1.3	3.5	4.8
Total	--	--	--	5.3	25.9	31.2
Lodgepole pine:						
Sawtimber	--	--	--	--	13.7	13.7
Poletimber	--	--	--	--	8.1	8.1
Sapling and seedling	--	--	--	--	2.0	2.0
Nonstocked	--	--	--	--	.9	.9
Total	--	--	--	--	24.7	24.7
Limber pine:						
Sawtimber	--	--	--	--	1.0	1.0
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	1.2	1.2
Total	--	--	--	--	2.2	2.2
White fir:						
Sawtimber	--	--	4.3	10.5	7.3	22.1
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	1.4	--	1.4
Nonstocked	--	--	--	--	--	--
Total	--	--	4.3	11.9	7.3	23.5
Fir-spruce:						
Sawtimber	--	2.1	18.6	51.2	23.2	95.1
Poletimber	--	--	.9	6.0	2.7	9.6
Sapling and seedling	--	--	--	4.7	.5	5.2
Nonstocked	--	--	--	--	--	--
Total	--	2.1	19.5	61.9	26.4	109.9
Pinyon-juniper:						
Sawtimber	--	--	--	--	5.3	5.3
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	1.0	1.0
Total	--	--	--	--	6.3	6.3
Aspen:						
Sawtimber	--	--	4.9	31.0	15.3	51.2
Poletimber	--	--	5.9	36.6	61.0	103.5
Sapling and seedling	--	--	--	13.8	24.5	38.3
Nonstocked	--	--	--	--	.7	.7
Total	--	--	10.8	81.4	101.5	193.7
Cottonwood:						
Sawtimber	--	--	--	--	8.8	8.8
Poletimber	--	--	--	--	--	--
Sapling and seedling	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--
Total	--	--	--	--	8.8	8.8
All forest types:						
Sawtimber	--	2.1	31.9	127.9	151.2	313.1
Poletimber	--	--	6.8	42.6	78.2	127.6
Sapling and seedling	--	--	--	21.7	37.5	59.2
Nonstocked	--	--	2.2	3.4	7.3	12.9
Total	--	2.1	40.9	195.6	274.2	512.8

Table 14.--Area of commercial timberland by stand-size class and ownership class, Utah, 1978

Stand-size class	National Forest	Other public	Farmer and other private	All ownerships
	- - - - - - - - - - *Thousand acres* - - - - - - - - - -			
Sawtimber stands	1,597.1	264.5	313.1	2,174.7
Poletimber stands	501.7	44.8	127.6	674.1
Sapling and seedling stands	132.7	33.5	59.2	225.4
Nonstocked areas	45.5	18.7	12.9	77.1
Total	2,277.0	361.5	512.8	3,151.3

Table 15.--Area of productive deferred, productive reserved, and other timberland by land class, ownership class, and forest type, Utah, 1978

Land class	Forest type										All types
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Fir-spruce	Pinyon-juniper	Other softwoods	Aspen	Cottonwood	Other hardwoods	
	Thousand acres										
Productive deferred:											
National Forest	20.2	15.4	41.9	0.1	63.7	--	--	16.0	--	--	157.3
Total	20.2	15.4	41.9	.1	63.7	--	--	16.0	--	--	157.3
Productive reserved area:											
National Forest	10.6	--	33.4	--	40.5	--	--	7.5	--	--	92.0
Other public	7.3	14.9	--	.1	4.8	--	--	3.9	--	--	31.0
Farmer and other private	.2	1.0	--	--	(1)	--	--	.1	--	--	1.3
Total	18.1	15.9	33.4	.1	45.3	--	--	11.5	--	--	124.3
Other forest land area:											
Unproductive reserved:											
National Forest	2.8	--	8.3	--	9.1	--	--	2.3	--	(1)	22.5
Other public	3.2	1.8	11.0	1.4	(1)	352.3	(1)	1.2	1.5	29.6	402.0
Farmer and other private	--	.1	--	--	--	1.7	--	(1)	--	2.4	4.2
Total	6.0	1.9	19.3	1.4	9.1	354.0	(1)	3.5	1.5	32.0	428.7
Unproductive nonreserved:											
National Forest	167.0	78.9	145.5	4.5	381.5	790.3	--	531.0	--	429.4	2,528.1
Other public	17.6	11.7	.6	11.3	6.8	7,001.6	1.0	79.1	15.4	331.8	7,476.9
Farmer and other private	11.0	5.3	2.0	6.8	3.4	1,054.1	.4	289.9	52.1	775.0	2,200.0
Total	195.6	95.9	148.1	22.6	391.7	8,846.0	1.4	900.0	67.5	1,536.2	12,205.0
Total other forest land:											
National Forest	169.8	78.9	153.8	4.5	390.6	790.3	--	533.3	--	429.4	2,550.6
Other public	20.8	13.5	11.6	12.7	6.8	7,353.9	1.0	80.3	16.9	361.4	7,878.9
Farmer and other private	11.0	5.4	2.0	6.8	3.4	1,055.8	.4	289.9	52.1	777.4	2,204.2
Total	201.6	97.8	167.4	24.0	400.8	9,200.0	1.4	903.5	69.0	1,568.2	12,633.7
Total all areas:											
National Forest	200.6	94.3	229.1	4.6	494.8	790.3	--	556.8	--	429.4	2,799.9
Other public	28.1	28.4	11.6	12.8	11.6	7,353.9	1.0	84.2	16.9	361.4	7,909.9
Farmer and other private	11.2	6.4	2.0	6.8	3.4	1,055.8	.4	290.0	52.1	777.4	2,205.5
Total	239.9	129.1	242.7	24.2	509.8	9,200.0	1.4	931.0	69.0	1,568.2	12,915.3

[1]Less than 0.05 thousand acres.

Table 16.--Number of growing-stock trees on commercial timberland by species and diameter class, Utah, 1978

Species	Diameter class (inches at breast height)															All classes
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand trees															
Douglas-fir	28,336	18,370	17,684	13,872	8,021	5,571	3,869	2,140	1,415	895	574	368	196	112	251	101,674
Ponderosa pine	14,642	11,155	4,778	3,856	2,464	1,781	1,509	1,119	750	667	494	381	267	182	392	44,437
Lodgepole pine	61,200	64,905	44,050	27,564	15,630	7,510	3,724	1,427	657	255	94	44	12	7	4	227,083
Limber pine	1,935	1,409	908	623	580	484	260	153	192	85	25	56	20	13	11	6,754
Subalpine fir[1]	93,961	60,243	35,148	17,932	11,009	5,941	3,346	1,970	1,196	571	358	190	106	52	28	232,051
White fir	19,802	13,760	13,974	6,077	3,913	2,079	1,637	1,079	806	412	251	176	68	54	86	64,174
Engelmann spruce	34,097	22,058	21,446	14,945	9,852	6,299	4,600	2,719	2,005	1,186	752	563	382	214	290	121,408
Pinyon/juniper	1,221	1,385	1,072	355	396	215	95	95	188	61	18	16	2	13	21	5,153
Other softwoods	206	--	--	--	--	--	--	--	--	--	--	--	--	--	--	206
Total softwoods	255,400	193,285	139,060	85,224	51,865	29,880	19,040	10,702	7,209	4,132	2,566	1,794	1,053	647	1,083	802,940
Aspen	97,416	95,831	76,792	34,660	14,621	8,208	3,546	1,500	588	129	76	42	12	3	--	333,424
Cottonwood	176	323	63	57	111	139	98	64	52	26	30	3	6	9	6	1,163
Other hardwoods	--	--	138	30	--	--	--	--	--	--	--	--	--	--	--	168
Total hardwoods	97,592	96,154	76,993	34,747	14,732	8,347	3,644	1,564	640	155	106	45	18	12	6	334,755
All species	352,992	289,439	216,053	119,971	66,597	38,227	22,684	12,266	7,849	4,287	2,672	1,839	1,071	659	1,089	1,137,695

[1]Includes corkbark fir.

