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Forest Statistics for Land Outside National Forests in Southwestern Montana, 1989

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RESEARCH SUMMARY

There are about 1 million acres of forest land outside the National Forests in southwestern Montana. Major timberland forest types include Douglas-fir, lodgepole pine, and spruce-fir. Also found are minor occurrences of Engelmann spruce, aspen, cottonwood, and limber pine forest types. There are no woodland forest types. Of the forest land outside National Forests, 57 percent is privately owned, and the rest is administered by government agencies. The estimated wood volume on these lands is nearly 1.3 billion cubic feet. Net annual growth in 1988 was about 14 million cubic feet. This report presents detailed information on total land area, timberland area, volume, growth, and mortality.

PREFACE

The primary objective of Forest Survey—a continuing, nationwide undertaking of the Forest Service, U.S. Department of Agriculture—is to assess the renewable resources on the Nation's forest lands. Periodic State-by-State resource inventories are key to accomplishing the objective. Forest Survey was initially authorized by the McSweeney-McNary Act of 1928. Its current mandate is the Renewable Resources Research Act of 1978.

The Intermountain Research Station with headquarters in Ogden, UT, conducts the forest resource inventories for the Rocky Mountain States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, and Wyoming. These inventories provide information on the extent and condition of the forests—their wood volume and wood growth, removals, and mortality for State, privately owned, and most other forest lands outside the National Forest System. These data, when combined with similar information on National Forest lands, provide a basis for forest policies and programs for the orderly development and use of wood resources.

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INTRODUCTION

Forest lands outside National Forests in southwestern Montana (fig. 1) were recently surveyed. Phase I of a statewide survey began in 1987 with assembling land area information and interpreting aerial photography of the forest land. Phase II, the field work, began in early 1988 in eastern Montana and was completed in the southwestern counties in 1989. Forested ground-plot locations in southwestern Montana totaled 127.

Figure 1—Sample design for southwestern Montana: 4,270 forested phase I photo-interpreted (PI) points, 127 phase II field locations, and nonsampled National Forest lands.

Resource statistics are reported for private land ownerships and public lands administered by the Bureau of Land Management, U.S. Department of the Interior (USDI), other Federal agencies, the State of Montana, and county and municipal governments. Reserved areas, such as lands administered by the USDI National Park Service, were not field sampled, but acreage estimates are included in the total area summaries (table 1). Area estimates of lands in the National Forest System (NFS) administered by the Forest Service, U.S. Department of Agriculture, are also included in table 1. However, no NFS resource statistics are presented in this report.

A later statewide analysis of Montana's forest resource situation will combine Forest Survey data and data supplied by the NFS.

HIGHLIGHTS

Area

Beaverhead, Deer Lodge, Silver Bow, Madison, Gallatin, and Park Counties in southwestern Montana cover 10.3 million acres. Of this total, 57 percent is in public ownership—the Forest Service being the largest administrator (fig. 2). Most of the privately owned land belongs to farmers, ranchers, corporations, and other individuals.

Figure 2—Land ownerships in southwestern Montana, 1989.

About 1 million acres of southwestern Montana outside National Forests are forested. This is 15 percent of the 6.3 million acres of land outside the National Forests (fig. 3). Of the 1 million acres, 0.8 million acres are potentially available for management. These 0.8 million acres—the nonreserved timberlands—are the land base for the resource statistics in this report.

Douglas-fir is the predominant forest type (Eyre 1980) covering 53 percent of the timberland area. Most of the remaining area is divided between lodgepole pine and spruce-fir types (fig. 4).

Two-thirds of the timberland area is classified as sawtimber stands (fig. 5).

Almost all of the timberland types except some spruce-fir and aspen are capable of producing more than 20 cubic feet per acre of wood on an annual basis. But less than 4 percent can produce more than 85 cubic feet per acre per year. Productivity was not measured directly but was calculated from stand-level yield capability equations (Brickell 1970) using data from site index trees.

One-half of the timberland stands have less than 5,000 board feet (International 1/4-inch rule) per acre (fig. 6). About 20 percent contain more than 10,000 board feet per acre.

Figure 3—Forest land outside National Forests in southwestern Montana, 1989.

Figure 4—Area of timberland outside National Forests by forest type in southwestern Montana, 1989.

Figure 5—Area of timberland outside National Forests by stand-size class in southwestern Montana, 1989.

Figure 6—Area of timberland outside National Forests by stand-volume class in southwestern Montana, 1989.

Stand Composition and Volume

More than 345 million healthy trees (growing stock) can be found outside NFS lands in southwestern Montana. Averaged over total nonreserved timberland, this amounts to about 400 trees per acre. Although most of the stands are classified sawtimber (fig. 5), more than 60 percent of the trees are small saplings between 1.0 and 5.0 inches diameter at breast height (d.b.h.), and only 15 percent are sawtimber trees (fig. 7). Besides healthy trees, timberland stands contain more than 6 million cull trees and another 13 million dead (standing or downed) trees determined to be usable for some wood products.

Only 10 percent of the acres are fully stocked (growing space completely utilized) by stands of timber (fig. 8). Mature stands of Douglas-fir, spruce-fir, and lodgepole pine forest type are found on 33 percent of the timberland.

Volume on timberland, excluding cull material, is 1.3 billion cubic feet or 4.8 billion board feet (International ¼-inch rule). On average, this is about 1,600 cubic feet or 21 cords per acre. Rough and rotten cull trees and salvable dead trees add another 160 million cubic feet to the timberland "woodpile."

More than 60 percent of the total volume is on forest industry and other private lands. The most volume per acre, 2,110 cubic feet, is in the other public owner group that is primarily USDI Bureau of Land Management.

Figure 7—Growing-stock trees outside National Forests by tree-size class in southwestern Montana, 1989.

Figure 8—Area of timberland outside National Forests by stocking condition in southwestern Montana, 1989.

Most of the volume is distributed among small sawtimber trees 9.0 to 17.0 inches d.b.h. (fig. 9). Douglas-fir (*Pseudotsuga mensiezii*) and lodgepole pine (*Pinus contorta*) account for 70 percent of the volume (fig. 10).

Other major species in southwestern Montana are subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), whitebark pine (*Pinus albicaulis*), limber pine (*Pinus flexilis*), cottonwood (*Populus* sp.), and aspen (*Populus tremuloides*).

Components of Change

Gross annual growth (net growth plus mortality) totaled 28 million cubic feet in 1988, but mortality reduced the net gain to less than 15 million cubic feet or 1 percent of inventory volume. On average, the annual growth is 34 cubic feet per acre. Average annual potential productivity is 48 cubic feet per acre.

Lodgepole pine accounted for more than one-half the mortality (fig. 11). Although cause was mostly unknown, mountain pine beetle—a well-known insect pest in southwestern Montana—probably had some effect.

Figure 9—Growing-stock volume outside National Forests by tree-size class in southwestern Montana, 1989.

Figure 10—Growing-stock volume outside National Forests by species in southwestern Montana, 1989.

Figure 11—Annual mortality of growing stock outside National Forests by species in southwestern Montana, 1988.

HOW THE INVENTORY WAS CONDUCTED

Data Reliability

The inventory was designed to provide reliable statistics primarily at the State and sample area levels. The six counties in southwestern Montana (fig. 1) were grouped into a sample area. Confidence intervals at the 67 percent level were computed for several sample area statistics. The intervals for timberland area estimates ranged from 0.76 to 0.85 million acres (± 5.2 percent standard error). Similarly, volume ranged from 1.2 to 1.4 billion cubic feet, net annual growth ranged from 10.3 to 17.9 million cubic feet, and annual mortality ranged from 9.9 to 16.9 million cubic feet. The confidence intervals can be interpreted by envisioning an inventory being repeated many times. Then 67 percent of the confidence intervals calculated for each inventory would be expected to contain the population mean. If confidence in these interval estimates was increased from 67 to 95 percent, the interval widths would double in range.

Prefield

Initial area estimates were based on classifying 25,572 photo points on a 1,000-m grid of the latest available aerial photographs of all non-National Forest land in southwestern Montana. The sample points were subsequently grouped into 17 strata. Two strata dealt with water, one with nonforest, and the other 14 divided photo points into county and ownership categories. The photo points were used to compute area expansion factors for field-data strata means in a stratified double-sampling design.

