Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

F76406
C2 United States
Department of
Agriculture

Forest Service

Intermountain
Research Station

Resource Bulletin
INT-66

November 1989

Timberland and Woodland Resources Outside National Forests in Arizona, 1985

Dennis C. Collins

NOV 15 1989
U.S. FOREST SERVICE
LIBRARY

PREFACE

The primary objective of Forest Survey—a continuing, nationwide undertaking of the Forest Service, U.S. Department of Agriculture—is to provide an assessment of the renewable resources for the forest lands of the Nation. Fundamental to the accomplishment of the 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 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—its volume of wood and stand dynamics as expressed by growth, removals, and mortality for State, privately owned, and most other forest lands not in the National Forest System. These data, when combined with similar information on National Forest lands, provide a basis for forming forest policies and programs and for the management and use of the resources.

THE AUTHOR

DENNIS C. COLLINS is a forester in the Forest Survey Research Work Unit at the Intermountain Research Station in Ogden, UT. His main area of responsibility is in resource analysis. He holds a B.S. degree in forest management from the University of Montana. He began his Forest Service career in 1978 with the Intermountain Station.

ACKNOWLEDGMENTS

We gratefully acknowledge the cooperation of the Bureaus of Land Management and Indian Affairs, U.S. Department of the Interior. We extend a special thanks to T. Mike Hart, Director, Forestry Division, Arizona State Land Department and his staff; and the private land owners who provided information and access to field sample locations.

RESEARCH SUMMARY

Outside National Forests in Arizona there are 10.5 million acres of nonreserved forest land, of which 87 percent is woodland. Most of the forest land is privately owned and located above the Mogollon Rim. Pinyon-juniper and juniper are the predominant forest types on woodland, occupying 5.5 and 1.9 million acres, respectively. Woodland volume is about 4.0 billion cubic feet. The ponderosa pine forest type accounts for 84 percent of the timberland. Net volume of growing stock is estimated to be 1.9 billion cubic feet.

Front cover: Predominant forest habitat types in Arizona, clockwise from top left: juniper, pinyon-juniper, ponderosa pine, and mesquite.

Intermountain Research Station
324 25th Street
Ogden, UT 84401

CONTENTS

	Page
Introduction	1
Highlights	1
Area	1
Timberland	2
Woodland	6
How the Inventory Was Conducted	9
Prefield	9
Field	9
Compilation	10
Data Reliability	10
Standard Forest Survey Terminology	10
References	14

Forest Survey Tables

1 Total land and water area by ownership class in Arizona, 1985	15
2 Area of forest land outside National Forests with percent standard error in Arizona, 1985	16
3 Net volume, net annual growth, and annual mortality of growing stock and sawtimber on forest land outside National Forests with percent standard error in Arizona	16
4 Total land area outside National Forests by major land class and ownership class in Arizona, 1985	17
5 Area of timberland outside National Forests by forest type, stand-size class, and productivity class in Arizona, 1985	18
6 Area of other publicly owned timberland by forest type, stand-size class, and productivity class in Arizona, 1985	19
7 Area of privately owned timberland by forest type, stand-size class, and productivity class in Arizona, 1985	20
8 Area of timberland outside National Forests by stand volume and ownership class in Arizona, 1985	21
9 Area of timberland outside National Forests by forest type and area condition class in Arizona, 1985	22
10 Number of growing-stock trees on timberland outside National Forests by species and diameter class in Arizona, 1985	22
11 Number of cull and salvable dead trees on timberland outside National Forests by ownership class, and softwoods and hardwoods in Arizona, 1985	23
12 Net volume of growing stock on timberland outside National Forests by ownership class, forest type, and stand-size class in Arizona, 1985	24
13 Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by ownership class, forest type, and stand-size class in Arizona, 1985	25
14 Net volume of sawtimber (Scribner rule) on timberland outside National Forests by ownership class, forest type, and stand-size class in Arizona, 1985	26
15 Net volume of growing stock on timberland outside National Forests by species and ownership class in Arizona, 1985	27
16 Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and ownership class in Arizona, 1985	27

	Page
17 Net volume of sawtimber (Scribner rule) on timberland outside National Forests by species and ownership class in Arizona, 1985	28
18 Net volume of growing stock on timberland outside National Forests by species and diameter class in Arizona, 1985	29
19 Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and diameter class in Arizona, 1985	30
20 Net volume of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in Arizona, 1985	31
21 Net volume of timber on timberland outside National Forests by class of timber, and softwoods and hardwoods in Arizona, 1985	32
22 Net volume of growing stock on timberland outside National Forests by forest type and species in Arizona, 1985	33
23 Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by forest type and species in Arizona, 1985	33
24 Net volume of sawtimber (Scribner rule) on timberland outside National Forests by forest type and species in Arizona, 1985	34
25 Net annual growth of growing stock on timberland outside National Forests by species and ownership class in Arizona, 1984	35
26 Net annual growth of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and ownership class in Arizona, 1984	35
27 Net annual growth of sawtimber (Scribner rule) on timberland outside National Forests by species and ownership class in Arizona, 1984	36
28 Net annual growth of growing stock on timberland outside National Forests by species and diameter class in Arizona, 1984	37
29 Net annual growth of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and diameter class in Arizona, 1984	38
30 Net annual growth of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in Arizona, 1984	39
31 Annual mortality of growing stock on timberland outside National Forests by species and ownership class in Arizona, 1984	40
32 Annual mortality of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and ownership class in Arizona, 1984	40
33 Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and ownership class in Arizona, 1984	41
34 Annual mortality of growing stock on timberland outside National Forests by species and diameter class in Arizona, 1984	42
35 Annual mortality of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and diameter class in Arizona, 1984	43
36 Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in Arizona, 1984	44