Table 17.--Net volume of growing stock on commercial timberland by species and diameter class, Utah, 1978

Species	Diameter class (inches at breast height)												All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Million cubic feet													
Douglas-fir	29.6	57.4	64.9	71.9	73.8	63.0	52.4	45.4	37.8	29.3	19.0	10.6	44.4	599.5
Ponderosa pine	2.7	9.7	16.8	20.3	25.6	28.0	26.6	29.9	27.5	26.9	23.4	18.7	61.0	317.1
Lodgepole pine	118.6	170.0	172.8	130.7	92.9	49.9	30.7	14.9	6.9	3.7	1.3	.8	.7	793.9
Limber pine	3.9	5.2	5.8	6.7	5.1	3.9	6.5	3.3	1.3	4.0	1.6	1.3	1.2	49.8
Subalpine fir	88.9	99.7	104.2	89.3	72.9	60.6	47.5	29.7	22.7	13.9	8.6	5.0	3.2	646.2
White fir	28.8	31.1	31.6	26.0	30.4	26.0	26.7	17.2	12.2	11.0	5.0	4.4	9.5	259.9
Engelmann spruce	52.7	86.7	96.2	97.9	110.2	92.5	94.5	70.9	55.6	51.7	43.6	27.9	52.0	932.4
Pinyon/juniper	.5	.7	1.2	.9	.7	1.0	2.4	1.0	.5	.3	.1	.3	.7	10.3
Total softwoods	325.7	460.5	493.5	443.7	411.6	324.9	287.3	212.3	164.5	140.8	102.6	69.0	172.7	3,609.1
Aspen	155.3	179.4	133.8	119.8	72.5	43.0	22.8	6.1	4.7	3.2	1.1	.5	--	742.2
Cottonwood	.1	.4	.8	1.8	1.9	1.7	1.5	1.0	1.3	.2	.3	.4	.5	11.9
Other hardwoods	.1	.1	--	--	--	--	--	--	--	--	--	--	--	.2
Total hardwoods	155.5	179.9	134.6	121.6	74.4	44.7	24.3	7.1	6.0	3.4	1.4	.9	.5	754.3
All species	481.2	640.4	628.1	565.3	486.0	369.6	311.6	219.4	170.5	144.2	104.0	69.9	173.2	4,363.4

Table 18.--Net volume of sawtimber on commercial timberland by species and diameter class, Utah, 1978

Species	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Million board feet, International 1/4-inch rule											
Douglas-fir	257.1	347.8	384.3	337.3	304.9	255.8	221.4	180.4	118.1	71.9	315.5	2,794.5
Ponderosa pine	40.5	80.1	124.4	148.2	150.6	175.6	165.4	166.0	144.0	117.1	390.8	1,702.7
Lodgepole pine	689.2	656.1	471.1	253.5	155.5	75.5	35.4	18.8	7.0	3.9	4.0	2,370.0
Limber pine	25.6	31.9	26.1	20.9	35.1	18.5	6.9	22.2	8.8	7.6	6.7	210.3
Subalpine fir	445.7	412.1	351.3	293.9	232.8	149.2	116.1	72.3	44.6	25.8	16.9	2,160.7
White fir	112.8	112.3	145.8	132.0	137.9	89.3	64.6	59.6	27.6	22.6	52.1	956.6
Engelmann spruce	451.9	505.0	574.1	485.6	498.5	374.4	306.9	287.4	240.2	154.3	295.5	4,173.8
Pinyon/juniper	3.7	2.7	2.8	2.9	7.2	2.6	2.1	.8	.2	.9	2.0	27.9
Total softwoods	2,026.5	2,148.0	2,079.9	1,674.3	1,522.5	1,140.9	918.8	807.5	590.5	404.1	1,083.5	14,396.5
Aspen	XXXXX	555.4	342.5	211.2	112.4	29.9	24.1	16.7	6.0	3.1	--	1,301.3
Cottonwood	XXXXX	9.4	9.4	8.5	7.3	4.7	6.1	.9	1.4	2.0	2.2	51.9
Other hardwoods	XXXXX	--	--	--	--	--	--	--	--	--	--	--
Total hardwoods	XXXXX	564.8	351.9	219.7	119.7	34.6	30.2	17.6	7.4	5.1	2.2	1,353.2
All species	2,026.5	2,712.8	2,431.8	1,894.0	1,642.2	1,175.5	949.0	825.1	597.9	409.2	1,085.7	15,749.7

Table 19.--Net volume of growing stock and sawtimber on commercial timberland by ownership class and species, Utah, 1978

Ownership class	Species Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Pinyon/juniper	Total softwoods	Aspen	Cotton-wood	Other hardwoods	Total hardwoods	All species
	GROWING STOCK *Million cubic feet*													
National Forest	341.3	238.7	755.2	36.5	426.3	178.8	831.0	--	2,807.8	443.9	0.2	--	444.1	3,251.9
Other public	116.2	52.4	11.8	5.5	80.5	21.5	41.4	7.3	336.6	85.5	2.2	([1])	87.7	424.3
Farmer and other private	142.0	26.0	26.9	7.8	139.4	59.6	60.0	3.0	464.7	212.8	9.5	.2	222.5	687.2
Total	599.5	317.1	793.9	49.8	646.2	259.9	932.4	10.3	3,609.1	742.2	11.9	.2	754.3	4,363.4
	SAWTIMBER *Million board feet, International 1/4-inch rule*													
National Forest	1,734.8	1,286.5	2,248.8	150.3	1,395.6	712.3	3,729.2	--	11,257.5	784.2	0.3	--	784.5	12,042.0
Other public	480.8	279.3	37.8	24.2	289.9	66.5	183.1	20.1	1,381.7	166.7	9.8	--	176.5	1,558.2
Farmer and other private	578.9	136.9	83.4	35.8	475.2	177.8	261.5	7.8	1,757.3	350.4	41.8	--	392.2	2,149.5
Total	2,794.5	1,702.7	2,370.0	210.3	2,160.7	956.6	4,173.8	27.9	14,396.5	1,301.3	51.9	--	1,353.2	15,749.7

[1]Less than 0.05 million cubic feet.

Table 20.--Net volume of timber on commercial timberland by class of timber

Table 20.--Net volume of timber on commercial timberland by class of timber and softwoods and hardwoods, Utah, 1978

Class of timber	Softwoods	Hardwoods	All classes
	Million cubic feet		
Sawtimber trees:			
Saw log portion	2,550.1	238.2	2,788.3
Upper-stem portion	272.8	46.1	318.9
Total	2,822.9	284.3	3,107.2
Poletimber trees	786.2	470.0	1,256.2
All growing stock trees	3,609.1	754.3	4,363.4
Sound cull trees	49.7	12.6	62.3
Rotten cull trees	35.3	135.0	170.3
Salvable dead trees	132.6	35.6	168.2
Total, all timber	3,826.7	937.5	4,764.2

Table 21.--Net annual growth of growing stock and sawtimber on commercial timberland by ownership class and species, Utah, 1977

Ownership class	Species												All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Other hardwoods	Total hardwoods	
	GROWING STOCK												
	Thousand cubic feet												
National Forest	3,749	2,917	11,762	325	6,387	2,006	10,581	37,727	4,397	([1])	--	4,397	42,124
Other public	1,851	1,028	-422	79	1,703	407	751	5,397	2,298	60	2	2,360	7,757
Farmer and other private	2,396	439	307	117	2,823	1,225	1,024	8,331	6,822	273	7	7,102	15,433
Total	7,996	4,384	11,647	521	10,913	3,638	12,356	51,455	13,517	333	9	13,859	65,314
	SAWTIMBER												
	Thousand board feet, International 1/4-inch rule												
National Forest	19,540	15,357	55,215	1,126	27,429	7,901	50,640	177,208	10,719	2	--	10,721	187,929
Other public	9,083	6,065	-250	594	8,541	2,463	3,304	29,800	7,328	467	--	7,795	37,595
Farmer and other private	11,945	2,428	2,194	712	10,030	6,060	4,946	38,315	21,493	1,986	--	23,479	61,794
Total	40,568	23,850	57,159	2,432	46,000	16,424	58,890	245,323	39,540	2,455	--	41,995	287,318

[1]Less than 0.5 thousand cubic feet.