Field

Field locations were selected on a 5,000-m grid from the 1,000-m grid of the photo points. Of the 975 possible field sample locations, 127 were forested (fig. 1). Sample trees on forested locations were selected from 10 points systematically arranged within an acre. At each point, trees 5.0 inches d.b.h. or larger were selected using a 40 basal area factor (BAF) variable radius plot. Trees less than 5.0 inches d.b.h. were measured on a $\frac{1}{300}$ -acre fixed radius plot at each point.

Compilation

All editing, computing, and tabulating of photo and field data were done with customized software programs. Documentation of formulas and algorithms is beyond the intent of this report; however, such information is available upon request from Forest Survey in Ogden, UT. Volume equations include those developed by Kemp (1958) and Moisen (1990).

STANDARD FOREST SURVEY TERMINOLOGY

Basal area—The cross-sectional area of a tree expressed in square feet.

For timber species the calculation is based on diameter at breast height (d.b.h.); for woodland species it is based on diameter at root collar (d.r.c.).

Christmas tree grade—Pinyon species are classified as Christmas trees using the following guidelines:

Premium—Excellent conical form with no gaps in branches and a straight bole.

Standard—Good conical form with small gaps in branches and bole slightly malformed.

Utility—Conical in form with branches missing and bole bent or malformed.

Cull—Not meeting one of the above classifications or over 12 feet in height.

Cord—A pile of stacked wood equivalent to 128 cubic feet of wood and air space having standard dimensions of 4 by 4 by 8 feet or 75 cubic feet of solid wood.

Cull trees—Live trees that are unmerchantable now or prospectively (see Rough trees and Rotten trees).

Cull volume—Portions of a tree's volume that are not usable for wood products because of rot, missing or dead material, or other cubic-foot defect.

Deferred forest land—Forest lands within the National Forest System that are under study for possible inclusion in the Wilderness System.

Diameter at breast height (d.b.h.)—Diameter of the stem measured at 4.5 feet above the ground.

Diameter at root collar (d.r.c.)—Diameter equivalent at the point nearest the ground line that represents the basal area of the tree stem or stems.

Diameter classes—Tree diameters, either d.b.h. or d.r.c., grouped into 2-inch classes.

Farmer /rancher-owned lands—Lands owned by a person who operates a farm or a ranch and who either does the work or directly supervises the work.

Fenceposts—Juniper and oak species are evaluated for post potential using the following criteria:

Line post—A 7-foot minimum length with 5 to 7 inches diameter at the butt, 2.5 inches minimum small end diameter, and reasonably straight and solid.

Corner post—An 8-foot minimum length with 7 to 9 inches diameter at the butt, 2.5 inches minimum small end diameter, and reasonably straight and solid.

Forest industry lands—Lands owned by companies or individuals operating a primary wood-processing plant.

Forest lands—Lands at least 10 percent stocked by forest trees of any size, including lands that formerly had such tree cover and that will be naturally or artificially regenerated. 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 wide.

Forest trees—Woody plants having a well-developed stem or stems, usually more than 12 feet in height at maturity, with a generally well-defined crown.

Forest type—A classification of forest land based upon and named for the tree species presently forming a plurality of live-tree stocking.

Gross annual growth—The average annual increase in the net volume of trees during a specified period.

Growing-stock trees—Live sawtimber trees, poletimber trees, saplings, and seedlings of timber species meeting specified standards of quality and vigor; excludes cull trees.

Growing-stock volume—Net cubic-foot volume in live poletimber-size and sawtimber-size growing-stock trees from a 1-foot 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.

Hardwood trees—Trees that are usually broad-leaved and deciduous.

Indian lands—Indian lands held in trust by the Federal Government.

Industrial wood—All commercial roundwood products except fuelwood.

Land area—The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains, streams, sloughs, estuaries, and canals less than 120 feet wide; and lakes, reservoirs, and ponds less than 1 acre in size.

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

Miscellaneous Federal lands—Lands administered by Federal agencies other than the Forest Service, U.S. Department of Agriculture, or Bureau of Land Management, U.S. Department of the Interior.

Mortality—The net volume of growing-stock trees that have died from natural causes during a specified period.

National Forest lands—Public lands administered by the Forest Service, U.S. Department of Agriculture.

National Resource lands—Public lands administered by the Bureau of Land Management, U.S. Department of the Interior.

Net annual growth—Gross annual growth minus average annual mortality.

Net dead volume—Total net volume of dead trees plus the net volume of dead material in live trees.

Net volume in board feet—The gross board-foot volume in the sawlog portion of growing-stock trees, less deductions for cull volume.

Net volume in cubic feet—Gross cubic-foot volume in the merchantable portion of trees less deductions for cull volume. For timber species, volume is computed for the merchantable stem from a 1-foot stump to a minimum 4-inch top diameter outside bark (d.o.b.), or to the point where the central stem breaks into limbs. For woodland species, volume is computed outside bark (o.b.) for all woody material above d.r.c. that is larger than 1.5 inches d.o.b.

Nonforest lands—Lands that do not currently qualify as forest land.

Nonindustrial private—All private ownerships except forest industry.

Nonstocked areas—Forest land less than 10 percent stocked with live trees.

Other private lands—Privately owned lands other than forest industry or Indian Trust.

Other public lands—Public lands administered by agencies other than the Forest Service, U.S. Department of Agriculture.

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.

Poletimber stands—Stands at least 10 percent stocked with growing-stock trees, in which half or more of the stocking is sawtimber or poletimber trees or both, with poletimber stocking exceeding that of sawtimber (see definition for Stocking).

Poletimber trees—Live trees of timber species at least 5 inches d.b.h. but smaller than sawtimber size.

Potential growth—The average net annual cubic-foot growth per acre, indexed to the culmination of mean annual growth attainable in a fully stocked natural stand.

Primary wood-processing plants—Plants using roundwood products such as sawlogs, pulpwood bolts, veneer logs, and so forth.

Productivity—Potential yield capability of a stand (in cubic feet per acre per year) calculated here as a function of site index.

Productivity class—A classification of forest land that reflects biological potential. For timberlands the index used is the potential net annual growth at culmination of mean annual increment in fully stocked natural stands. For woodland, characteristics that affect the land's ability to produce wood, such as soil depth and aspect, are used. Furthermore, woodland is classified as high site where sustained wood production is likely, or low site where the continuous production of wood is unlikely.

Removals—The net volume of growing-stock trees removed from the inventory by harvesting, cultural operations, land clearings, or changes in land use.

Reserved forest land—Forest land withdrawn from tree utilization through statute or administrative designation.

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.

Plant residues—Wood materials from primary manufacturing plants that are not used for any product.

Rotten trees—Live poletimber or sawtimber trees with more than 67 percent of their total volume cull (cubic-foot) and with more than half of the cull volume attributable to rotten or missing material.

Rough trees—Live poletimber or sawtimber trees with more than 67 percent of their total volume cull (cubic-foot) and with less than half of the cull volume attributable to rotten or missing material.

Roundwood—Logs, bolts, or other round sections cut from trees.

Salvable dead trees—Standing dead trees that are currently merchantable by regional standards.

Saplings—Live trees of timber species 1 to 4.9 inches d.b.h. or woodland species 1 to 2.9 inches d.r.c.

Sapling and seedling stands—Timberland stands at least 10 percent stocked on which more than half of the stocking is saplings or seedlings or both.

Sawlog portion—That part of the bole of sawtimber trees between a 1-foot stump and the sawlog top.

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

Sawtimber stands—Stands at least 10 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.

Sawtimber trees—Live trees of timber species meeting regional size and defect specifications. Softwood trees must be at least 9 inches d.b.h. and hardwood trees 11 inches d.b.h.

Sawtimber volume—Net volume in board feet of the sawlog portion of live sawtimber trees.

Seedlings—Established live trees of timber species less than 1 inch d.b.h. or woodland species less than 1 inch d.r.c.

Site index—Expected height (in feet) of a tree on a site at age 50 (or 80 for aspen and cottonwood) calculated from height-to-age equations. Trees selected for site index calculations are dominant or codominant within the stand, age 30 to 200 years, and show high vigor.

Softwood trees—Coniferous trees that are usually evergreen and have needle or scalelike leaves.

Standard error—An expression of the degree of confidence that can be placed on an estimated total or average obtained by statistical sampling methods. Standard errors do not include technique errors that could occur in photo classification of areas, field measurements, or compilation of data.