	Page
37 Annual mortality of growing stock on timberland outside National Forests by species and cause of death in Arizona, 1984	45
38 Annual mortality of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and cause of death in Arizona, 1984	46
39 Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and cause of death in Arizona, 1984	47
40 Area of woodland outside National Forests by forest type and ownership class in Arizona, 1985	48
41 Area of woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1985	49
42 Area of woodland outside National Forests by ownership class, forest type, and volume class in Arizona, 1985	50
43 Number of trees on woodland outside National Forests by ownership class, species, and diameter class in Arizona, 1985	51
44 Net volume on woodland outside National Forests by species and ownership class in Arizona, 1985	52
45 Net volume of woodland species on woodland outside National Forests by ownership class, species, and diameter class in Arizona, 1985	53
46 Net volume on woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1985	54

	Page
47 Net volume on woodland outside National Forests by ownership class, forest type, and volume class in Arizona, 1985	55
48 Net dead volume of woodland species on woodland outside National Forests by ownership class, species, and diameter class in Arizona, 1985	56
49 Net dead volume of woodland species on woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1985	57
50 Net dead volume of woodland species on woodland outside National Forests by ownership class, forest type, and volume class in Arizona, 1985	58
51 Net annual growth on woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1984	59
52 Annual mortality on woodland outside National Forests by species and ownership class in Arizona, 1984	60
53 Number of pinyon Christmas trees on woodland outside National Forests by ownership class, grade, and height class in Arizona, 1985	60
54 Number of fenceposts on woodland outside National Forests by ownership class, species, and type of post in Arizona, 1985	61
55 Area of timberland and woodland outside National Forests by county in Arizona, 1985	61

Timberland and Woodland Resources Outside National Forests in Arizona, 1985

Dennis C. Collins

INTRODUCTION

This report presents the principal findings of the most recent Forest Survey of the timberland and woodland resources outside National Forests in Arizona. Information on forest land area, volume, growth, removals, and mortality was derived from inventory data collected during cooperative inventories between 1982 and 1985. The data are presented in tables 1 through 55 at the end of this publication.

The resource statistics in this report include estimates for those lands in private ownership and those public lands administered by the Bureau of Land Management (BLM), U.S. Department of the Interior (USDI) other Federal agencies, the State of Arizona, and county and municipal governments. Reserved areas, such as those lands administered by the USDI National Park Service, are not field sampled but are included in the total area summaries (table 1). La Paz and Yuma Counties were administratively designated nonforest and not sampled. Resource estimates for those lands administered by the National Forest System, Forest Service, U.S. Department of Agriculture, are not included in this report but will be combined with the estimates presented here and in other sample area reports to form the basis for a statewide report of Arizona's forest resources.

HIGHLIGHTS

Area

Excluding National Forests, the land and water area of Arizona is 61,724,722 acres. Of this, 53 percent is privately owned. Most of the remaining lands are administered by the Bureau of Land Management and the State of Arizona (fig. 1). About 11.4 million acres are forest land and include species as diverse as mesquite (*Prosopis* sp.) growing among saguaro cactus in southern Arizona, and subalpine fir (*Abies lasiocarpa*) growing in the high mountains. The bulk of the forested area outside National Forests is woodland (fig. 2). About 8 percent or 935,496 acres of forest land is reserved from harvesting wood products, and most of it is in Grand Canyon National Park.

Figure 1—Distribution of land area outside National Forests by ownership class in Arizona, 1985.

Figure 2—Area of timberland and woodland outside National Forests in Arizona, 1985.

Timberland

Area—Most of the 1.4 million acres of nonreserved timberland is found in the northern half of the State above the Mogollon Rim and is mainly privately owned. Only 55,000 acres or 4 percent is found on other public lands. Mohave, Yavapai, Coconino, Navajo, and Apache Counties account for 1.2 million acres of the State's timberland (fig. 3).

Ponderosa pine is the predominant forest type, occupying 1.1 million acres or 84 percent of the timberland (fig. 4). Of this type, 16 percent has the inherent ability to produce 50 cubic feet or more per acre per year (fig. 5).

Figure 3—Distribution of timberland outside National Forests by county in northern Arizona, 1985.

Figure 4—Distribution of timberland outside National Forests by forest type in Arizona, 1985.

Figure 5—Distribution of ponderosa pine forest type outside National Forests by productivity class in Arizona, 1985.

Douglas-fir is the next most common forest type, occupying 14 percent of timberland. Most of this type falls in the 50 to 84 cubic feet per acre per year productivity class.

The bulk of timberland stands support between 1,500 and 10,000 board feet of sawtimber (International 1/4-inch rule) per acre. Only about 18 percent or 253,000 acres support 10,000 board feet or more per acre (fig. 6).

Figure 6—Distribution of timberland outside National Forests by stand volume class in Arizona, 1985.

Volume—Net volume of growing stock is approximately 1.9 billion cubic feet. Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) account for 78 percent of it (fig. 7). Most of this volume is found in sawtimber stands. The average net volume per acre is 1,373 cubic feet.

Over 95 percent or 8.4 billion board feet of the sawtimber volume is found in the ponderosa pine and Douglas-fir forest types. Within these two types almost 1 billion board feet are Engelmann spruce (*Picea engelmannii*) and aspen (*Populus tremuloides*).

Figure 7—Distribution of net growing-stock volume on timberland outside National Forests by species in Arizona, 1985.

Figure 8—Net annual growth of growing stock on timberland outside National Forests by diameter class in Arizona, 1984.

The average net annual growth is 23 cubic feet per acre, which is a little more than half the average potential net annual growth of 42 cubic feet per acre. The difference between actual and potential growth can, in part, be explained by area condition class (table 9). About two-thirds of timberland stands are nonstocked, poorly stocked with desirable trees—area condition classes 50, 60, 70—or are occupied by stands more than 100 years old—area condition class 90. These kinds of conditions contribute little to growth, primarily due to the lack of those types of trees normally featured in management.