Table 22.--Net annual growth of growing stock on commercial timberland by species and diameter class, Utah, 1977

Species	Diameter class (inches at breast height)													
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand cubic feet													
Douglas-fir	1,768	1,433	1,300	1,331	1,024	604	405	137	241	155	-86	-503	187	7,996
Ponderosa pine	198	464	618	528	591	475	327	347	109	231	144	95	257	4,384
Lodgepole pine	7,160	2,424	1,379	838	267	-120	-8	-168	-52	-27	-49	2	1	11,647
Limber pine	234	55	79	62	52	21	52	15	5	-66	4	4	4	521
Subalpine fir	4,607	1,684	1,241	1,246	889	536	387	27	17	122	86	45	26	10,913
White fir	1,674	337	436	151	383	186	227	73	6	64	23	31	47	3,638
Engelmann spruce	2,134	1,602	1,553	1,474	1,387	977	961	679	374	350	381	168	316	12,356
Total softwoods	17,775	7,999	6,606	5,630	4,593	2,679	2,351	1,110	700	829	503	-158	838	51,455
Aspen	5,695	3,215	2,067	1,541	451	375	192	4	-35	-2	9	5	--	13,517
Cottonwood	11	28	33	63	65	52	24	12	28	1	7	5	4	333
Other hardwoods	7	2	--	--	--	--	--	--	--	--	--	--	--	9
Total hardwoods	5,713	3,245	2,100	1,604	516	427	216	16	-7	-1	16	10	4	13,859
All species	23,488	11,244	8,706	7,234	5,109	3,106	2,567	1,126	693	828	519	-148	842	65,314

Table 23.--Net annual growth of sawtimber on commercial timberland by species and diameter class, Utah, 1977

Species	Diameter class (inches at breast height)											
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand board feet, International 1/4-inch											
Douglas-fir	20,451	7,611	6,059	3,460	2,579	1,014	1,271	825	-594	-3,191	1,083	40,568
Ponderosa pine	3,733	3,344	3,801	2,936	2,151	2,246	766	1,533	940	635	1,765	23,850
Lodgepole pine	52,677	4,727	1,657	-425	-40	-817	-250	-141	-246	12	5	57,159
Limber pine	1,564	364	293	119	304	81	29	-399	27	26	24	2,432
Subalpine fir	27,667	6,801	4,674	2,984	1,963	305	125	658	453	230	140	46,000
White fir	9,096	1,135	2,343	1,180	1,230	409	108	364	130	163	266	16,424
Engelmann spruce	19,520	8,190	7,626	5,400	5,291	3,706	2,149	2,049	2,167	974	1,818	58,890
Total softwoods	134,708	32,172	26,453	15,654	13,478	6,944	4,198	4,889	2,877	-1,151	5,101	245,323
Aspen	XXXXX	34,496	2,480	1,880	904	-34	-235	-22	46	25	--	39,540
Cottonwood	XXXXX	1,546	319	234	107	50	117	5	33	23	21	2,455
Other hardwoods	XXXXX	--	--	--	--	--	--	--	--	--	--	--
Total hardwoods	XXXXX	36,042	2,799	2,114	1,011	16	-118	-17	79	48	21	41,995
All species	134,708	68,214	29,252	17,768	14,489	6,960	4,080	4,872	2,956	-1,103	5,122	287,318

Table 24.--Annual mortality of growing stock and sawtimber on commercial timberland by ownership class and softwoods and hardwoods, Utah, 1977

Species group and ownership class	Growing stock	Sawtimber
	- Thousand cubic feet -	*- Thousand board feet - International 1/4-inch rule*
Softwoods:		
National Forest	20,410	83,410
Other public	2,221	7,458
Farmer and other private	3,459	12,142
Total	26,090	103,010
Hardwoods:		
National Forest	7,216	17,977
Other public	828	1,563
Farmer and other private	1,262	1,160
Total	9,306	20,700

Table 25.--Annual mortality of growing stock on commercial timberland by species and diameter class, Utah, 1977

Species	Diameter class (inches at breast height)													All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand cubic feet													
Douglas-fir	111	305	495	328	485	520	416	538	289	220	330	621	276	4,934
Ponderosa pine	2	6	4	4	6	6	24	6	188	26	54	4	26	356
Lodgepole pine	550	765	1,129	759	534	514	218	262	87	46	55	--	--	4,919
Limber pine	6	8	30	40	31	25	29	12	18	111	19	9	15	353
Subalpine fir	1,009	1,555	2,065	1,343	1,021	1,015	671	602	435	134	89	10	22	9,971
White fir	111	334	273	317	206	234	162	178	142	55	40	34	57	2,143
Engelmann spruce	262	258	262	296	318	418	350	331	269	202	157	110	181	3,414
Total softwoods	2,051	3,231	4,258	3,087	2,601	2,732	1,870	1,929	1,428	794	744	788	577	26,090
Aspen	1,505	1,254	1,803	1,653	1,512	780	409	153	150	73	13	--	--	9,305
Cottonwood	--	--	--	--	--	--	--	1	--	--	--	--	--	1
Total hardwoods	1,505	1,254	1,803	1,653	1,512	780	409	154	150	73	13	--	--	9,306
All species	3,556	4,485	6,061	4,740	4,113	3,512	2,279	2,083	1,578	867	757	788	577	35,396

Table 26.--Annual mortality of sawtimber on commercial timberland by species and diameter class, Utah, 1977

Species	Diameter class (inches at breast height)											All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	1,967	1,576	2,352	2,734	2,096	2,782	1,710	1,287	1,963	3,866	1,462	23,795
Ponderosa pine	17	23	29	33	121	29	1,154	154	324	20	157	2,061
Lodgepole pine	4,133	3,493	2,547	2,506	1,080	1,327	440	239	278	--	--	16,043
Limber pine	150	221	168	138	159	65	98	653	105	52	86	1,895
Subalpine fir	9,268	6,542	5,250	5,002	3,433	3,001	2,296	732	486	55	121	36,186
White fir	1,055	1,532	1,038	1,158	840	899	686	304	221	185	312	8,230
Engelmann spruce	1,132	1,507	1,616	2,148	1,791	1,702	1,399	1,081	847	588	989	14,800
Total softwoods	17,722	14,894	13,000	13,719	9,520	9,805	7,783	4,450	4,224	4,766	3,127	103,010
Aspen	XXXXX	6,639	6,811	3,484	1,807	735	789	367	65	--	--	20,697
Cottonwood	XXXXX	--	--	--	--	3	--	--	--	--	--	3
Total hardwoods	XXXXX	6,639	6,811	3,484	1,807	738	789	367	65	--	--	20,700
All species	17,722	21,533	19,811	17,203	11,327	10,543	8,572	4,817	4,289	4,766	3,127	123,710

Table 27.--Annual mortality of growing stock and sawtimber on commercial timberland by cause of death and species, Utah, 1977

Ownership class	Species											All species
	Douglas-fir	Ponderosa pine	Lodgepole pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cotton-wood	Total hardwoods	
	GROWING STOCK											
	Thousand cubic feet											
Insects	1,340	96	377	56	2,690	759	--	5,318	159	--	159	5,477
Disease	675	--	--	--	597	--	299	1,571	3,108	--	3,108	4,679
Fire	875	179	3,605	280	--	--	--	4,939	--	--	--	4,939
Animal	--	--	136	--	147	--	--	283	625	--	625	908
Weather	169	--	282	--	1,863	260	1,227	3,801	582	--	582	4,383
Suppression	--	--	--	--	112	514	--	626	41	--	41	667
Unknown	1,742	81	519	17	4,562	610	1,888	9,419	4,790	1	4,791	14,210
Logging	133	--	--	--	--	--	--	133	--	--	--	133
Total	4,934	356	4,919	353	9,971	2,143	3,414	26,090	9,305	1	9,306	35,396
	SAWTIMBER											
	Thousand board feet, International 1/4-inch rule											
Insects	5,560	548	1,840	225	10,522	3,893	--	22,588	310	--	310	22,898
Disease	3,589	--	--	--	2,182	--	--	5,771	11,486	--	11,486	17,257
Fire	5,023	1,028	11,349	1,621	--	--	--	19,021	--	--	--	19,021
Animal	--	--	549	--	--	--	--	549	309	--	309	858
Weather	362	--	1,478	--	6,154	837	3,658	12,489	5,497	--	5,497	17,986
Suppression	--	--	--	--	--	805	--	805	--	--	--	805
Unknown	8,554	485	827	49	17,328	2,695	11,142	41,080	3,095	3	3,098	44,178
Logging	707	--	--	--	--	--	--	707	--	--	--	707
Total	23,795	2,061	16,043	1,895	36,186	8,230	14,800	103,010	20,697	3	20,700	123,710

Table 28.--Annual timber removals from growing stock on commercial timberland by item and softwoods and hardwoods, Utah, 1977

Item	All species	Softwoods	Hardwoods
	Thousand cubic feet		
Roundwood products:			
Sawlogs	9,762	9,729	33
Veneer logs and bolts	--	--	--
Pulpwood	554	--	554
Other industrial	906	897	9
Fuelwood	343	331	12
All products	11,565	10,957	608
Logging residues	1,188	1,159	29
Other removals	304	285	19
Total removals	13,057	12,401	656

Table 29.--Annual timber removals from sawtimber on commercial timberland by item and softwoods and hardwoods, Utah, 1977

Item	All species	Softwoods	Hardwoods
	Thousand board feet, International 1/4-inch rule		
Roundwood products:			
Sawlogs	62,572	62,360	212
Veneer logs and bolts	--	--	--
Pulpwood	1,514	--	1,514
Other industrial	3,877	3,832	45
Fuelwood	1,992	1,922	70
All products	69,955	68,114	1,841
Logging residues	7,374	7,207	167
Other removals	1,883	1,771	112
Total removals	79,212	77,092	2,120

ıble 30.--Output of roundwood products by source, product, and softwoods and hardwoods, Utah, 1977