Stand-size classes—A classification of forest land based on the predominant size of trees present (see Sawtimber stands, Poletimber stands, and Sapling and seedling stands).

State, county, and municipal lands—Lands administered by States, counties, and local public agencies, or lands leased by these governmental units for more than 50 years.

Stocking—An expression of the extent to which growing space is effectively used by present or potential growing-stock trees of timber species.

Stocking condition—A categorization of timberland reflecting the degree to which the site is being utilized by growing-stock trees and other conditions affecting current and prospective timber growth (see Stocking):

Overstocked—Areas at least 60 percent stocked with growing-stock trees, but overstocked with all live trees.

Fully stocked—Areas at least 60 percent stocked with growing-stock trees and not overstocked.

Medium to fully stocked—Areas 35 percent to 60 percent stocked with growing-stock trees. Includes areas where other trees or inhibiting vegetation or surface conditions prevent occupancy by growing-stock trees.

Poorly stocked—Areas less than 35 percent stocked with growing-stock trees.

Nonstocked—Forest land less than 10 percent stocked with growing-stock trees.

Mature—Stands of timber species over 100 years old.

Timberland—Forest land where timber species make up at least 10 percent stocking.

Timber species—Tree species traditionally used for industrial wood products. In the Rocky Mountain States, these include aspen and cottonwood hardwood species and all softwood species except pinyon and juniper.

Timber stand improvement—Treatments such as thinning, pruning, release cutting, girdling, weeding, or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Upper-stem portion—That part of the main stem or fork of sawtimber trees above the sawlog top to a minimum top diameter of 4 inches outside bark or to the point where the main stem or fork breaks into limbs.

Water—Streams, sloughs, estuaries, and canals more than 120 feet wide, and lakes, reservoirs, and ponds more than 1 acre in size at mean high water level.

Wilderness—An area of undeveloped land currently included in the Wilderness System, managed so as to preserve its natural conditions and retain its primeval character and influence.

Woodland—Forest land where timber species make up less than 10 percent stocking.

Woodland species—Tree species not usually converted into industrial wood products. Common uses are fuelwood, fenceposts, and Christmas trees.

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FOREST SURVEY TABLES

Table 1—Total area by ownership class and land class in southwestern Montana, 1989

[illegible]

¹ Data not available for this report.

² Not included with miscellaneous Federal, a component of other public, for purpose of clarity. These lands are reserved and are included in tables 1, 2, and 4 only.

³ U.S. Department of Commerce, Bureau of Census 1980.

Table 2—Area of forest land outside National Forests with percent standard error in southwestern Montana, 1989

Item	Acres	Percent standard error
Timberland	803,773	±5.2
Woodland	—	±0.0
Reserved forest land: ¹		
Timberland	164,922	
Woodland	—	
Total forest land ²	968,695	

¹Reserved land areas are estimated from aerial photos without field verification; therefore, standard errors are not calculated.

²On this and all following tables, totals may vary due to rounding.

Table 3—Net volume, net annual growth, and annual mortality of growing stock and sawtimber on timberland outside National Forests with percent standard error in southwestern Montana

Item	All species	
	Volume	Percent standard error
Net volume, 1989:		
Growing stock (M cubic feet)	1,266,390	±8.5
Sawtimber ¹ (M board feet)	4,772,665	±9.5
Sawtimber ² (M board feet)	3,957,189	±9.7
Net annual growth, 1988:		
Growing stock (M cubic feet)	14,111	±26.8
Sawtimber ¹ (M board feet)	70,201	±28.4
Sawtimber ² (M board feet)	61,318	±27.3
Annual mortality, 1988:		
Growing stock (M cubic feet)	13,401	±25.9
Sawtimber ¹ (M board feet)	50,446	±30.7
Sawtimber ² (M board feet)	42,054	±31.0

¹International ¼-inch rule.

²Scribner rule.

Table 4—Total land area outside National Forests by major land class and owner group in southwestern Montana, 1989

Land class	Owner group					Total
	Other public			Forest Industry	NonIndustrial private	
	State	Other	Total other public			
	----- Acres -----					
Timberland:						
Reserved	309	164,613	164,922	—	—	164,922
Nonreserved	81,302	170,122	251,424	141,385	410,964	803,773
Total	81,611	334,735	416,346	141,385	410,964	968,695
Woodland:						
Reserved	—	—	—	—	—	—
Nonreserved	—	—	—	—	—	—
Total	—	—	—	—	—	—
Total forest land:						
Reserved	309	164,613	164,922	—	—	164,922
Nonreserved	81,302	170,122	251,424	141,385	410,964	803,773
Total	81,611	334,735	416,346	141,385	410,964	968,695
Nonforest land	574,074	880,003	1,454,077	47,987	3,836,615	5,338,679
Total land area	655,685	1,214,738	1,870,423	189,372	4,247,579	6,307,374

TIMBERLAND TABLES

Area

Table 5—Area of timberland outside National Forests by forest type, stand-size class, and productivity class in southwestern Montana, 1989

Forest type and stand-size class	Productivity class					Total acres
	120-164	85-119	50-84	20-49	0-19	
----- Acres -----						
Douglas-fir:						
Sawtimber	—	—	143,249	192,917	—	336,166
Poletimber	—	—	5,928	50,139	—	56,067
Sapling and seedling	—	—	—	16,002	—	16,002
Nonstocked	—	—	—	15,899	—	15,899
Total	—	—	149,177	274,957	—	424,134
Lodgepole pine:						
Sawtimber	—	—	29,820	34,867	—	64,687
Poletimber	—	—	10,594	49,130	—	59,724
Sapling and seedling	—	7,163	5,527	17,530	—	30,220
Nonstocked	—	—	—	4,667	—	4,667
Total	—	7,163	45,941	106,194	—	159,298
Limber pine:						
Sawtimber	—	—	—	5,163	—	5,163
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	—	5,163	—	5,163
Spruce-fir:						
Sawtimber	—	10,156	57,445	25,278	6,195	99,074
Poletimber	—	—	—	14,326	—	14,326
Sapling and seedling	—	—	12,326	29,404	—	41,730
Nonstocked	—	—	—	—	—	—
Total	—	10,156	69,771	69,008	6,195	155,130
Engelmann spruce:						
Sawtimber	—	9,093	10,405	9,385	—	28,883
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	9,093	10,405	9,385	—	28,883
Aspen:						
Sawtimber	—	—	—	—	—	—
Poletimber	—	—	—	9,093	—	9,093
Sapling and seedling	—	—	—	5,078	6,258	11,336
Nonstocked	—	—	—	—	—	—
Total	—	—	—	14,171	6,258	20,429
Cottonwood: ¹						
Sawtimber	—	—	10,736	—	—	10,736
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	10,736	—	—	10,736
All types:						
Sawtimber	—	19,249	251,655	267,610	6,195	544,709
Poletimber	—	—	16,522	122,688	—	139,210
Sapling and seedling	—	7,163	17,853	68,014	6,258	99,288
Nonstocked	—	—	—	20,566	—	20,566
Total	—	26,412	286,030	478,878	12,453	803,773

¹Includes paper birch.

Table 6—Area of other publicly owned timberland by forest type, stand-size class, and productivity class in southwestern Montana, 1989

Forest type and stand-size class	Productivity class					Total acres
	120-164	85-119	50-84	20-49	0-19	
	----- Acres -----					
Douglas-fir:						
Sawtimber	—	—	45,149	64,551	—	109,700
Poletimber	—	—	5,928	19,681	—	25,609
Sapling and seedling	—	—	—	1,676	—	1,676
Nonstocked	—	—	—	1,675	—	1,675
Total	—	—	51,077	87,583	—	138,660
Lodgepole pine:						
Sawtimber	—	—	25,343	4,928	—	30,271
Poletimber	—	—	5,928	19,273	—	25,201
Sapling and seedling	—	—	—	7,870	—	7,870
Nonstocked	—	—	—	—	—	—
Total	—	—	31,271	32,071	—	63,342
Limber pine:						
Sawtimber	—	—	—	—	—	—
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	—	—	—	—
Spruce-fir:						
Sawtimber	—	—	20,415	13,532	6,195	40,142
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	20,415	13,532	6,195	40,142
Engelmann spruce:						
Sawtimber	—	—	5,928	—	—	5,928
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	5,928	—	—	5,928
Aspen:						
Sawtimber	—	—	—	—	—	—
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	1,676	1,676
Nonstocked	—	—	—	—	—	—
Total	—	—	—	—	1,676	1,676
Cottonwood: ¹						
Sawtimber	—	—	1,676	—	—	1,676
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	1,676	—	—	1,676
All types:						
Sawtimber	—	—	98,511	83,011	6,195	187,717
Poletimber	—	—	11,856	38,954	—	50,810
Sapling and seedling	—	—	—	9,546	1,676	11,222
Nonstocked	—	—	—	1,675	—	1,675
Total	—	—	110,367	133,186	7,871	251,424

¹Includes paper birch.