Annual mortality of growing stock resulted in a loss of 11.4 million cubic feet of wood, which is about 1 percent of the net growing-stock volume. Weather damage caused over a quarter of the total mortality, and insects and logging damage each accounted for 18 percent (fig. 9).

Ponderosa pine and Engelmann spruce together make up 74 percent of the growing stock mortality and 80 percent of the sawtimber mortality.

The volume of timber products, primarily sawlogs harvested in 1984, was 21.6 million cubic feet (McLain 1988b). Of that, 97 percent was growing stock and the remainder came from dead trees.

Of the growing-stock volume, 5 percent or 163,000 cubic feet was harvested for fuelwood in 1984 (McLain 1988a).

Figure 9—Distribution of mortality on timberland outside National Forests by cause of death in Arizona, 1984.

Woodland

Area—On the nonreserved lands outside National Forests, about 87 percent of 9.1 million acres are woodland. About 6.9 million acres of Arizona's woodland are privately owned. Almost three-quarters of the woodland area or 6.7 million acres are found in the State's northernmost counties (fig. 10).

Figure 10—Distribution of woodland outside National Forests by county in northern Arizona, 1985.

About 7.3 million acres of woodland are composed of pinyon-juniper and juniper forest types (fig. 11). Species commonly in these types are Rocky Mountain juniper (*Juniperus scopulorum*), Utah juniper (*J. osteosperma*), oneseed juniper (*J. monosperma*), alligator juniper (*J. deppeana*), pinyon (*Pinus edulis*), and singleleaf pinyon (*P. monophylla*).

Mesquite and oak forest types account for 18 percent of the woodland, with mesquite being the predominant forest type in southern Arizona.

There are numerous oak species in the State, with Emory oak (*Quercus emoryi*), Gambel oak (*Q. gambelii*), and Arizona white oak (*Q. arizonica*) being the most common.

Figure 11—Area of woodland outside National Forests by forest type in Arizona, 1985.

Volume—Total volume in woodland trees 3.0 inches diameter at root collar (d.r.c.) and larger is about 4.0 billion cubic feet. Of this, some 770 million cubic feet or 19 percent is dead wood mostly contained in live trees (fig. 12). More than two-thirds of the total volume is juniper species.

Total volume per acre averages about 437 cubic feet. Woodland supporting 600 cubic feet or more per acre accounts for 60 percent of the net volume.

Over three-quarters of the 1.2 billion woodland trees are pinyon or juniper. Sixty percent of these trees are under 7.0 inches d.r.c. (fig. 13). Pinyon and juniper trees 23.0 inches d.r.c. and larger represent only 2 percent of the total number of trees on woodland but contain 21 percent of the net volume (fig. 14).

Figure 12—Distribution of gross volume of woodland species on woodland outside National Forests by live and dead wood in Arizona, 1985.

Figure 13—Distribution of pinyon and juniper trees on woodland outside National Forests by diameter class in Arizona, 1985.

Figure 14—Net volume on woodland outside National Forests by species and diameter class in Arizona, 1985.

Components of Change—Net annual growth on woodland is over 27 million cubic feet. The pinyon-juniper, juniper, and oak types account for 93 percent of this growth.

Annual mortality on woodland averages some 719,000 cubic feet. This is only about two-hundredths of one percent—0.02 percent—of the total volume on woodland.

Woodland Species Products—Woodland species have historically been a major source of fuelwood in Arizona. In 1984, some 2.6 million cubic feet of woodland species were harvested from lands outside National Forests for this purpose (McLain 1988a). Mesquite accounted for 1.1 million cubic feet of this harvest (fig. 15), and most of it came from Pima County.

Pinyon is used as Christmas trees in Arizona. Of the estimated 87.4 million pinyons meeting Christmas tree standards, 41 percent are in the preferred 6- to 10-foot height class.

Woodland species have also been a major source of fenceposts. The number of fenceposts potentially available from woodland is estimated at 193 million. Thirty-six percent are the preferred cornerposts, and 86 percent are from juniper.

HOW THE INVENTORY WAS CONDUCTED

The inventory was designed to provide reliable statistics primarily at the State and sample area levels.

Prefield

Initial area estimates were based on land classification information derived from Landsat multispectral scanner (MSS) data. These data were summarized and grouped into strata for subsequent field sampling. Area estimates adjusted to meet known land areas were used to compute area expansion factors for the sampling strata means.

Field

Land classification and estimates for timberland and woodland characteristics and volume were based on observations and measurements recorded at 1,646 forested field sample locations.

Sample trees for timberland were selected using a 5-point cluster. Trees less than 5.0 inches d.b.h. were measured on a $\frac{1}{300}$ -acre fixed radius plot. Trees 5.0 inches d.b.h. or larger were selected using a variable radius plot. A 20 basal area factor was used for ponderosa pine locations. Other timberland locations were measured using a 40 basal area factor.

Figure 15—Volume of fuelwood harvested outside National Forests by woodland species in Arizona, 1984.

Sample trees for woodland were selected using a $\frac{1}{20}$ -acre, $\frac{1}{10}$ -acre, or $\frac{1}{5}$ -acre fixed radius plot for trees 3.0 inches d.r.c. and larger. Trees less than 3.0 inches d.r.c. were tallied on $\frac{1}{300}$ -acre subplots.

Compilation

All MSS, photo, and field data were loaded onto tape and stored for computer editing, computation, and tabulation. Final estimates from these data were based on statistical summaries, a portion of which is included in this bulletin. Volume and defect were computed using equations developed by Chojnacky (1988), Edminster (1977), and Hann and Bare (1978). Defect for woodland species was computed from field observations.