Products and additional removals	Species group	Standard units	Output of roundwood products: All sources roundwood products		Growing stock trees	Rough and rotten trees	Salvable dead trees	Other sources	Output from sawtimber
			Number of units	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]
ıw logs	Softwoods	Thousand board feet	63,962	9,978	9,729	--	200	49	62,360
	Hardwoods		244	38	33	--	4	1	212
	Total		64,206	10,016	9,762	--	204	50	62,572
ɜneer logs and bolts	Softwoods		--	--	--	--	--	--	--
	Hardwoods		--	--	--	--	--	--	--
	Total		--	--	--	--	--	--	--
ılpwood	Softwoods	Standard cords	--	--	--	--	--	--	--
	Hardwoods		6,442	554	554	--	--	--	1,514
	Total		6,442	554	554	--	--	--	1,514
ıscellaneous industrial:									
Cooperage	Softwoods	Thousand board feet	--	--	--	--	--	--	--
	Hardwoods		--	--	--	--	--	--	--
Piling	Softwoods	Thousand linear feet	--	--	--	--	--	--	--
	Hardwoods		--	--	--	--	--	--	--
Poles	Softwoods	Thousand pieces	36	583	583	--	--	--	2,759
	Hardwoods		1	9	9	--	--	--	45
Mine timbers (round)	Softwoods	Thousand cubic feet	245	245	245	--	--	--	677
	Hardwoods		--	--	--	--	--	--	--
Posts (round and split)	Softwoods	Thousand pieces	93	91	12	79	--	--	67
	Hardwoods		--	--	--	--	--	--	--
Other	Softwoods	Thousand cubic feet	76	76	57	4	15	--	329
	Hardwoods		2	2	--	1	--	1	--
Summary, all miscellaneous	Softwoods		n.a.	995	897	83	15	--	3,832
	Hardwoods		n.a.	11	9	1	--	1	45
	Total		n.a.	1,006	906	84	15	1	3,877
ıelwood	Softwoods	Standard cords	6,256	538	331	207	--	--	1,922
	Hardwoods		140	12	12	--	--	--	70
	Total		6,396	550	343	207	--	--	1,992
Total, all products	Softwoods		n.a.	11,511	10,957	290	215	49	68,114
	Hardwoods		n.a.	615	608	1	4	2	1,841
	Total		n.a.	12,126	11,565	291	219	51	69,955
ıdditional removals:									
Logging residues	Softwoods		n.a.	n.a.	1,159	n.a.	n.a.	n.a.	7,207
	Hardwoods		n.a.	n.a.	29	n.a.	n.a.	n.a.	167
	Total		n.a.	n.a.	1,188	n.a.	n.a.	n.a.	7,374
ıher removals	Softwoods		n.a.	n.a.	285	n.a.	n.a.	n.a.	1,771
	Hardwoods		n.a.	n.a.	19	n.a.	n.a.	n.a.	112
	Total		n.a.	n.a.	,304	n.a.	n.a.	n.a.	1,883
Total removals	Softwoods		n.a.	n.a.	12,401	n.a.	n.a.	n.a.	77,092
	Hardwoods		n.a.	n.a.	656	n.a.	n.a.	n.a.	2,120
	Total		n.a.	n.a.	13,057	n.a.	n.a.	n.a.	79,212

[1]International 1/4-inch rule.

Table 31.--Annual removals of growing stock and sawtimber on commercial timberland by species, Utah, 1977

Species	Growing stock	Sawtimber
	- Thousand cubic feet -	*- Thousand board feet, - International 1/4-inch rule*
Douglas-fir	1,479	9,195
Ponderosa pine	2,897	18,012
Engelmann spruce	3,913	24,330
White fir	12	76
Subalpine fir	121	749
Lodgepole pine	3,978	24,727
Other softwoods	1	3
Total softwoods	12,401	77,092
Aspen	573	1,853
Other hardwoods	83	267
Total hardwoods	656	2,120
All species	13,057	79,212

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Reports findings of the comprehensive inventory of Utah's 16 million acres of forest land, which include 3.2 million acres of commercial timberland. Presents area, volume, growth, mortality, and timber use; also describes timber types, volumes per acre, stocking, ownership, and major nontimber uses of the forest land.

KEYWORDS: commercial timberland, forest inventory, timber volume, timber growth, timber mortality, timber removals

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

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Forest Area and Timber Resource Statistics for State and Private Lands in McKinley, San Juan, and Valencia Counties, New Mexico, 1979

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RESEARCH SUMMARY

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Forest Survey standards.

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FOREST SURVEY TABLES (con.)

FIGURE

Forest Area and Timber Resource Statistics for State and Private Lands in McKinley, San Juan, and Valencia Counties, New Mexico, 1979

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INTRODUCTION

This resource bulletin presents the principal findings of the second forest inventory of State and private lands in McKinley, San Juan, and Valencia Counties, New Mexico (fig. 1). Valencia County, as shown in this report, is now divided into Valencia and Cibola Counties. Fieldwork conducted by personnel from the New Mexico Division of State Forestry began in September 1979 and was completed in November 1979. The 1962 statewide inventory did not sample these counties intensively and did not report findings at the working circle level.

The primary objective of Forest Survey, a continuing nationwide undertaking conducted by the Forest Service, U.S. Department of Agriculture, is to provide an assessment of the renewable resource situation for forest and rangelands of the Nation. Fundamental to the accomplishment of this objective are the periodic State-by-State resource inventories. Originally, Forest Survey was authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming, and western South Dakota are administered by the Intermountain Forest and Range Experiment Station with headquarters in Ogden, Utah. These inventories provide information on the extent and condition of State and privately owned forest lands, volume of timber, and rates of timber growth and mortality. These data, when combined with similar information on Federal lands, provide a basis for the formulation of forest policies and programs and for the orderly development and use of the resources.

The three-county area covered by this report is one of 11 working circles in New Mexico. Similar reports have been issued for Colfax, Santa Fe, San Miguel, Taos-Rio Arriba and Bernalillo, Sandoval and Torrance Working Circles. A report covering all counties in New Mexico will be issued when the Statewide inventory data have been compiled and summarized. The total land area in McKinley, San Juan, and Valencia Counties is 10,611,007 acres (4 294 140 hectares). Lands managed by the Forest Service; and the U.S. Department of Interior's Bureau of Land Management, National Park Service, and Indian trust lands together account for 7,288,880 acres (2 949 717 hectares), or 69 percent of this land. The remaining 3,322,127 acres (1 344 423 hectares) are in State, private, and other ownerships. DATA PRESENTED HERE ARE FOR STATE, PRIVATE, MISCELLANEOUS FEDERAL, AND A SMALL ACREAGE OF COUNTY AND MUNICIPAL LANDS ONLY.

Highlights show the area of commercial timberland in comparison to total forest land area and the distribution of this area by forest type, stand-size class, and site class. Discussions of the data reliability and terminology are included. These two items should be reviewed carefully when using this information.

HIGHLIGHTS

Area

- The forest land area is 768 thousand acres (311 thousand hectares), or 23 percent of the total State and private land area in McKinley, San Juan, and Valencia Counties.
- Of the forest land, 65.9 thousand acres (26.6 thousand hectares), almost 9 percent, is classified as commercial timberland.
- Private ownership accounts for 60.6 thousand acres (24.5 thousand hectares), or 92 percent of the commercial timberland.
- Ponderosa pine is the predominant type and occupies 91 percent of the commercial timberland. Douglas-fir, cottonwood, and aspen cover the remaining area.
- Over half of the commercial timberland is in the 20 to 49 cubic foot productivity class; 92 percent of this is privately owned.

Inventory

- Growing stock volume amounts to 43.4 million cubic feet (1.2 million cubic meters) and sawtimber volume totals 177.9 million board feet.
- Rough, rotten, and salvable dead trees comprise 6.5 million cubic feet (185 thousand cubic meters), 13 percent of the total sound wood volume.
- The largest share of the total growing stock volume is made up of ponderosa pine (92 percent). Aspen, Douglas-fir, cottonwood, Engelmann spruce, and pinyon/juniper account for the remaining volume. Although pinyon/juniper usually occurs on unproductive forest land, when it occurs in mixtures with commercial species on productive sites, it is reported in the commercial timberland statistics.
- Private owners control 92 percent of both the total growing stock and the sawtimber volume.