Table 7—Area of forest industry owned timberland by forest type, stand-size class, and productivity class in southwestern Montana, 1989

Forest type and stand-size class	Productivity class					Total acres
	120-164	85-119	50-84	20-49	0-19	
	----- Acres -----					
Douglas-fir:						
Sawtimber	—	—	24,751	15,366	—	40,117
Poletimber	—	—	—	212	—	212
Sapling and seedling	—	—	—	129	—	129
Nonstocked	—	—	—	5,211	—	5,211
Total	—	—	24,751	20,918	—	45,669
Lodgepole pine:						
Sawtimber	—	—	—	15,319	—	15,319
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	129	—	129
Nonstocked	—	—	—	—	—	—
Total	—	—	—	15,448	—	15,448
Limber pine:						
Sawtimber	—	—	—	5,163	—	5,163
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	—	5,163	—	5,163
Spruce-fir:						
Sawtimber	—	10,156	29,867	47	—	40,070
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	5,163	20,311	—	25,474
Nonstocked	—	—	—	—	—	—
Total	—	10,156	35,030	20,358	—	65,544
Engelmann spruce:						
Sawtimber	—	—	—	9,385	—	9,385
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	—	9,385	—	9,385
Aspen:						
Sawtimber	—	—	—	—	—	—
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	82	47	129
Nonstocked	—	—	—	—	—	—
Total	—	—	—	82	47	129
Cottonwood: ¹						
Sawtimber	—	—	47	—	—	47
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	47	—	—	47
All types:						
Sawtimber	—	10,156	54,665	45,280	—	110,101
Poletimber	—	—	—	212	—	212
Sapling and seedling	—	—	5,163	20,651	47	25,861
Nonstocked	—	—	—	5,211	—	5,211
Total	—	10,156	59,828	71,354	47	141,385

¹Includes paper birch.

Table 8—Area of nonindustrial private timberland by forest type, stand-size class, and productivity class in southwestern Montana, 1989

Forest type and stand-size class	Productivity class					Total acres
	120-164	85-119	50-84	20-49	0-19	
	----- Acres -----					
Douglas-fir:						
Sawtimber	—	—	73,349	113,000	—	186,349
Poletimber	—	—	—	30,246	—	30,246
Sapling and seedling	—	—	—	14,197	—	14,197
Nonstocked	—	—	—	9,013	—	9,013
Total	—	—	73,349	166,456	—	239,805
Lodgepole pine:						
Sawtimber	—	—	4,477	14,620	—	19,097
Poletimber	—	—	4,666	29,857	—	34,523
Sapling and seedling	—	7,163	5,527	9,531	—	22,221
Nonstocked	—	—	—	4,667	—	4,667
Total	—	7,163	14,670	58,675	—	80,508
Limber pine:						
Sawtimber	—	—	—	—	—	—
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	—	—	—	—
Spruce-fir:						
Sawtimber	—	—	7,163	11,699	—	18,862
Poletimber	—	—	—	14,326	—	14,326
Sapling and seedling	—	—	7,163	9,093	—	16,256
Nonstocked	—	—	—	—	—	—
Total	—	—	14,326	35,118	—	49,444
Engelmann spruce:						
Sawtimber	—	9,093	4,477	—	—	13,570
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	9,093	4,477	—	—	13,570
Aspen:						
Sawtimber	—	—	—	—	—	—
Poletimber	—	—	—	9,093	—	9,093
Sapling and seedling	—	—	—	4,996	4,535	9,531
Nonstocked	—	—	—	—	—	—
Total	—	—	—	14,089	4,535	18,624
Cottonwood: ¹						
Sawtimber	—	—	9,013	—	—	9,013
Poletimber	—	—	—	—	—	—
Sapling and seedling	—	—	—	—	—	—
Nonstocked	—	—	—	—	—	—
Total	—	—	9,013	—	—	9,013
All types:						
Sawtimber	—	9,093	98,479	139,319	—	246,891
Poletimber	—	—	4,666	83,522	—	88,188
Sapling and seedling	—	7,163	12,690	37,817	4,535	62,205
Nonstocked	—	—	—	13,680	—	13,680
Total	—	16,256	115,835	274,338	4,535	410,964

¹Includes paper birch.

Table 9—Area of timberland outside National Forests by stand volume and owner group in southwestern Montana, 1989

Stand volume per acre ¹	Owner group					Total
	Other public			Forest industry	Nonindustrial private	
	State	Other	Total other public			
	----- Acres -----					
Less than 1,500 board feet	10,139	37,205	47,344	30,991	99,298	177,633
1,500 to 4,999 board feet	34,919	33,984	68,903	36,154	137,114	242,171
5,000 to 9,999 board feet	20,869	49,090	69,959	18,852	116,615	205,426
10,000 board feet or more	15,375	49,843	65,218	55,388	57,937	178,543
All classes	81,302	170,122	251,424	141,385	410,964	803,773

¹International ¼-inch rule.**Table 10**—Area of timberland outside National Forests by forest type and stocking condition in southwestern Montana, 1989

Forest type	Stocking condition						All classes
	Overstocked	Fully stocked	Medium to fully stocked	Poorly stocked	Mature	Nonstocked	
	----- Acres -----						
Douglas-fir	7,150	51,942	117,537	98,116	133,490	15,899	424,134
Lodgepole pine	37,859	21,267	39,894	6,258	49,354	4,666	159,298
Limber pine	—	—	—	—	5,163	—	5,163
Spruce-fir	—	7,163	44,793	30,670	72,504	—	155,130
Engelmann spruce	—	—	18,478	4,477	5,928	—	28,883
Aspen	—	—	11,336	9,093	—	—	20,429
Cottonwood ¹	—	—	10,736	—	—	—	10,736
All types	45,009	80,372	242,774	148,614	266,439	20,565	803,773

¹Includes paper birch.

Number of Trees

Table 11—Number of growing-stock trees on timberland outside National Forests by species and diameter class in southwestern Montana, 1989

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	20,084	20,432	16,604	11,894	10,500	7,171	3,824	2,267	1,413	734	425	218	179	109	242	96,096
Lodgepole pine	48,349	37,675	17,189	9,933	5,947	3,273	1,012	532	225	101	65	18	7	—	—	124,326
Whitebark pine	4,450	2,618	2,429	1,901	1,743	688	262	273	103	85	39	7	11	—	—	14,609
Limber pine	508	2,897	1,766	431	224	194	85	43	44	17	12	18	—	—	—	6,239
Subalpine fir	44,365	14,778	8,690	5,680	2,040	1,339	540	104	66	29	—	8	7	—	—	77,646
Engelmann spruce	6,398	2,325	2,433	1,666	986	809	816	540	328	123	103	7	22	16	36	16,608
Total softwoods	124,154	80,725	49,111	31,505	21,440	13,474	6,539	3,759	2,179	1,089	644	276	226	125	278	335,524
Aspen	4,669	1,877	548	570	400	182	77	—	—	—	—	—	—	—	—	8,323
Cottonwood ¹	—	—	405	135	226	181	57	77	34	37	7	23	5	—	9	1,196
Total hardwoods	4,669	1,877	953	705	626	363	134	77	34	37	7	23	5	—	9	9,519
All species	128,823	82,602	50,064	32,210	22,066	13,837	6,673	3,836	2,213	1,126	651	299	231	125	287	345,043

¹Includes paper birch.