DATA RELIABILITY

Individual cells within tables should be used with caution. Some are based on small sample sizes, which may result in high sampling errors. The standard error percentages shown in tables 2 and 3 were calculated at the 67 percent confidence level.

STANDARD FOREST SURVEY TERMINOLOGY

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

Area condition class—A classification 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):

Class 10—Areas fully stocked with desirable trees and not overstocked.

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

Class 30—Areas medium to fully stocked 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, or both.

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, or both.

Class 50—Areas poorly stocked 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 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 10 percent stocked with growing-stock trees.

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.

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.

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 within the next decade.

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 labeled by the midpoint of the class.

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 inch 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 inch 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—Dicotyledonous trees, usually broad-leaved and deciduous.

High-risk old-growth stands—Timber stands over 100 years old in which the majority of the trees are not expected to survive more than 10 years.

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

Low-risk old-growth stands—Timber stands over 100 years old in which the majority of the trees are expected to survive more than 10 years.

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.

Old-growth stands—Stands of timber species over 100 years old.

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

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 at culmination of mean annual growth attainable in fully stocked natural stands.

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

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 or down 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.

Softwood trees—Monocotyledonous trees, usually evergreen, having 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 utilized by present or potential growing-stock trees of timber species.
- 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.

REFERENCES

- Chojnacky, David C. 1988. Juniper, pinyon, oak, and mesquite volume equations for Arizona. Res. Pap. INT-391. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 11 p.
- Edminster, Carleton B. 1977. Past diameters and gross volumes of plains cottonwood in eastern Colorado. Res. Note RM-351. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 4 p.
- Hann, David W.; Bare, Bruce B. 1978. Comprehensive tree volume equations for major species of New Mexico and Arizona: II. tables for unforked trees. Res. Pap. INT-210. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 127 p.
- McLain, William H. 1988a. Arizona's 1984 fuelwood harvest. Resour. Bull. INT-57. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 8 p.
- McLain, William H. 1988b. Arizona's timber production and mill residue, 1984. Resour. Bull. INT-55. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 16 p.

FOREST SURVEY TABLES

Table 1--Total land and water area by ownership class
in Arizona, 1985

Ownership class	Area
	- - <u>Acres</u> - -
Land:	
Public:	
National Forest	11,235,316
Other public:	
Bureau of Land Management	11,803,378
National Parks ¹	2,587,633
Miscellaneous Federal	4,424,027
State	9,635,026
County and municipal	158,976
Total other public	28,609,040
Total public	39,844,356
Private:	
Indian	20,150,604
Other private	12,786,767
Total private	32,937,371
Total land area	72,781,727
Census water	178,311
Total land and water ²	72,960,038

¹Not 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.

²U.S. Department of Commerce, Bureau of Census. Area measurement reports, GE-20 No. 1, 22 p., 1970, updated to account for changes in inland water estimates obtained from the USDA Soil Conservation Service's National Resource Inventory, 1982.

Table 2--Area of forest land outside National Forests with percent standard error in Arizona, 1985

Item	Acres	Percent standard error
Timberland	1,372,013	±2.6
Woodland	9,133,597	±2.3
Reserved forest land: ¹		
Timberland	226,236	
Woodland	709,260	
Total forest land ²	11,441,106	

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 forest land outside National Forests with percent standard error in Arizona

Forest land	Item	All species	
		Volume	Percent standard error
Timberland:	Net volume, 1985:		
	Growing stock (M cubic feet)	1,884,208	±3.5
	Sawtimber ¹ (M board feet)	8,832,759	±4.0
	Sawtimber ² (M board feet)	7,880,850	±3.9
	Net annual growth, 1984:		
	Growing stock (M cubic feet)	31,327	±6.0
	Sawtimber ¹ (M board feet)	153,437	±7.3
	Sawtimber ² (M board feet)	135,515	±7.2
	Annual mortality, 1984:		
	Growing stock (M cubic feet)	11,420	±9.9
	Sawtimber ¹ (M board feet)	56,139	±12.1
	Sawtimber ² (M board feet)	50,524	±12.1
Woodland:	Volume, 1985	3,227,572,901	±3.7
	Growth, 1984	30,716,592	
	Mortality, 1984	719,594	

¹International ¼-inch rule.

²Scribner rule.

Table 4--Total land area outside National Forests by major land class and ownership class in Arizona, 1985

Land class	Ownership class		
	Other public	Private	Total
- - - - - Acres - - - - -			
Timberland:			
Reserved	214,399	11,837	226,236
Nonreserved	54,937	1,317,076	1,372,013
Total	269,336	1,328,913	1,598,249
Woodland:			
Reserved	709,260	--	709,260
Nonreserved	2,249,633	6,883,964	9,133,597
Total	2,958,893	6,883,964	9,842,857
Total forest land:			
Reserved	923,659	11,837	935,496
Nonreserved	2,304,570	8,201,040	10,505,610
Total	3,228,229	8,212,877	11,441,106
Nonforest land	25,380,813	24,724,492	50,105,305
Total land area	28,609,042	32,937,369	61,546,411

Table 5--Area of timberland outside National Forests by forest type, stand-size class, and productivity class in Arizona, 1985

Forest type and stand-size class	Productivity class				Total acres
	85-119	50-84	20-49	0-19	
	- - - - - Acres - - - - -				
Douglas-fir:					
Sawtimber	--	133,489	62,089	--	195,578
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	2,287	--	2,287
Nonstocked	--	--	--	--	--
Total	--	133,489	64,376	--	197,865
Ponderosa pine:					
Sawtimber	2,573	184,876	834,297	2,378	1,024,124
Poletimber	--	--	41,938	1,189	43,127
Sapling and seedling	--	--	36,781	--	36,781
Nonstocked	--	--	26,575	16,170	42,745
Total	2,573	184,876	939,591	19,737	1,146,777
Spruce-fir:					
Sawtimber	--	13,444	1,034	--	14,478
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	6,205	--	--	6,205
Total	--	19,649	1,034	--	20,683
Aspen:					
Sawtimber	--	--	4,180	--	4,180
Poletimber	--	2,508	--	--	2,508
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	2,508	4,180	--	6,688
All types:					
Sawtimber	2,573	331,809	901,600	2,378	1,238,360
Poletimber	--	2,508	41,938	1,189	45,635
Sapling and seedling	--	--	39,068	--	39,068
Nonstocked	--	6,205	26,575	16,170	48,950
Total	2,573	340,522	1,009,181	19,737	1,372,013