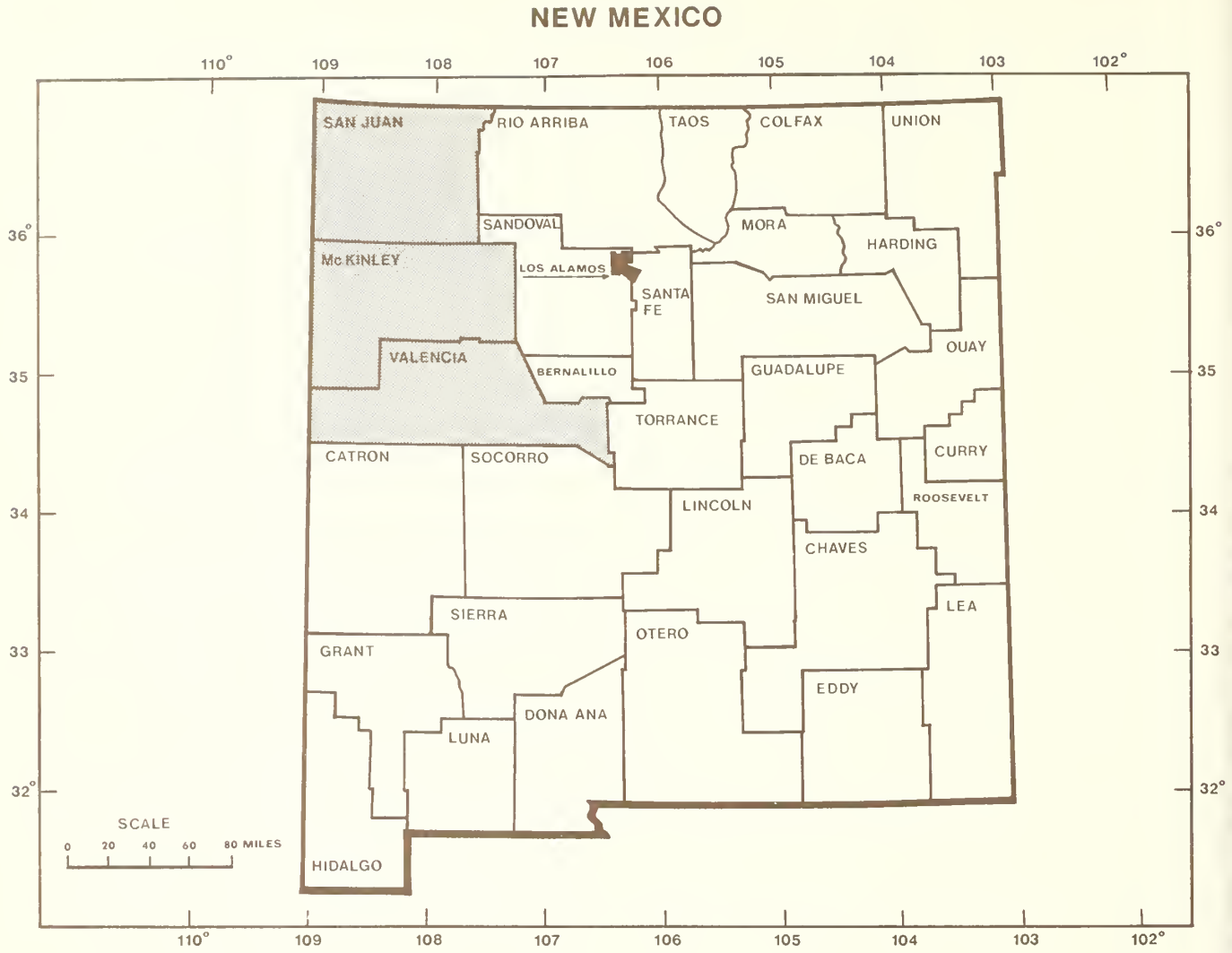

Figure 1.--McKinley, San Juan, and Valencia Counties, New Mexico.

Growth and Mortality

- Net annual growth of growing stock totals 1,169 thousand cubic feet (33 thousand cubic meters). Growth and mortality were not measured for pinyon and juniper trees.
- About 93 percent of the total net growth is on private lands.
- The annual mortality of 43 thousand cubic feet (1 thousand cubic meters) offsets 4 percent of the gross annual growth.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and working circle levels. Procedures were:

1. Initial area estimates were based on the classification of 11,340 sample points systematically placed on the latest aerial photographs available. The sample points were summarized and grouped into strata for subsequent field sampling. The photo-points, adjusted to meet known land areas, were used to compute area expansion factors for the field stratum means.

2. Land classification and estimates of timber characteristics and volume were based on observations and measurement recorded at 295 ground sample locations of which 177 were forested. Sample trees were selected using a 10-point cluster which includes fixed plots (1/300 acre) for trees less than 5.0 inches diameter at breast height (d.b.h.) and variable plots (40 BAF [basal area factor]) for trees 5.0 inches d.b.h. or larger.

3. Equations prepared from detailed measurements collected on standing trees throughout the Southwest were used to compute the volume and defect of individual tally trees.

4. All photo and field data were sent to Ogden, Utah, for editing and were punched onto cards and stored for machine computing, sorting, and tabulation. Final estimates were based on statistical summaries of the data.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on very small sample sizes, and so result in high sampling errors. The standard error percents shown in tables 1 and 2 were calculated at the 67 percent confidence level.

Table 1.--Area of forest land in McKinley, San Juan, and Valencia Counties with percent standard error, 1979

Item	Softwoods		Hardwoods		All types	
	Acres	Percent standard error	Acres	Percent standard error	Acres	Percent standard error
Commercial timberland	62,463	±11.5	3,389	±60.8	65,852	±10.8
Productive reserved[1]	189		434		623	
Other forest land:						
Unproductive reserved[1]	11,000		4,768		15,768	
Unproductive nonreserved	667,940	±1.4	18,095	±14.6	686,035	±1.4

[1]Reserved land areas are estimated from aerial photos without field verification; therefore, standard errors are not calculated.

Table 2.--Net volume, net annual growth, and annual mortality of growing stock and sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties with percent standard error, 1979

Item	Softwoods		Hardwoods		All types	
	Volume	Percent standard error	Volume	Percent standard error	Volume	Percent standard error
Net volume:						
Growing stock (M cubic feet)	41,325	±14.0	2,057	±54.4	43,382	±13.7
Sawtimber (M board feet[1])	171,465	±14.2	6,456	±80.5	177,921	±14.1
Net annual growth:						
Growing stock (cubic feet)	1,083,126	±14.1	85,980	±56.7	1,169,106	±14.0
Sawtimber (board feet[1])	4,809,749	±16.2	271,460	±76.7	5,081,209	±15.9
Annual mortality:						
Growing stock (cubic feet)	43,044	±53.4	--	--	43,044	±53.4
Sawtimber (board feet[1])	168,263	±69.2	--	--	168,263	±69.2

[1]International 1/4-inch rule.

TERMINOLOGY AND DATA TABLES

This section contains definitions relevant to the timber resource data presented in this resource bulletin. Forest area and timber resource data for McKinley, San Juan, and Valencia Counties in New Mexico are displayed in tables 3 through 23.

Land

Land.—As defined by the Bureau of the Census, the area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area. Includes noncensus water. See definition below.

Water

Census water.—As defined by the Bureau of the Census, streams, sloughs, estuaries, and canals more than one-eighth of a statute mile in width; and lakes, reservoirs, and ponds more than 40 acres in area.

Noncensus water.—The same as defined by the Bureau of the Census, except minimum width of streams, sloughs, estuaries, and canals is 120 feet and minimum size of lakes, reservoirs, and ponds is 1 acre.

Land Use Classes

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

Commercial timberland.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Areas qualifying have the capability of producing in excess of 20 cubic feet per acre per year of industrial wood under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.)

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial timberland, but withdrawn

from timber utilization through statute, administrative designation, or exclusive use for Christmas tree production.

Other forest land.—Forest land incapable of producing 20 cubic feet per acre of industrial wood under management, because of adverse site conditions; includes both reserved and nonreserved forest land.

Nonforest land.—Land that has never supported forests and lands formerly forested where use for timber management is precluded by development for other uses.

Public Ownership Classes

National Forest lands.—Federal lands legally designated as National Forest or purchase units and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

Bureau of Land Management lands.—Federal lands administered by the Bureau of Land Management.

Indian lands.—Tribal lands held in fee by the Federal Government, but administered for Indian tribal groups and Indian trust allotments.

State lands.—Lands owned by States, or lands leased to these governmental units for 50 years or more.

Private and Other

County and municipal lands.—Lands owned by counties and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

Forest industry lands.—Lands owned by companies or by individuals operating wood-processing plants.

Farmer-owned lands.—Lands owned by farm operators. (These exclude lands leased by farm operators from such nonfarm owners as railroad companies and States.)

Miscellaneous Federal lands.—Federal lands other than the following: (1) National Forest lands; (2) lands administered by the Bureau of Land Management; and (3) Indian lands.

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

Forest Type and Tree Species

Forest types.—A classification of forest land based upon the species forming a plurality of live-tree stocking.