Table 12—Number of cull and salvable dead trees on timberland outside National Forests by owner group, and softwoods and hardwoods in southwestern Montana, 1989

Owner group	Species group	Cull trees			Salvable dead trees	Total
		Rough	Rotten	Total		
----- Thousand trees -----						
Other public: State:	Softwoods	181	60	241	382	623
	Hardwoods	—	—	—	—	—
	Total	181	60	241	382	623
Other:	Softwoods	921	328	1,249	2,503	3,752
	Hardwoods	—	—	—	—	—
	Total	921	328	1,249	2,503	3,752
Total other public:	Softwoods	1,102	388	1,490	2,885	4,375
	Hardwoods	—	—	—	—	—
	Total	1,102	388	1,490	2,885	4,375
Forest industry:	Softwoods	2,413	372	2,785	4,284	7,069
	Hardwoods	—	—	—	—	—
	Total	2,413	372	2,785	4,284	7,069
Nonindustrial private:	Softwoods	1,842	133	1,975	6,258	8,233
	Hardwoods	—	—	—	—	—
	Total	1,842	133	1,975	6,258	8,233
Total:	Softwoods	5,357	893	6,250	13,427	19,677
	Hardwoods	—	—	—	—	—
	Total	5,357	893	6,250	13,427	19,677

Volume

Table 13—Net volume of growing stock on timberland outside National Forests by forest type and stand-size class in southwestern Montana, 1989

Forest type	Stand-size class				All classes
	Sawtimber	Poletimber	Sapling/ seedling	Nonstocked	
	----- Thousand cubic feet -----				
Douglas-fir	489,954	66,375	2,639	799	559,767
Lodgepole pine	187,401	130,627	14,658	644	333,330
Limber pine	2,193	—	—	—	2,193
Spruce-fir	280,499	12,522	3,509	—	296,530
Engelmann spruce	47,575	—	—	—	47,575
Aspen	—	8,126	4,336	—	12,462
Cottonwood¹	14,533	—	—	—	14,533
All types	1,022,155	217,650	25,142	1,443	1,266,390

¹Includes paper birch.

Table 14—Net volume of sawtimber (International ¼-inch rule) on timberland outside National Forests by forest type and stand-size class in southwestern Montana, 1989

Forest type	Stand-size class				All classes
	Sawtimber	Poletimber	Sapling/ seedling	Nonstocked	
	----- Thousand board feet, International 1/4-inch rule -----				
Douglas-fir	2,194,607	110,430	12,708	4,406	2,322,151
Lodgepole pine	719,636	277,951	9,962	2,585	1,010,134
Limber pine	13,350	—	—	—	13,350
Spruce-fir	1,118,148	23,777	2,889	—	1,144,814
Engelmann spruce	196,824	—	—	—	196,824
Aspen	—	19,141	9,258	—	28,399
Cottonwood¹	56,993	—	—	—	56,993
All types	4,299,558	431,299	34,817	6,991	4,772,665

¹Includes paper birch.

Table 15—Net volume of sawtimber (Scribner rule) on timberland outside National Forests by forest type and stand-size class in southwestern Montana, 1989

Forest type	Stand-size class				All classes
	Sawtimber	Poletimber	Sapling/ seedling	Nonstocked	
----- Thousand board feet, Scribner rule -----					
Douglas-fir	1,798,179	86,952	10,242	3,617	1,898,990
Lodgepole pine	608,408	230,961	8,051	2,133	849,553
Limber pine	11,417	—	—	—	11,417
Spruce-fir	941,488	18,739	2,233	—	962,460
Engelmann spruce	162,811	—	—	—	162,811
Aspen	—	15,524	7,383	—	22,907
Cottonwood ¹	49,051	—	—	—	49,051
All types	3,571,354	352,176	27,909	5,750	3,957,189

¹Includes paper birch.

Table 16—Net volume of growing stock on timberland outside National Forests by species and owner group in southwestern Montana, 1989

Species	Owner group					Total
	Other public			Forest industry	Nonindustrial private	
	State	Other	Total other public			
----- Thousand cubic feet -----						
Douglas-fir	43,720	130,281	174,001	96,666	279,507	550,174
Lodgepole pine	40,910	132,861	173,771	33,708	139,734	347,213
Whitebark pine	7,716	18,254	25,970	18,691	16,952	61,613
Limber pine	1,551	6,655	8,206	2,138	4,346	14,690
Subalpine fir	28,328	39,520	67,848	45,443	23,528	136,819
Engelmann spruce	5,716	30,520	36,236	45,209	47,501	128,946
Total softwoods	127,941	358,091	486,032	241,855	511,568	1,239,455
Aspen	49	69	118	54	12,229	12,401
Cottonwood¹	623	868	1,491	42	13,001	14,534
Total hardwoods	672	937	1,609	96	25,230	26,935
All species	128,613	359,028	487,641	241,951	536,798	1,266,390

¹Includes paper birch.

Table 17—Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and owner group in southwestern Montana, 1989

Species	Owner group					Total
	Other public			Forest industry	Nonindustrial private	
	State	Other	Total other public			
----- Thousand board feet, International 1/4-inch rule -----						
Douglas-fir	194,246	513,589	707,835	495,998	1,180,985	2,384,818
Lodgepole pine	185,779	436,165	621,944	135,394	373,659	1,130,997
Whitebark pine	28,257	81,257	109,514	77,022	63,107	249,643
Limber pine	8,924	13,980	22,904	12,397	15,198	50,499
Subalpine fir	73,600	110,976	184,576	88,430	32,009	305,015
Engelmann spruce	15,503	119,906	135,409	214,853	225,137	575,399
Total softwoods	506,309	1,275,873	1,782,182	1,024,094	1,890,095	4,696,371
Aspen	—	—	—	95	19,205	19,300
Cottonwood¹	1,895	2,638	4,533	128	52,333	56,994
Total hardwoods	1,895	2,638	4,533	223	71,538	76,294
All species	508,204	1,278,511	1,786,715	1,024,317	1,961,633	4,772,665

¹Includes paper birch.

Table 18—Net volume of sawtimber (Scribner rule) on timberland outside National Forests by species and owner group in southwestern Montana, 1989

Species	Owner group					Total
	Other public			Forest industry	Nonindustrial private	
	State	Other	Total other public			
----- Thousand board feet, Scribner rule -----						
Douglas-fir	159,283	420,328	579,611	421,111	950,240	1,950,962
Lodgepole pine	158,335	367,474	525,809	114,876	314,527	955,212
Whitebark pine	22,174	68,607	90,781	63,855	49,797	204,433
Limber pine	7,739	11,774	19,513	9,905	12,490	41,908
Subalpine fir	60,080	91,927	152,007	73,174	25,776	250,957
Engelmann spruce	12,744	101,980	114,724	184,616	189,833	489,173
Total softwoods	420,355	1,062,090	1,482,445	867,537	1,542,663	3,892,645
Aspen	—	—	—	76	15,417	15,493
Cottonwood ¹	1,591	2,215	3,806	107	45,138	49,051
Total hardwoods	1,591	2,215	3,806	183	60,555	64,544
All species	421,946	1,064,305	1,486,251	867,720	1,603,218	3,957,189

¹Includes paper birch.

Table 19—Net volume of growing stock on timberland outside National Forests by species and diameter class in southwestern Montana, 1989

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+ classes
----- Thousand cubic feet -----													
Douglas-fir	32,991	52,814	87,524	91,181	72,208	57,990	45,138	29,938	20,088	12,573	11,995	8,977	26,758
Lodgepole pine	49,006	74,668	80,284	67,765	29,750	22,433	10,774	5,596	4,866	1,515	556	—	550,175
Whitebark pine	5,522	10,251	15,201	9,541	4,594	7,155	3,546	3,018	1,770	374	641	—	347,213
Limber pine	3,678	1,967	1,227	1,935	1,691	796	1,595	562	389	850	—	—	61,613
Subalpine fir	33,783	38,657	22,147	21,618	12,899	2,948	2,591	1,246	—	483	446	—	14,690
Engelmann spruce	7,533	11,983	13,960	13,933	22,468	19,173	14,750	6,714	7,144	678	2,076	2,160	136,818
Total softwoods	132,513	190,340	220,343	205,973	143,610	110,495	78,394	47,074	34,257	16,473	15,714	11,137	33,132
Aspen	1,259	3,209	4,164	2,491	1,279	—	—	—	—	—	—	—	12,402
Cottonwood ¹	477	432	1,855	2,874	1,132	1,904	994	1,417	301	1,342	310	—	1,495
Total hardwoods	1,736	3,641	6,019	5,365	2,411	1,904	994	1,417	301	1,342	310	—	1,495
All species	134,249	193,981	226,362	211,338	146,021	112,399	79,388	48,491	34,558	17,815	16,024	11,137	34,627
----- All classes -----													
----- All classes -----													
----- All classes -----													

¹Includes paper birch.