Table 6--Area of other publicly owned timberland by forest type, stand-size class, and productivity class in Arizona, 1985

Forest type and stand-size class	Productivity class				Total acres
	85-119	50-84	20-49	0-19	
	- - - - - Acres - - - - -				
Douglas-fir:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	--	--
Ponderosa pine:					
Sawtimber	--	--	54,937	--	54,937
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	54,937	--	54,937
Spruce-fir:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	--	--
Aspen:					
Sawtimber	--	--	--	--	--
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	--	--	--
All types:					
Sawtimber	--	--	54,937	--	54,937
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	--	54,937	--	54,937

Table 7--Area of privately owned timberland by forest type, stand-size class, and productivity class in Arizona, 1985

Forest type and stand-size class	Productivity class				Total acres
	85-119	50-84	20-49	0-19	
	- - - - - Acres - - - - -				
Douglas-fir:					
Sawtimber	--	133,489	62,089	--	195,578
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	2,287	--	2,287
Nonstocked	--	--	--	--	--
Total	--	133,489	64,376	--	197,865
Ponderosa pine:					
Sawtimber	2,573	184,876	779,360	2,378	969,187
Poletimber	--	--	41,938	1,189	43,127
Sapling and seedling	--	--	36,781	--	36,781
Nonstocked	--	--	26,575	16,170	42,745
Total	2,573	184,876	884,654	19,737	1,091,840
Spruce-fir:					
Sawtimber	--	13,444	1,034	--	14,478
Poletimber	--	--	--	--	--
Sapling and seedling	--	--	--	--	--
Nonstocked	--	6,205	--	--	6,205
Total	--	19,649	1,034	--	20,683
Aspen:					
Sawtimber	--	--	4,180	--	4,180
Poletimber	--	2,508	--	--	2,508
Sapling and seedling	--	--	--	--	--
Nonstocked	--	--	--	--	--
Total	--	2,508	4,180	--	6,688
All types:					
Sawtimber	2,573	331,809	846,663	2,378	1,183,423
Poletimber	--	2,508	41,938	1,189	45,635
Sapling and seedling	--	--	39,068	--	39,068
Nonstocked	--	6,205	26,575	16,170	48,950
Total	2,573	340,522	954,244	19,737	1,317,076

Table 8--Area of timberland outside National Forests by stand volume and ownership class in Arizona, 1985

Stand volume per acre ¹	Ownership class		
	Other public	Private	Total
	- - - - - Acres - - - - -		
Less than 1,500 board feet	--	298,533	298,533
1,500 to 4,999 board feet	36,710	452,014	488,724
5,000 to 9,999 board feet	18,227	313,557	331,784
10,000 board feet or more	--	252,972	252,972
All classes	54,937	1,317,076	1,372,013

¹International $\frac{1}{4}$ -inch rule.

Table 9--Area of timberland outside National Forests by forest type and area condition class in Arizona, 1985

Forest type	Area condition class										
	10	20	30	40	50	60	70	80	90	Nonstocked	All classes
	----- Acres -----										
Douglas-fir	94,777	--	44,051	--	34,707	--	2,287	--	22,042	--	197,864
Ponderosa pine	167,661	--	160,527	4,575	344,437	139,819	131,423	1,465	154,125	42,745	1,146,777
Spruce-fir	4,137	--	5,171	--	5,171	--	--	--	--	6,205	20,684
Aspen	5,852	--	--	--	836	--	--	--	--	--	6,688
All types	272,427	--	209,749	4,575	385,151	139,819	133,710	1,465	176,167	48,950	1,372,013

Table 10--Number of growing-stock trees on timberland outside National Forests by species and diameter class in Arizona, 1985

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	--	1,528	5,141	4,822	2,028	1,392	811	495	198	286	130	146	148	60	157	17,342	
Ponderosa pine	30,725	35,313	36,611	22,445	14,055	9,142	5,216	3,782	3,028	1,986	1,621	1,057	774	458	488	166,701	
Limber pine	--	--	722	568	303	129	78	53	26	25	31	7	52	7	33	2,034	
Subalpine fir	--	--	378	350	178	67	114	39	17	12	5	17	--	--	5	1,182	
White fir	--	--	1,608	751	375	193	73	66	45	38	47	7	20	7	65	3,295	
Engelmann spruce	--	--	2,819	1,578	1,073	858	596	373	332	192	106	44	34	--	25	8,030	
Total softwoods	30,725	36,841	47,279	30,514	18,012	11,781	6,888	4,808	3,646	2,539	1,940	1,278	1,028	532	773	198,584	
Aspen	3,006	1,683	5,504	3,318	2,603	1,580	1,132	490	292	115	30	13	5	6	--	19,777	
Cottonwood	--	--	60	36	36	49	25	19	6	6	--	6	--	--	6	249	
Total hardwoods	3,006	1,683	5,564	3,354	2,639	1,629	1,157	509	298	121	30	19	5	6	6	20,026	
All species	33,731	38,524	52,843	33,868	20,651	13,410	8,045	5,317	3,944	2,660	1,970	1,297	1,033	538	779	218,610	

Table 11--Number of cull and salvable dead trees on timberland outside National Forests by ownership class, and softwoods and hardwoods in Arizona, 1985