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

Commercial species.—Tree species presently or prospectively suitable for industrial wood products.

Softwoods.—Coniferous trees, usually evergreen, having needles or scalelike leaves.

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

Area Condition Classes

Stocking.—Stocking is an expression of the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Percent of stocking" is synonymous with "percentage of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Basal area is used as a basis for measuring stocking.

"Stocking percentages" express current area occupancy in relation to specified standards for full stocking based on number, size, and spacing of trees considered necessary to fully utilize the forest land.

Full utilization of the site is assumed to occur over a range of basal area. As an interim guide, 60 percent of the normal yield table values has been used to establish the lower limit of this range which represents full-site occupancy. This is called 100-percent stocking. The upper limit of full stocking has been set at 132 percent. Sites with less than 100-percent stocking represent understocking with less than full-site occupancy. Overstocking is characterized by sites with 133 percent or more stocking.

Class 10.—Areas fully stocked (100 to 132 percent) with desirable trees and not overstocked (133 percent or more).

Class 20.—Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.—Areas medium to fully stocked (60 to 99 percent) with desirable trees and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

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

Class 50.—Areas poorly stocked (16.7 to 59 percent) with desirable trees, but fully stocked with growing stock trees.

Class 60.—Areas poorly stocked with desirable trees, but with medium to full stocking of growing stock trees.

Class 70.—Areas nonstocked (less than 16.7 percent) to poorly stocked with desirable trees, and poorly stocked with growing stock trees.

Class 80.—Low-risk old-growth stands.

Class 90.—High-risk old-growth stands.

Nonstocked.—Areas less than 16.7 percent stocked with growing stock trees.

Class of Timber

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

Desirable trees.—Growing stock trees (1) having no serious defect in quality limiting present or prospective use for timber products; (2) of relatively high vigor; and (3) containing no pathogens that may result in death or serious deterioration before rotation age.

Acceptable trees.—Growing stock trees meeting specified standards of size and quality, but not qualifying as desirable trees.

Rough trees.—(1) Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of roughness or poor form; and (2) all live trees of noncommercial species.

Rotten trees.—Live trees that do not contain at least one 12-foot saw log or two noncontiguous saw logs, each 8 feet or longer, now or prospectively, and/or do not meet Rocky Mountain regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume (cubic-foot basis) in a tree is rotten.

Salvable dead trees.—Standing or down dead trees that are considered merchantable by Rocky Mountain regional standards.

Saw-log portion.—That part of the bole of sawtimber trees between the stump and the saw-log top. A 1-foot stump is used.

Upper-stem portion.—That part of the bole of sawtimber trees above the saw-log top to a minimum top diameter of 4.0 inches outside bark or to the point where the central stem breaks into limbs, whichever occurs first.

Tree-Size Classes

Seedlings.—Live trees less than 1.0 inch d.b.h.

Saplings.—Trees 1.0 to 4.9 inches d.b.h.

Poletimber trees.—Trees at least 5.0 inches d.b.h., but smaller than sawtimber size.

Sawtimber trees.—Trees exceeding poletimber size. In the Intermountain States, the minimum d.b.h. for softwood sawtimber is 9.0 inches and for hardwoods 11.0 inches.

Volume

Cull volume.—Portions of a tree's volume that are not usable for industrial wood products because of rot, form, or other defect.

Net volume.—Gross volume less deductions for cull.

Growing stock volume.—Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot and missing bole sections.

Sawtimber volume.—Net volume in board feet of sawtimber trees of commercial species. Net volume equals gross volume less deduction for rot, sweep, crook, and other defects that affect use for lumber.

Growth and Mortality

Net annual growth.—The increase in net growing stock volume of a specified size class for a specific year. (Components of net annual growth include the increment in net volume of trees at the beginning of the specific year and surviving to its end, plus the net volume of trees reaching the size class during the year, minus the net volume of trees that died during the year, minus the net volume of trees that became rough or rotten trees during the year.)

Mortality.—Number or sound-wood volume of growing stock trees dying from natural causes during a specified period, usually annually.

Site

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood.

Site classifications are based upon the mean net annual growth of growing stock (not including thinnings or mortality loss) attainable at culmination of mean net annual growth over age. Height-age relationships are usually used as indicators of the specified volume-site class.

Stand-Size Classes

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

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

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

Nonstocked land.—Commercial timberland less than 16.7 percent stocked with growing stock trees.

Table 3.--Total land and water area in McKinley, San Juan, and Valencia Counties by ownership class, 1979

Ownership class	Area	
	- - Acres - -	- - Hectares - -
Land:		
National Forest	509,584	206 222
Bureau of Land Management	1,503,443	608 425
National Park	22,816	9 233
Indian trust lands	5,253,037	2 125 837
State	546,412	221 126
Private[1]	2,775,715	1 123 297
Total	10,611,007	4 294 140
Census water	15,616	6 320
Total land and water[2]	10,626,623	4 300 460

[1]In this and all following tables, the private ownership category includes farmer-owned and other private ownerships, a small acreage of county and municipal ownerships, and miscellaneous Federal ownership.

[2]U.S. Bureau of the Census, land and water area of the United States, 1980.

Table 4.--Total land area in McKinley, San Juan, and Valencia Counties by major land class and ownership class, 1979

Land class	Ownership class				Total	
	State		Private			
	Acres	Hectares	Acres	Hectares	Acres	Hectares
Commercial timberland	5,216	2 111	60,636	24 538	65,852	26 649
Productive reserved	434	171	189	276	623	252
Other forest land:						
Unproductive reserved	9,827	3 977	5,941	2 404	15,768	6 381
Unproductive nonreserved	141,870	57 413	544,165	220 217	686,035	277 630
Total forest land	157,347	63 677	610,931	247 235	768,278	310 912
Nonforest land	389,065	157 449	2,184,177	883 910	2,573,242	1 041 359
Total land area	546,412	221 126	2,795,108	1 131 145	3,341,520	1 352 271

Table 5.--Area of commercial timberland in McKinley, San Juan, and Valencia Counties by forest type, stand-size class, and productivity class, 1979

Forest type and stand-size class	Productivity class				Total acres
	120+	85-119	50-84	20-49	
	- - - - - - - - - - - - Acres - - - - - - - - - - - -				
Douglas-fir:					
Sawtimber	--	--	--	1,029	1,029
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	1,372	1,372
Nonstocked	--	--	--	--	--
Total	--	--	--	2,401	2,401
Ponderosa pine:					
Sawtimber	--	--	21,168	26,542	47,710
Poletimber	--	--	4,346	2,601	6,947
Sapling and seedling	--	--	1,029	2,802	3,831
Nonstocked	--	--	--	1,574	1,574
Total	--	--	26,543	33,519	60,062
Aspen:					
Sawtimber	--	--	1,029	--	1,029
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	1,029	--	1,029
Cottonwood:					
Sawtimber	--	1,631	--	--	1,631
Poletimber	--	--	--	729	729
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	1,631	--	729	2,360
All types:					
Sawtimber	--	1,631	22,197	27,571	51,399
Poletimber	--	--	4,346	3,330	7,676
Sapling and seedling	--	--	1,029	4,174	5,203
Nonstocked	--	--	--	1,574	1,574
Total	--	1,631	27,572	36,649	65,852

Table 6.--Area of State-owned commercial timberland in McKinley, San Juan, and Valencia Counties by forest type, stand-size class, and productivity class, 1979

Forest type and stand-size class	Productivity class				Total acres
	120+	85-119	50-84	20-49	
	- - - - - - - - - - Acres - - - - - - - - - -				
Douglas-fir:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	224	224
Nonstocked	--	--	--	--	--
Total	--	--	--	224	224
Ponderosa pine:					
Sawtimber	--	--	1,733	2,198	3,931
Poletimber	--	--	440	174	614
Sapling and seedling	--	--	--	165	165
Nonstocked	--	--	--	135	135
Total	--	--	2,173	2,672	4,845
Aspen:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	--	--
Cottonwood:					
Sawtimber	--	110	--	--	110
Poletimber	--	--	--	37	37
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	110	--	37	147
All types:					
Sawtimber	--	110	1,733	2,198	4,041
Poletimber	--	--	440	211	651
Sapling and seedling	--	--	--	389	389
Nonstocked	--	--	--	135	135
Total	--	110	2,173	2,933	5,216

Table 7.--Area of privately owned commercial timberland in McKinley, San Juan and Valencia Counties by forest type, stand-size class, and productivity class, 1979