Table 20—Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and diameter class in southwestern Montana, 1989

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	306,880	425,364	375,376	318,965	260,765	178,852	123,811	78,949	76,687	58,181	180,987	2,384,817	
Lodgepole pine	328,844	389,630	167,678	121,759	57,392	29,560	25,196	7,913	3,025	—	—	1,130,997	
Whitebark pine	68,623	58,305	27,957	41,573	20,150	17,253	9,966	2,108	3,709	—	—	249,644	
Limber pine	3,684	12,404	10,064	4,856	8,967	3,284	2,319	4,921	—	—	—	50,499	
Subalpine fir	84,285	112,323	67,987	15,337	13,486	6,467	—	2,626	2,505	—	—	305,016	
Engelmann spruce	58,893	75,557	121,794	102,524	77,713	35,173	37,429	3,683	11,402	12,626	38,605	575,399	
Total softwoods	851,209	1,073,583	770,856	605,014	438,473	270,589	198,721	100,200	97,328	70,807	219,592	4,696,372	
Aspen	XXXXX ¹	12,754	6,546	—	—	—	—	—	—	—	—	19,300	
Cottonwood ²	XXXXX	14,728	5,721	9,429	4,739	6,597	1,377	6,036	1,385	—	6,981	56,993	
Total hardwoods	XXXXX	27,482	12,267	9,429	4,739	6,597	1,377	6,036	1,385	—	6,981	76,293	
All species	851,209	1,101,065	783,123	614,443	443,212	277,186	200,098	106,236	98,713	70,807	226,573	4,772,665	

¹Hardwood trees must be at least 11-inches d.b.h.²Includes paper birch.

Table 21—Net volume of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in southwestern Montana, 1989

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, Scribner rule -----													
Douglas-fir	219,133	319,912	304,729	267,765	222,894	154,960	110,192	70,265	68,252	51,782	161,079	1,950,963	
Lodgepole pine	275,618	320,860	142,804	106,676	50,811	26,283	22,424	7,043	2,692	—	—	955,211	
Whitebark pine	53,835	45,857	22,836	35,314	17,480	15,077	8,857	1,876	3,301	—	—	204,433	
Limber pine	3,278	9,221	8,318	4,011	7,831	2,853	2,016	4,380	—	—	—	41,908	
Subalpine fir	69,004	89,824	57,083	13,084	11,746	5,658	—	2,329	2,229	—	—	250,957	
Engelmann spruce	48,788	60,530	102,235	87,524	67,145	30,619	33,312	3,278	10,148	11,237	34,358	489,174	
Total softwoods	669,656	846,204	638,005	514,374	377,907	235,450	176,801	89,171	86,622	63,019	195,437	3,892,646	
Aspen	XXXXX	10,115	5,377	—	—	—	—	—	—	—	—	15,492	
Cottonwood ¹	XXXXX	12,153	4,833	8,107	4,122	5,803	1,214	5,372	1,233	—	6,214	49,051	
Total hardwoods	XXXXX	22,268	10,210	8,107	4,122	5,803	1,214	5,372	1,233	—	6,214	64,543	
All species	669,656	868,472	648,215	522,481	382,029	241,253	178,015	94,543	87,855	63,019	201,651	3,957,189	

¹Includes paper birch.

Table 22—Net volume of timber on timberland outside National Forests by class of timber, and softwoods and hardwoods in southwestern Montana, 1989

Class of timber	Softwoods	Hardwoods	Total
----- <i>Thousand cubic feet</i> -----			
Sawtimber trees:			
Sawlog portion	814,046	11,947	825,993
Upper-stem portion	102,555	3,593	106,148
Total	916,601	15,540	932,141
Poletimber trees:	322,854	11,395	334,249
All growing-stock trees	1,239,455	26,935	1,266,390
Rough cull trees	54,524	—	54,524
Rotten cull trees	4,274	—	4,274
Salvable dead trees	100,808	—	100,808
All timber	1,399,061	26,935	1,425,996

Table 23—Net volume of growing stock on timberland outside National Forests by forest type and species in southwestern Montana, 1989

Forest type	Species							
	Douglas-fir	Lodgepole pine	Whitebark pine	Limber pine	Subalpine fir	Engelmann spruce	Total softwoods	Total hardwoods
	<i>Thousand cubic feet</i>							
Douglas-fir	507,459	28,442	326	12,475	3,909	6,046	558,657	1,110
Lodgepole pine	8,788	279,667	8,612	565	26,524	9,174	333,330	—
Limber pine	678	1,180	—	335	—	—	2,193	—
Spruce-fir	23,012	34,318	52,675	329	104,023	82,173	296,530	—
Engelmann spruce	9,193	2,852	—	986	2,363	31,553	46,947	628
Aspen	1,044	754	—	—	—	—	1,798	10,664
Cottonwood ¹	—	—	—	—	—	—	—	14,533
All types	550,174	347,213	61,613	14,690	136,819	128,946	1,239,455	26,935
								14,533
								26,935
								1,266,390

¹Includes paper birch.

Table 24—Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by forest type and species in southwestern Montana, 1989

Forest type	Species							
	Douglas-fir	Lodgepole pine	Whitebark pine	Limber pine	Subalpine fir	Engelmann spruce	Total softwoods	Total hardwoods
	<i>Thousand board feet, International 1/4-inch rule</i>							
Douglas-fir	2,172,500	89,268	978	42,287	2,423	14,695	2,322,151	—
Lodgepole pine	34,709	867,069	26,798	—	47,908	33,651	1,010,135	—
Limber pine	4,654	6,710	—	1,986	—	—	13,350	—
Spruce-fir	126,022	155,381	221,867	—	247,592	393,951	1,144,813	—
Engelmann spruce	41,232	9,172	—	6,226	7,090	133,103	196,823	—
Aspen	5,702	3,398	—	—	—	—	9,100	19,300
Cottonwood ¹	—	—	—	—	—	—	—	56,993
								56,993
								19,300
								56,993
All types	2,384,819	1,130,998	249,643	50,499	305,013	575,400	4,696,372	76,293
								56,993
								76,293
								4,772,665

¹Includes paper birch.

Growth

Table 26—Net annual growth of growing stock on timberland outside National Forests by species and owner group in southwestern Montana, 1988

Species	Owner group					Total
	Other public			Forest Industry	NonIndustrial private	
	State	Other	Total other public			
	----- Thousand cubic feet -----					
Douglas-fir	1,252	2,448	3,700	922	6,017	10,639
Lodgepole pine	669	1,060	1,729	-470	-731	528
Whitebark pine	130	267	397	-115	-137	145
Limber pine	20	-78	-58	-1,325	216	-1,167
Subalpine fir	282	493	775	24	484	1,283
Engelmann spruce	191	409	600	768	774	2,142
Total softwoods	2,544	4,599	7,143	-196	6,623	13,570
Aspen	1	3	4	2	218	224
Cottonwood¹	19	26	45	1	271	317
Total hardwoods	20	29	49	3	489	541
All species	2,564	4,628	7,192	-193	7,112	14,111

¹Includes paper birch.

Table 27—Net annual growth of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and owner group in southwestern Montana, 1988

Species	Owner group					Total
	Other public			Forest Industry	NonIndustrial private	
	State	Other	Total other public			
----- Thousand board feet, International 1/4-inch rule -----						
Douglas-fir	8,047	13,224	21,271	4,727	33,775	59,773
Lodgepole pine	970	28	998	-6,382	-3,247	-8,631
Whitebark pine	1,095	965	2,060	1,520	-1,818	1,762
Limber pine	105	226	331	-6,459	261	-5,867
Subalpine fir	2,414	6,200	8,614	1,718	616	10,948
Engelmann spruce	344	1,340	1,684	3,152	2,472	7,308
Total softwoods	12,975	21,983	34,958	-1,724	32,059	65,293
Aspen	—	—	—	27	1,725	1,752
Cottonwood¹	285	396	681	19	2,456	3,156
Total hardwoods	285	396	681	46	4,181	4,908
All species	13,260	22,379	35,639	-1,678	36,240	70,201

¹Includes paper birch.