Ownership class and species group	Cull trees			Salvable dead trees	Total
	Rough	Rotten	Total		
	- - - - - <u>Thousand trees</u> - - - - -				
Other public:					
Softwoods	--	--	--	181	181
Hardwoods	--	--	--	--	--
Total	--	--	--	181	181
Private:					
Softwoods	19	--	19	8,436	8,455
Hardwoods	--	87	87	3,410	3,497
Total	19	87	106	11,846	11,952
Total:					
Softwoods	19	--	19	8,617	8,636
Hardwoods	--	87	87	3,410	3,497
Total	19	87	106	12,027	12,133

Table 12--Net volume of growing stock on timberland outside National Forests by ownership class, forest type, and stand-size class in Arizona, 1985

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/ seedling	Nonstocked	
----- Thousand cubic feet -----						
Other public:	Douglas-fir	--	--	--	--	--
	Ponderosa pine	46,975	--	--	--	46,975
	Spruce-fir	--	--	--	--	--
	Aspen	--	--	--	--	--
	All types	46,975	--	--	--	46,975
Private:	Douglas-fir	582,927	--	576	--	583,503
	Ponderosa pine	1,112,488	22,830	11,495	3,894	1,150,707
	Spruce-fir	58,493	--	--	10,707	69,200
	Aspen	19,524	14,299	--	--	33,823
	All types	1,773,432	37,129	12,071	14,601	1,837,233
Total:	Douglas-fir	582,927	--	576	--	583,503
	Ponderosa pine	1,159,463	22,830	11,495	3,894	1,197,682
	Spruce-fir	58,493	--	--	10,707	69,200
	Aspen	19,524	14,299	--	--	33,823
	All types	1,820,407	37,129	12,071	14,601	1,884,208

Table 13--Net volume of sawtimber (International 1/4-inch rule) on timberland outside National Forests by ownership class, forest type, and stand-size class in Arizona, 1985

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/ seedling	Nonstocked	
- - - - Thousand board feet, International 1/4-inch rule - - - -						
Other public:	Douglas-fir	--	--	--	--	--
	Ponderosa pine	231,137	--	--	--	231,137
	Spruce-fir	--	--	--	--	--
	Aspen	--	--	--	--	--
	All types	231,137	--	--	--	231,137
Private:	Douglas-fir	2,844,210	--	2,683	--	2,846,893
	Ponderosa pine	5,204,434	52,725	50,776	19,429	5,327,364
	Spruce-fir	302,999	--	--	55,076	358,075
	Aspen	22,595	46,695	--	--	69,290
	All types	8,374,238	99,420	53,459	74,505	8,601,622
Total:	Douglas-fir	2,844,210	--	2,683	--	2,846,893
	Ponderosa pine	5,435,571	52,725	50,776	19,429	5,558,501
	Spruce-fir	302,999	--	--	55,076	358,075
	Aspen	22,595	46,695	--	--	69,290
	All types	8,605,375	99,420	53,459	74,505	8,832,759

Table 14--Net volume of sawtimber (Scribner rule) on timberland outside National Forests by ownership class, forest type, and stand-size class in Arizona, 1985

Ownership class	Forest type	Stand-size class				All classes
		Sawtimber	Poletimber	Sapling/ seedling	Nonstocked	
<hr/>						
		- - - - -	- - - - -	Thousand board feet, Scribner rule	- - - - -	- - - - -
Other public:						
	Douglas-fir	--	--	--	--	--
	Ponderosa pine	201,584	--	--	--	201,584
	Spruce-fir	--	--	--	--	--
	Aspen	--	--	--	--	--
<hr/>						
	All types	201,584	--	--	--	201,584
<hr/>						
Private:						
	Douglas-fir	2,553,892	--	2,239	--	2,556,131
	Ponderosa pine	4,632,978	44,205	43,849	17,089	4,738,121
	Spruce-fir	272,972	--	--	49,618	322,590
	Aspen	20,356	42,068	--	--	62,424
<hr/>						
	All types	7,480,198	86,273	46,088	66,707	7,679,266
<hr/>						
Total:						
	Douglas-fir	2,553,892	--	2,239	--	2,556,131
	Ponderosa pine	4,834,562	44,205	43,849	17,089	4,939,705
	Spruce-fir	272,972	--	--	49,618	322,590
	Aspen	20,356	42,068	--	--	62,424
<hr/>						
	All types	7,681,782	86,273	46,088	66,707	7,880,850

Table 15--Net volume of growing stock on timberland outside National Forests by species and ownership class in Arizona, 1985

Species	Ownership class		
	Other public	Private	Total
- - - - - Thousand cubic feet - - - - -			
Douglas-fir	--	204,448	204,448
Ponderosa pine	46,975	1,217,154	1,264,129
Limber pine	--	26,216	26,216
Subalpine fir	--	16,367	16,367
White fir	--	35,899	35,899
Engelmann spruce	--	132,740	132,740
Total softwoods	46,975	1,632,824	1,679,799
Aspen	--	201,529	201,529
Cottonwood	--	2,880	2,880
Total hardwoods	--	204,409	204,409
All species	46,975	1,837,233	1,884,208

Table 16--Net volume of sawtimber (International $\frac{1}{4}$ -inch rule) on timberland outside National Forests by species and ownership class in Arizona, 1985

Species	Ownership class		
	Other public	Private	Total
- Thousand board feet, International $\frac{1}{4}$ -inch rule -			
Douglas-fir	--	952,589	952,589
Ponderosa pine	231,137	5,929,910	6,161,047
Limber pine	--	122,612	122,612
Subalpine fir	--	72,480	72,480
White fir	--	159,050	159,050
Engelmann spruce	--	653,896	653,896
Total softwoods	231,137	7,890,537	8,121,674
Aspen	--	698,104	698,104
Cottonwood	--	12,981	12,981
Total hardwoods	--	711,085	711,085
All species	231,137	8,601,622	8,832,759