Forest type and stand-size class	Productivity class				Total acres
	120+	85-119	50-84	20-49	
	- - - - - - - - - - - - Acres - - - - - - - - - - - -				
Douglas-fir:					
Sawtimber	--	--	--	1,029	1,029
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	1,148	1,148
Nonstocked	--	--	--	--	--
Total	--	--	--	2,177	2,177
Ponderosa pine:					
Sawtimber	--	--	19,435	24,344	43,779
Poletimber	--	--	3,906	2,427	6,333
Sapling and seedling	--	--	1,029	2,637	3,666
Nonstocked	--	--	--	1,439	1,439
Total	--	--	24,370	30,847	55,217
Aspen:					
Sawtimber	--	--	1,029	--	1,029
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	1,029	--	1,029
Cottonwood:					
Sawtimber	--	1,521	--	--	1,521
Poletimber	--	--	--	692	692
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	1,521	--	692	2,213
All types:					
Sawtimber	--	1,521	20,464	25,373	47,358
Poletimber	--	--	3,906	3,119	7,025
Sapling and seedling	--	--	1,029	3,785	4,814
Nonstocked	--	--	--	1,439	1,439
Total	--	1,521	25,399	33,716	60,636

Table 8.--Area of commercial timberland in McKinley, San Juan, and Valencia Counties by stand volume and ownership class, 1979

Stand volume per acre[1]	Ownership class		
	State	Private	State and private
	- - - - - - - - - - - - Acres - - - - - - - - - - - -		
Less than 1,500 board feet	1,422	18,263	19,685
1,500 to 4,999 board feet	3,068	31,313	34,381
5,000 to 9,999 board feet	726	11,060	11,786
10,000 board feet or more	--	--	--
All classes	5,216	60,636	65,852

[1]International 1/4-inch rule.

Table 9.--Area of commercial timberland in McKinley, San Juan, and Valencia Counties by forest type and area condition class, 1979

Forest type	Area condition class									Nonstocked	All classes	
	10	20	30	40	50	60	70	80	90			
	- Acres -										- Hectares -	
Douglas-fir	--	--	--	--	--	--	2,401	--	--	--	2,401	972
Ponderosa pine	--	--	--	--	2,945	18,022	28,942	--	8,579	1,574	60,062	24 306
Aspen	--	--	--	--	--	1,029	--	--	--	--	1,029	416
Cottonwood	--	--	--	--	--	--	2,360	--	--	--	2,360	955
All types	--	--	--	--	2,945	19,051	33,703	--	8,579	1,574	65,852	26 649

Table 10.--Area of productive reserved and other forest land in McKinley, San Juan, and Valencia Counties by land class, ownership class, and forest type, 1979

Land class	Forest type								All types	
	Ponderosa pine	Pinyon-juniper	Mixed softwoods	Total softwoods	Oak	Cottonwood	Other hardwoods	Total hardwoods		
	- - - - - - - - - - - -	- - - - - - - -	- - - - - - - -	- - - - - Acres	- - - - - - - -	- - - - - - - -	- - - - - - - -	- - - - - - - -	- - - - - - - -	-Hectares-
Productive reserved area:										
State	--	--	--	--	--	--	434	434	434	176
Private	189	--	--	189	--	--	--	--	189	76
Total	189	--	--	189	--	--	434	434	623	252
Other forest land area:										
Unproductive reserved:										
State	--	5,059	--	5,059	1,734	--	3,034	4,768	9,827	3 977
Private	--	5,941	--	5,941	--	--	--	--	5,941	2 404
Total	--	11,000	--	11,000	1,734	--	3,034	4,768	15,768	6 381
Unproductive nonreserved:										
State	--	141,540	38	141,578	--	37	255	292	141,870	57 413
Private	--	525,670	692	526,362	--	692	17,111	17,803	544,165	220 217
Total	--	667,210	730	667,940	--	729	17,366	18,095	686,035	277 630
Total all areas:										
State	--	146,599	38	146,637	1,734	37	3,723	5,494	152,131	61 566
Private	189	531,611	692	532,492	--	692	17,111	17,803	550,295	222 697
Total acres	189	678,210	730	679,129	1,734	729	20,834	23,297	702,426	--
Total hectares	76	274 463	296	274 835	702	295	8 431	9 428	--	284 263

Table 11.--Number of growing stock trees on commercial timberland in McKinley, San Juan, and Valencia Counties by species and diameter class, 1979

Species	Diameter class (inches at breast height)															
	1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	All classes
	Thousand trees															
Douglas-fir	409	93	35	46	37	7	7	--	2	--	5	1	1	--	--	643
Ponderosa pine	1,005	1,514	1,085	1,223	847	548	298	204	145	70	46	13	11	6	11	7,026
Engelmann spruce	93	93	22	11	15	--	--	--	--	--	--	--	--	--	--	234
Pinyon/juniper	98	91	--	--	--	5	--	--	4	--	--	--	--	--	--	198
Total softwoods	1,605	1,791	1,142	1,280	899	560	305	204	151	70	51	14	12	6	11	8,101
Aspen	31	62	63	43	--	10	8	6	8	2	2	--	--	--	--	235
Cottonwood	--	71	55	29	17	4	--	--	--	--	2	2	--	--	--	180
Total hardwoods	31	133	118	72	17	14	8	6	8	2	4	2	--	--	--	415
All species	1,636	1,924	1,260	1,352	916	574	313	210	159	72	55	16	12	6	11	8,516

Table 12.--Number of cull and salvable dead trees on commercial timberland in McKinley, San Juan, and Valencia Counties by ownership class, and softwoods and hardwoods, 1979

Ownership class and species group	Cull trees			Salvable dead trees
	Sound	Rotten	Total	
	- - - - - - - - - - Thousand trees - - - - - - - - - -			
State:				
Softwoods	91	1	92	30
Hardwoods	2	2	4	--
Total	93	3	96	30
Private:				
Softwoods	929	5	934	274
Hardwoods	33	30	63	8
Total	962	35	997	282
State and private:				
Softwoods	1,020	6	1,026	304
Hardwoods	35	32	67	8
Total	1,055	38	1,093	312

Table 13.--Net volume of growing stock on commercial timberland in McKinley, San Juan, and Valencia Counties by ownership class, forest type, and stand-size class, 1979

Ownership class	Forest type	Stand-size class				All classes	
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked		
		Thousand cubic feet					Thousand cubic meters
State:							
	Douglas-fir	--	--	61	--	61	2
	Ponderosa pine	2,604	608	11	8	3,231	91
	Aspen	--	--	--	--	--	--
	Cottonwood	153	15	--	--	168	5
	All types	2,757	623	72	8	3,460	98
Private:							
	Douglas-fir	699	--	312	--	1,011	28
	Ponderosa pine	30,056	4,574	342	82	35,054	993
	Aspen	1,462	--	--	--	1,462	41
	Cottonwood	2,107	288	--	--	2,395	68
	All types	34,324	4,862	654	82	39,922	1 130
State and private:							
	Douglas-fir	699	--	373	--	1,072	30
	Ponderosa pine	32,660	5,182	353	90	38,285	1 084
	Aspen	1,462	--	--	--	1,462	41
	Cottonwood	2,260	303	--	--	2,563	73
	All types	37,081	5,485	726	90	43,382	1 228

Table 14.--Net volume of sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by ownership class, forest type, and stand-size class, 1979

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/seedling	Nonstocked	
		- - - - - - - Thousand board feet, International 1/4-inch rule - - - - - - -				
State:						
	Douglas-fir	--	--	228	--	228
	Ponderosa pine	11,199	1,654	61	48	12,962
	Aspen	--	--	--	--	--
	Cottonwood	673	10	--	--	683
	All types	11,872	1,664	289	48	13,873
Private:						
	Douglas-fir	2,617	--	1,172	--	3,789
	Ponderosa pine	129,520	12,239	1,969	515	144,243
	Aspen	6,554	--	--	--	6,554
	Cottonwood	9,272	190	--	--	9,462
	All types	147,963	12,429	3,141	515	164,048
State and private:						
	Douglas-fir	2,617	--	1,400	--	4,017
	Ponderosa pine	140,719	13,893	2,030	563	157,205
	Aspen	6,554	--	--	--	6,554
	Cottonwood	9,945	200	--	--	10,145
	All types	159,835	14,093	3,430	563	177,921

Table 15.--Net volume of growing stock on commercial timberland in McKinley, San Juan, and Valencia Counties by species and diameter class, 1979