Table 28—Net annual growth of sawtimber (Scribner rule) on timberland outside National Forests by species and owner group in southwestern Montana, 1988

Species	Owner group					Total
	Other public		Total other public	Forest industry	Nonindustrial private	
	State	Other				
----- Thousand board feet, Scribner rule -----						
Douglas-fir	6,420	10,475	16,895	4,284	28,332	49,511
Lodgepole pine	959	519	1,478	-5,238	-2,018	-5,778
Whitebark pine	986	882	1,868	1,363	-1,348	1,883
Limber pine	96	206	302	-5,287	238	-4,747
Subalpine fir	2,204	5,496	7,700	1,579	565	9,844
Engelmann spruce	311	1,208	1,519	2,840	2,289	6,648
Total softwoods	10,976	18,786	29,762	-459	28,058	57,361
Aspen	—	—	—	20	1,326	1,346
Cottonwood ¹	230	320	550	16	2,045	2,611
Total hardwoods	230	320	550	36	3,371	3,957
All species	11,206	19,106	30,312	-423	31,429	61,318

¹Includes paper birch.

Table 29—Net annual growth of growing stock on timberland outside National Forests by species and diameter class in southwestern Montana, 1988

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+ classes
----- Thousand cubic feet -----													
Douglas-fir	1,775	1,496	1,859	1,856	1,372	707	530	392	232	136	104	74	10,640
Lodgepole pine	3,229	1,018	-1,078	-779	-667	-533	-599	-103	26	8	5	—	527
Whitebark pine	54	17	178	-170	-86	58	35	32	20	3	4	—	145
Limber pine	19	-229	-50	-51	-254	-304	-125	-113	-65	5	—	—	-1,167
Subalpine fir	359	135	164	406	204	-24	44	-9	—	2	2	—	1,283
Engelmann spruce	395	379	96	358	447	33	233	27	105	4	6	16	2,142
Total softwoods	5,831	2,816	1,169	1,620	1,016	-63	118	226	318	158	121	90	13,570
Aspen	45	67	57	46	9	—	—	—	—	—	—	—	224
Cottonwood ¹	30	19	75	63	21	31	15	22	4	21	3	—	317
Total hardwoods	75	86	132	109	30	31	15	22	4	21	3	—	541
All species	5,906	2,902	1,301	1,729	1,046	-32	133	248	322	179	124	90	14,111

¹Includes paper birch.

Table 30—Net annual growth of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and diameter class in southwestern Montana, 1988

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	25,239	11,464	8,434	4,474	3,420	2,514	1,493	887	674	486	689	59,774	
Lodgepole pine	7,061	-4,899	-3,916	-3,114	-3,397	-564	129	42	27	—	—	-8,631	
Whitebark pine	2,632	-1,028	-616	296	179	163	100	13	23	—	—	1,762	
Limber pine	-455	-367	-1,543	-1,765	-735	-664	-366	28	—	—	—	-5,867	
Subalpine fir	7,518	2,255	1,092	-127	230	-45	—	17	8	—	—	10,948	
Engelmann spruce	495	1,952	2,355	141	1,190	128	585	27	40	110	284	7,307	
Total softwoods	42,490	9,377	5,806	-95	887	1,532	1,941	1,014	772	596	973	65,293	
Aspen	XXXXX	1,709	43	—	—	—	—	—	—	—	—	1,752	
Cottonwood ¹	XXXXX	2,583	99	139	61	89	16	92	13	—	64	3,156	
Total hardwoods	XXXXX	4,292	142	139	61	89	16	92	13	—	64	4,908	
All species	42,490	13,669	5,948	44	948	1,621	1,957	1,106	785	596	1,037	70,201	

¹Includes paper birch.

Table 31—Net annual growth of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in southwestern Montana, 1988

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, Scribner rule -----												
Douglas-fir	18,224	10,310	7,678	4,124	3,145	2,267	1,329	789	600	432	613	49,511
Lodgepole pine	6,884	-3,522	-3,190	-2,670	-2,957	-500	115	37	24	—	—	-5,779
Whitebark pine	2,359	-761	-422	274	164	147	90	11	20	—	—	1,882
Limbark pine	-277	-215	-1,253	-1,500	-631	-571	-324	25	—	—	—	-4,746
Subalpine fir	6,659	2,074	1,003	-95	210	-30	—	15	8	—	—	9,844
Engelmann spruce	447	1,768	2,132	167	1,074	129	521	24	36	98	253	6,649
Total softwoods	34,296	9,654	5,948	300	1,005	1,442	1,731	901	688	530	866	57,361
Aspen	XXXXX	1,305	41	—	—	—	—	—	—	—	—	1,346
Cottonwood ¹	XXXXX	2,089	92	128	56	81	14	82	12	—	57	2,611
Total hardwoods	XXXXX	3,394	133	128	56	81	14	82	12	—	57	3,957
All species	34,296	13,048	6,081	428	1,061	1,523	1,745	983	700	530	923	61,318

¹Includes paper birch.

Mortality

Table 32—Annual mortality of growing stock on timberland outside National Forests by species and owner group in southwestern Montana, 1988

Species	Owner group					Total
	Other public			Forest industry	Nonindustrial private	
	State	Other	Total other public			
----- Thousand cubic feet -----						
Douglas-fir	66	187	253	50	742	1,045
Lodgepole pine	194	2,081	2,275	1,309	4,229	7,813
Whitebark pine	—	—	—	266	436	702
Limber pine	—	224	224	1,370	—	1,594
Subalpine fir	734	179	913	1,005	—	1,918
Engelmann spruce	—	—	—	—	329	329
Total softwoods	994	2,671	3,665	4,000	5,736	13,401
Aspen	—	—	—	—	—	—
Cottonwood ¹	—	—	—	—	—	—
Total hardwoods	—	—	—	—	—	—
All species	994	2,671	3,665	4,000	5,736	13,401

¹Includes paper birch.

Table 33—Annual mortality of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and owner group in southwestern Montana, 1988

Species	Owner group					Total
	Other public			Forest industry	Nonindustrial private	
	State	Other	Total other public			
----- Thousand board feet, International 1/4-inch rule -----						
Douglas-fir	—	818	818	237	3,507	4,562
Lodgepole pine	926	9,720	10,646	7,300	15,259	33,205
Whitebark pine	—	—	—	106	2,642	2,748
Limber pine	—	—	—	6,689	—	6,689
Subalpine fir	1,115	415	1,530	139	—	1,669
Engelmann spruce	—	—	—	—	1,573	1,573
Total softwoods	2,041	10,953	12,994	14,471	22,981	50,446
Aspen	—	—	—	—	—	—
Cottonwood ¹	—	—	—	—	—	—
Total hardwoods	—	—	—	—	—	—
All species	2,041	10,953	12,994	14,471	22,981	50,446

¹Includes paper birch.

Table 34—Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and owner group in southwestern Montana, 1988

Species	Owner group					Total
	Other public		Total other public	Forest industry	Nonindustrial private	
	State	Other				
----- Thousand board feet, Scribner rule -----						
Douglas-fir	—	687	687	149	2,826	3,662
Lodgepole pine	771	8,289	9,060	6,079	12,810	27,949
Whitebark pine	—	—	—	94	2,104	2,198
Limber pine	—	—	—	5,499	—	5,499
Subalpine fir	976	282	1,258	124	—	1,382
Engelmann spruce	—	—	—	—	1,364	1,364
Total softwoods	1,747	9,258	11,005	11,945	19,104	42,054
Aspen	—	—	—	—	—	—
Cottonwood ¹	—	—	—	—	—	—
Total hardwoods	—	—	—	—	—	—
All species	1,747	9,258	11,005	11,945	19,104	42,054

¹Includes paper birch.

Table 35—Annual mortality of growing stock on timberland outside National Forests by species and diameter class in southwestern Montana, 1988

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	88	100	110	222	50	204	204	—	—	—	—	—	66	1,044		
Lodgepole pine	732	594	2,356	1,627	1,020	661	670	153	—	—	—	—	—	7,813		
Whitebark pine	81	150	35	291	145	—	—	—	—	—	—	—	—	702		
Limber pine	198	275	80	102	286	317	146	120	71	—	—	—	—	1,595		
Subalpine fir	767	723	315	—	—	68	—	45	—	—	—	—	—	1,918		
Engelmann spruce	—	—	74	—	—	168	—	87	—	—	—	—	—	329		
Total softwoods	1,866	1,842	2,970	2,242	1,501	1,418	1,020	405	71	—	—	—	66	13,401		
Aspen	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Cottonwood ¹	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Total hardwoods	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
All species	1,866	1,842	2,970	2,242	1,501	1,418	1,020	405	71	—	—	—	66	13,401		

¹Includes paper birch.