Table 17--Net volume of sawtimber (Scribner rule) on timberland outside National Forests by species and ownership class in Arizona, 1985

Species	Ownership class		
	Other public	Private	Total
- - - Thousand board feet, Scribner rule - -			
Douglas-fir	--	843,320	843,320
Ponderosa pine	201,584	5,293,124	5,494,708
Limber pine	--	110,461	110,461
Subalpine fir	--	65,297	65,297
White fir	--	143,289	143,289
Engelmann spruce	--	589,096	589,096
Total softwoods	201,584	7,044,587	7,246,171
Aspen	--	622,984	622,984
Cottonwood	--	11,695	11,695
Total hardwoods	--	634,679	634,679
All species	201,584	7,679,266	7,880,850

Table 18--Net volume of growing stock on timberland outside National Forests by species and diameter class in Arizona, 1985

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	10,002	19,205	15,291	18,004	17,431	15,007	8,077	15,791	9,941	14,282	14,963	8,704	37,750	204,448	
Ponderosa pine	57,326	74,984	96,438	109,760	103,878	109,593	124,906	108,558	121,035	104,540	92,116	65,824	95,171	1,264,129	
Limber pine	1,335	2,025	2,265	1,779	1,579	1,684	1,102	1,341	2,164	543	4,840	721	4,838	26,216	
Subalpine fir	795	1,705	1,825	1,263	3,369	1,735	1,067	842	555	2,183	--	--	1,027	16,366	
White fir	3,221	2,974	2,775	2,395	1,533	1,899	1,806	2,030	2,997	534	1,901	807	11,027	35,899	
Engelmann spruce	5,356	6,555	9,821	14,136	16,415	15,948	19,356	15,399	11,224	5,727	5,569	--	7,234	132,740	
Total softwoods	78,035	107,448	128,415	147,337	144,205	145,866	156,314	143,961	147,916	127,809	119,389	76,056	157,047	1,679,798	
Aspen	14,790	25,580	36,417	37,378	35,173	21,918	15,924	8,693	2,751	1,385	615	906	--	201,530	
Cottonwood	42	98	197	433	347	367	159	195	--	357	--	--	685	2,880	
Total hardwoods	14,832	25,678	36,614	37,811	35,520	22,285	16,083	8,888	2,751	1,742	615	906	685	204,410	
All species	92,867	133,126	165,029	185,148	179,725	168,151	172,397	152,849	150,667	129,551	120,004	76,962	157,732	1,884,208	

Table 19--Net volume of sawtimber (International 4-inch rule) on timberland outside National Forests by species and diameter class in Arizona, 1985

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 4-inch rule -----													
Douglas-fir	44,309	61,535	77,546	74,677	43,536	90,589	59,620	89,189	93,751	56,800	261,037	952,589	
Ponderosa pine	293,350	394,670	468,987	567,462	694,654	640,149	745,654	668,766	600,871	437,809	648,675	6,161,047	
Limber pine	6,538	6,184	6,886	8,632	5,983	7,488	12,768	3,277	29,667	4,482	30,707	122,612	
Subalpine fir	5,269	4,828	16,272	9,484	6,285	5,099	3,589	14,481	--	--	7,173	72,480	
White fir	8,010	7,827	6,539	9,233	9,471	11,212	17,273	3,170	11,472	4,964	69,879	159,050	
Engelmann spruce	28,345	48,686	77,151	86,499	113,430	96,033	73,384	38,550	38,663	--	53,155	653,896	
Total softwoods	385,821	523,730	653,381	755,987	873,359	850,570	912,288	817,433	774,424	504,055	1,070,626	8,121,674	
Aspen	XXXXX	190,670	195,300	127,615	95,131	53,675	17,223	8,767	3,907	5,816	--	698,104	
Cottonwood	XXXXX	1,804	1,633	1,841	827	1,028	--	1,855	--	--	3,993	12,981	
Total hardwoods	XXXXX	192,474	196,933	129,456	95,958	54,703	17,223	10,622	3,907	5,816	3,993	711,085	
All species	385,821	716,204	850,314	885,443	969,317	905,273	929,511	828,055	778,331	509,871	1,074,619	8,832,759	

Table 20--Net volume of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in Arizona, 1985

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	38,095	51,772	66,358	65,776	38,201	80,241	53,148	80,351	83,283	51,171	234,924	843,320	
Ponderosa pine	251,482	340,996	414,885	504,947	622,617	574,468	669,481	600,762	539,635	393,093	582,341	5,494,707	
Limber pine	5,890	5,571	6,204	7,776	5,390	6,746	11,503	2,953	26,727	4,038	27,664	110,462	
Subalpine fir	4,747	4,350	14,659	8,544	5,663	4,593	3,233	13,046	--	--	6,462	65,297	
White fir	7,216	7,051	5,891	8,318	8,533	10,101	15,561	2,856	10,336	4,472	62,954	143,289	
Engelmann spruce	25,536	43,861	69,506	77,928	102,189	86,516	66,112	34,730	34,831	--	47,887	589,096	
Total softwoods	332,966	453,601	577,503	673,289	782,593	762,665	819,038	734,698	694,812	452,774	962,232	7,246,171	
Aspen	XXXXX	171,376	172,318	113,697	85,063	48,356	15,516	7,898	3,520	5,240	--	622,984	
Cottonwood	XXXXX	1,626	1,471	1,658	745	926	--	1,671	--	--	3,598	11,695	
Total hardwoods	XXXXX	173,002	173,789	115,355	85,808	49,282	15,516	9,569	3,520	5,240	3,598	634,679	
All species	332,966	626,603	751,292	788,644	868,401	811,947	834,554	744,267	698,332	458,014	965,830	7,880,850	