Species	Diameter class (inches at breast height)													All classes
	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand cubic feet													
Douglas-fir	66	148	222	94	110	--	62	--	269	105	45	--	--	1,121
Ponderosa pine	1,388	4,314	5,453	5,811	4,993	4,851	4,466	2,776	2,211	903	817	550	1,424	39,957
Engelmann spruce	30	50	121	--	--	--	--	--	--	--	--	--	--	201
Pinyon/juniper	--	--	--	9	--	--	37	--	--	--	--	--	--	46
Total softwoods	1,484	4,512	5,796	5,914	5,103	4,851	4,565	2,776	2,480	1,008	862	550	1,424	41,325
Aspen	147	158	--	217	229	212	318	92	93	--	--	--	--	1,466
Cottonwood	77	109	128	43	--	--	--	--	108	126	--	--	--	591
Total hardwoods	224	267	128	260	229	212	318	92	201	126	--	--	--	2,057
All species	1,708	4,779	5,924	6,174	5,332	5,063	4,883	2,868	2,681	1,134	862	550	1,424	43,382

Table 16.--Net volume of sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by species and diameter class, 1979

Species	Diameter class (inches at breast height)											All classes
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+	
	Thousand board feet, International 1/4-inch rule											
Douglas-fir	658	420	546	--	469	--	1,535	603	258	--	--	4,489
Ponderosa pine	18,639	26,747	24,991	25,761	23,781	15,667	10,824	5,194	4,403	2,492	7,994	166,493
Engelmann spruce	353	--	--	--	--	--	--	--	--	--	--	353
Pinyon/juniper	--	26	--	--	104	--	--	--	--	--	--	130
Total softwoods	19,650	27,193	25,537	25,761	24,354	15,667	12,359	5,797	4,661	2,492	7,994	171,465
Aspen	XXXXX	1,170	1,092	1,195	1,300	503	289	--	--	--	--	5,549
Cottonwood	XXXXX	200	--	--	--	--	333	374	--	--	--	907
Total hardwoods	XXXXX	1,370	1,092	1,195	1,300	503	622	374	--	--	--	6,456
All species	19,650	28,563	26,629	26,956	25,654	16,170	12,981	6,171	4,661	2,492	7,994	177,921

Table 17.--Net volume of growing stock and sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by ownership class and species, 1979

Ownership class	Species								
	Douglas-fir	Ponderosa pine	Engelmann spruce	Pinyon/ juniper	Total softwoods	Aspen	Cotton-wood	Total hardwoods	All species
	GROWING STOCK								
	Thousand cubic feet								
State	51	3,351	--	3	3,405	20	35	55	3,460
Private	1,070	36,606	201	43	37,920	1,446	556	2,002	39,922
Total	1,121	39,957	201	46	41,325	1,466	591	2,057	43,382
	GROWING STOCK								
	Thousand cubic meters								
State	1	95	--	(1)	96	1	1	2	98
Private	30	1 036	6	1	1 073	41	16	57	1 130
Total	31	1 131	6	1	1 169	42	17	59	1 228
	SAWTIMBER								
	Thousand board feet, International 1/4-inch rule								
State	202	13,536	--	9	13,747	68	58	126	13,873
Private	4,287	152,957	353	121	157,718	5,481	849	6,330	164,048
Total	4,489	166,493	353	130	171,465	5,549	907	6,456	177,921

[1]Less than 500 cubic meters.

Table 18.--Net volume of timber on commercial timberland in McKinley, San Juan, and Valencia Counties by class of timber, and softwoods and hardwoods, 1979

Class of timber	Softwoods	Hardwoods	All classes
	- - - - - - Thousand cubic feet - - - - - -		
Sawtimber trees:			
Saw-log portion	33,149	1,350	34,499
Upper-stem portion	2,180	88	2,268
Total	35,329	1,438	36,767
Poletimber trees	5,996	619	6,615
All growing stock trees	41,325	2,057	43,382
Sound cull trees	3,836	224	4,060
Rotten cull trees	68	426	494
Salvable dead trees	1,855	125	1,980
All timber	47,084	2,832	49,916

Table 19.--Net volume of growing stock on commercial timberland in McKinley, San Juan, and Valencia Counties by forest type and species, 1979

Forest type	Species								All species	
	Douglas-fir	Ponderosa pine	Engelmann spruce	Pinyon/ juniper	Total softwoods	Aspen	Cotton-wood	Total hardwoods		
	- - - - - - - - - - - - - - - - - - Thousand cubic feet - - - - - - - - - - - - - - - - - -									Thousand cubic meters
Douglas-fir	411	565	--	--	976	96	--	96	1,072	30
Ponderosa pine	544	37,420	--	46	38,010	275	--	275	38,285	1 084
Aspen	166	--	201	--	367	1,095	--	1,095	1,462	41
Cottonwood	--	1,972	--	--	1,972	--	591	591	2,563	73
All types	1,121	39,957	201	46	41,325	1,466	591	2,057	43,382	--
	- Thousand cubic meters -									
All types	31	1 131	6	1	1 169	42	17	59	--	1 228

Table 20.--Net volume of sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by forest type and species, 1979

Forest type	Species								All species
	Douglas-fir	Ponderosa pine	Engelmann spruce	Pinyon/ juniper	Total softwoods	Aspen	Cotton-wood	Total hardwoods	
	Thousand board feet, International 1/4-inch rule								
Douglas-fir	1,225	2,792	--	--	4,017	--	--	--	4,017
Ponderosa pine	2,192	154,463	--	130	156,785	420	--	420	157,205
Aspen	1,072	--	353	--	1,425	5,129	--	5,129	6,554
Cottonwood	--	9,238	--	--	9,238	--	907	907	10,145
All types	4,489	166,493	353	130	171,465	5,549	907	6,456	177,921

Table 21.--Net annual growth of growing stock and sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by ownership class and species, 1979

Ownership class	Species							All species
	Douglas-fir	Ponderosa pine	Engelmann spruce	Total softwoods	Aspen	Cotton-wood	Total hardwoods	
	GROWING STOCK - Cubic feet							
State	1,148	83,010	--	84,158	237	3,171	3,408	87,566
Private	28,201	958,958	11,809	998,968	28,203	54,369	82,572	1,081,540
Total	29,349	1,041,968	11,809	1,083,126	28,440	57,540	85,980	1,169,106
	GROWING STOCK - Cubic meters							
State	32	2 351	--	2 383	7	90	97	2 480
Private	799	27 155	334	28 288	798	1 540	2 338	30 626
Total	831	29 506	334	30 671	805	1 630	2 435	33 106
	SAWTIMBER - Board feet, International 1/4-inch rule							
State	3,004	375,533	--	378,537	583	10,987	11,570	390,107
Private	80,112	4,335,672	15,428	4,431,212	60,596	199,294	259,890	4,691,102
Total	83,116	4,711,205	15,428	4,809,749	61,179	210,281	271,460	5,081,209

Table 22.--Annual mortality of growing stock and sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by ownership class, and softwoods and hardwoods, 1979

Species group and ownership class	Growing stock		Sawtimber
	-Cubic feet-	-Cubic meters-	-Board feet[1]-
Softwoods:			
State	6,421	182	27,396
Private	36,623	1 037	140,867
Total	43,044	1 219	168,263
Hardwoods:			
State	--	--	--
Private	--	--	--
Total	--	--	--
All owners	43,044	1 219	168,263

[1]International 1/4-inch rule.

Table 23.--Annual mortality of growing stock and sawtimber on commercial timberland in McKinley, San Juan, and Valencia Counties by cause of death and species, 1979

Cause of death	Species							All species
	Douglas-fir	Ponderosa pine	Engelmann spruce	Total softwoods	Aspen	Cotton-wood	Total hardwoods	
	GROWING STOCK							
	Cubic feet							
Disease	--	16,654	--	16,654	--	--	--	16,654
Weather	--	5,446	--	5,446	--	--	--	5,446
Suppression	--	6,169	--	6,169	--	--	--	6,169
Unknown	--	14,775	--	14,775	--	--	--	14,775
Total	--	43,044	--	43,044	--	--	--	43,044
	GROWING STOCK							
	Cubic meters							
Disease	--	472	--	472	--	--	--	472
Weather	--	154	--	154	--	--	--	154
Suppression	--	175	--	175	--	--	--	175
Unknown	--	418	--	418	--	--	--	418
Total	--	1 219	--	1 219	--	--	--	1 219
	SAWTIMBER							
	Board feet, International 1/4-inch rule							
Disease	--	85,749	--	85,749	--	--	--	85,749
Weather	--	--	--	--	--	--	--	--
Suppression	--	--	--	--	--	--	--	--
Unknown	--	82,514	--	82,514	--	--	--	82,514
Total	--	168,263	--	168,263	--	--	--	168,263

Sterrett, Velma J.; Felt, Dorothy G. Forest area and timber resource statistics for State and private lands in McKinley, San Juan, and Valencia Counties, New Mexico, 1979. Resour. Bull. INT-31. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1983. 22 p.

Presents land area, commercial timberland area, timber inventory, and growth and mortality data based on Forest Survey standards.

KEYWORDS: forest surveys (regional), forest area classification, stand volume

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