¹Includes paper birch.

Table 36—Annual mortality of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and diameter class in southwestern Montana, 1988

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	454	1,050	237	1,129	1,214	—	—	—	—	—	477	4,561
Lodgepole pine	9,792	9,453	5,750	3,698	3,712	801	—	—	—	—	—	33,206
Whitebark pine	106	1,706	936	—	—	—	—	—	—	—	—	2,748
Limber pine	545	658	1,718	1,833	835	700	400	—	—	—	—	6,689
Subalpine fir	1,082	—	—	354	—	233	—	—	—	—	—	1,669
Engelmann spruce	218	—	—	899	—	456	—	—	—	—	—	1,573
Total softwoods	12,197	12,867	8,641	7,913	5,761	2,190	400	—	—	—	477	50,446
Aspen	XXXXX	—	—	—	—	—	—	—	—	—	—	—
Cottonwood ¹	XXXXX	—	—	—	—	—	—	—	—	—	—	—
Total hardwoods	XXXXX	—	—	—	—	—	—	—	—	—	—	—
All species	12,197	12,867	8,641	7,913	5,761	2,190	400	—	—	—	477	50,446

¹Includes paper birch.

Table 37—Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in southwestern Montana, 1988

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, Scribner rule -----													
Douglas-fir	302	817	149	933	1,037	—	—	—	—	—	425	3,663	
Lodgepole pine	8,195	7,717	4,883	3,199	3,241	713	—	—	—	—	—	27,948	
Whitebark pine	94	1,387	718	—	—	—	—	—	—	—	—	2,199	
Limber pine	357	483	1,415	1,563	721	604	355	—	—	—	—	5,498	
Subalpine fir	875	—	—	304	—	203	—	—	—	—	—	1,382	
Engelmann spruce	194	—	—	772	—	398	—	—	—	—	—	1,364	
Total softwoods	10,017	10,404	7,165	6,771	4,999	1,918	355	—	—	—	425	42,054	
Aspen	XXXXX	—	—	—	—	—	—	—	—	—	—	—	
Cottonwood ¹	XXXXX	—	—	—	—	—	—	—	—	—	—	—	
Total hardwoods	XXXXX	—	—	—	—	—	—	—	—	—	—	—	
All species	10,017	10,404	7,165	6,771	4,999	1,918	355	—	—	—	425	42,054	

¹Includes paper birch.

Table 38—Annual mortality of growing stock on timberland outside National Forests by species and cause of death in southwestern Montana, 1988

Species	Cause of death							Logging	Total
	Insects	Disease	Fire	Animal	Weather	Suppression	Unknown¹		
----- Thousand cubic feet -----									
Douglas-fir	107	—	—	—	—	—	937	—	1,044
Lodgepole pine	1,238	371	33	—	376	—	5,742	53	7,813
Whitebark pine	—	77	—	—	—	—	625	—	702
Limber pine	—	149	—	—	—	—	1,445	—	1,594
Subalpine fir	—	—	—	—	153	93	1,673	—	1,919
Engelmann spruce	—	—	—	—	329	—	—	—	329
Total softwoods	1,345	597	33	—	858	93	10,422	53	13,401
Aspen	—	—	—	—	—	—	—	—	—
Cottonwood²	—	—	—	—	—	—	—	—	—
Total hardwoods	—	—	—	—	—	—	—	—	—
All species	1,345	597	33	—	858	93	10,422	53	13,401

¹Because many destructive agents often attack trees in concert or in succession, it is often difficult to identify the actual causal agent. When the primary cause of death cannot be precisely determined, it is listed as unknown.

²Includes paper birch.

Table 39—Annual mortality of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and cause of death in southwestern Montana, 1988

Species	Cause of death							Logging	Total
	Insects	Disease	Fire	Animal	Weather	Suppression	Unknown		
----- Thousand board feet, International 1/4-inch rule -----									
Douglas-fir	626	—	—	—	—	—	3,936	—	4,562
Lodgepole pine	4,988	2,135	—	—	1,815	—	23,962	305	33,205
Whitebark pine	—	—	—	—	—	—	2,748	—	2,748
Limber pine	—	—	—	—	—	—	6,689	—	6,689
Subalpine fir	—	—	—	—	494	—	1,176	—	1,670
Engelmann spruce	—	—	—	—	1,572	—	—	—	1,572
Total softwoods	5,614	2,135	—	—	3,881	—	38,511	305	50,446
Aspen	—	—	—	—	—	—	—	—	—
Cottonwood ¹	—	—	—	—	—	—	—	—	—
Total hardwoods	—	—	—	—	—	—	—	—	—
All species	5,614	2,135	—	—	3,881	—	38,511	305	50,446

¹Includes paper birch.

Table 40—Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and cause of death in southwestern Montana, 1988

Species	Cause of death								Total
	Insects	Disease	Fire	Animal	Weather	Suppression	Unknown	Logging	
----- <i>Thousand board feet, Scribner rule</i> -----									
Douglas-fir	528	—	—	—	—	—	3,135	—	3,663
Lodgepole pine	4,228	1,699	—	—	1,475	—	20,297	249	27,948
Whitebark pine	—	—	—	—	—	—	2,198	—	2,198
Limber pine	—	—	—	—	—	—	5,499	—	5,499
Subalpine fir	—	—	—	—	428	—	954	—	1,382
Engelmann spruce	—	—	—	—	1,364	—	—	—	1,364
Total softwoods	4,756	1,699	—	—	3,267	—	32,083	249	42,054
Aspen	—	—	—	—	—	—	—	—	—
Cottonwood¹	—	—	—	—	—	—	—	—	—
Total hardwoods	—	—	—	—	—	—	—	—	—
All species	4,756	1,699	—	—	3,267	—	32,083	249	42,054

¹Includes paper birch.

COUNTY TABLES

Table 41—Area of timberland outside National Forests by county in southwestern Montana, 1989

County	Area
	<i>Acres</i>
Beaverhead	130,848
Deer Lodge	93,893
Gallatin	175,191
Madison	199,920
Park	136,041
Silver Bow	67,880
Total	803,773

Table 42—Net volume of growing stock and sawtimber on timberland outside National Forests by county in southwestern Montana, 1989

County	Growing stock	Sawtimber	
		<i>Thousand board feet International 1/4-inch rule</i>	<i>Thousand board feet Scribner rule</i>
	<i>Thousand cubic feet</i>		
Beaverhead	259,298	936,650	784,760
Deer Lodge	128,926	401,213	329,322
Gallatin	245,512	1,074,107	898,719
Madison	286,355	1,062,052	877,246
Park	259,462	983,809	808,893
Silver Bow	86,837	314,834	258,249
Total	1,266,390	4,772,665	3,957,189

Table 43—Net annual growth of growing stock and sawtimber on timberland outside National Forests by county in southwestern Montana, 1988

County	Growing stock	Sawtimber	
		<i>Thousand board feet International 1/4-inch rule</i>	<i>Thousand board feet Scribner rule</i>
	<i>Thousand cubic feet</i>		
Beaverhead	5,382	25,263	21,819
Deer Lodge	2,664	12,209	10,771
Gallatin	3,420	14,995	13,228
Madison	374	1,828	1,077
Park	8	8,011	7,639
Silver Bow	2,263	7,895	6,784
Total	14,111	70,201	61,318

Table 44—Annual mortality of growing stock and sawtimber on timberland outside National Forests by county in southwestern Montana, 1988

County	Growing stock	Sawtimber	
		<i>Thousand board feet International 1/4-inch rule</i>	<i>Thousand board feet Scribner rule</i>
	<i>Thousand cubic feet</i>		
Beaverhead	475	846	725
Deer Lodge	536	2,160	1,837
Gallatin	1,992	8,303	6,953
Madison	5,721	24,261	20,462
Park	4,387	13,536	10,994
Silver Bow	290	1,340	1,083
Total	13,401	50,446	42,054

Chojnacky, David C.; Brown, Susan S. 1991. Forest area and timber resource statistics for land outside National Forests in southwestern Montana, 1989. Resour. Bull. INT-75. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 43 p.

Presents land area, timberland area, associated volume, and components of change for the forest lands outside the National Forests in southwestern Montana.

KEYWORDS: forest survey, inventory, volume

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