Table 21--Net volume of timber on timberland outside National Forests
by class of timber, and softwoods and hardwoods in Arizona,
1985

Class of timber	Softwoods	Hardwoods	Total
- - - - - <u>Thousand cubic feet</u> - - - - -			
Sawtimber trees:			
Sawlog portion	378,973	10,894	389,867
Upper-stem portion	1,115,343	116,390	1,231,733
Total	1,494,316	127,284	1,621,600
Poletimber trees	185,483	77,125	262,608
All growing-stock trees	1,679,799	204,409	1,884,208
Rough cull trees	206	--	206
Rotten cull trees	--	715	715
Salvable dead trees	106,234	23,483	129,717
All timber	1,786,239	228,607	2,014,846

Table 22--Net volume of growing stock on timberland outside National Forests by forest type and species in Arizona, 1985

Forest type	Species										
	Douglas- fir	Ponderosa pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	----- Thousand cubic feet -----										
Douglas-fir	150,341	167,092	18,738	5,362	32,831	75,823	450,187	132,877	439	133,316	583,503
Ponderosa pine	52,485	1,097,008	7,478	--	2,224	2,531	1,161,726	33,514	2,442	35,956	1,197,682
Spruce-fir	1,256	--	--	10,550	775	53,680	66,261	2,939	--	2,939	69,200
Aspen	366	29	--	454	68	706	1,623	32,200	--	32,200	33,823
All types	204,448	1,264,129	26,216	16,366	35,898	132,740	1,679,797	201,530	2,881	204,411	1,884,208

Table 23--Net volume of sawtimber (International 4-inch rule) on timberland outside National Forests by forest type and species in Arizona, 1985

Forest type	Species										
	Douglas-fir	Ponderosa pine	Limber pine	Subalpine fir	White fir	Engelmann spruce	Total softwoods	Aspen	Cottonwood	Total hardwoods	All species
	----- Thousand board feet, International 4-inch rule -----										
Douglas-fir	778,633	946,587	91,635	25,278	146,120	356,441	2,344,694	500,181	2,017	502,198	2,846,892
Ponderosa pine	165,902	5,214,376	30,977	--	8,297	12,411	5,431,963	115,574	10,965	126,539	5,558,502
Spruce-fir	7,108	--	--	46,863	4,450	282,503	340,924	17,151	--	17,151	358,075
Aspen	946	84	--	338	184	2,541	4,093	65,197	--	65,197	69,290
All types	952,589	6,161,047	122,612	72,479	159,051	653,896	8,121,674	698,103	12,982	711,085	8,832,759

Table 25--Net annual growth of growing stock on timberland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		
	Other public	Private	Total
- - - - - Thousand cubic feet - - - - -			
Douglas-fir	--	4,385	4,385
Ponderosa pine	830	21,895	22,725
Limber pine	--	348	348
Subalpine fir	--	172	172
White fir	--	842	842
Engelmann spruce	--	-96	-96
Total softwoods	830	27,546	28,376
Aspen	--	2,663	2,663
Cottonwood	--	288	288
Total hardwoods	--	2,951	2,951
All species	830	30,497	31,327

Table 26--Net annual growth of sawtimber (International 1/4-inch rule) on timberland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		
	Other public	Private	Total
- Thousand board feet, International 1/4-inch rule -			
Douglas-fir	--	19,683	19,683
Ponderosa pine	3,668	106,462	110,130
Limber pine	--	2,162	2,162
Subalpine fir	--	1,039	1,039
White fir	--	2,637	2,637
Engelmann spruce	--	-2,410	-2,410
Total softwoods	3,668	129,573	133,241
Aspen	--	18,671	18,671
Cottonwood	--	1,525	1,525
Total hardwoods	--	20,196	20,196
All species	3,668	149,769	153,437

Table 27--Net annual growth of sawtimber (Scribner rule) on timberland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		
	Other public	Private	Total
<hr/>			
- - - <u>Thousand board feet, Scribner rule</u> - - -			
Douglas-fir	--	17,529	17,529
Ponderosa pine	3,250	93,496	96,746
Limber pine	--	1,948	1,948
Subalpine fir	--	936	936
White fir	--	2,375	2,375
Engelmann spruce	--	-2,171	-2,171
<hr/>			
Total softwoods	3,250	114,113	117,363
<hr/>			
Aspen	--	16,778	16,778
Cottonwood	--	1,374	1,374
<hr/>			
Total hardwoods	--	18,152	18,152
<hr/>			
All species	3,250	132,265	135,515

Table 28--Net annual growth of growing stock on timberland outside National Forests by species and diameter class in Arizona, 1984

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	687	792	572	610	568	365	140	168	133	148	78	96	28	4,385	
Ponderosa pine	4,167	2,472	3,403	3,378	2,576	2,096	1,210	987	963	677	768	127	-98	22,726	
Limber pine	76	56	88	47	-1	-36	16	13	18	2	53	2	14	348	
Subalpine fir	39	38	30	15	25	2	-20	6	5	19	--	--	13	172	
White fir	243	144	123	118	69	60	53	46	58	11	26	-64	-45	842	
Engelmann spruce	290	202	321	336	216	-49	-172	-297	-372	-34	55	-300	-293	-97	
Total softwoods	5,502	3,704	4,537	4,504	3,453	2,438	1,227	923	805	823	980	-139	-381	28,376	
Aspen	514	428	554	419	276	185	199	26	27	9	13	13	--	2,663	
Cottonwood	4	10	20	43	35	37	16	19	--	36	--	--	68	288	
Total hardwoods	518	438	574	462	311	222	215	45	27	45	13	13	68	2,951	
All species	6,020	4,142	5,111	4,966	3,764	2,660	1,442	968	832	868	993	-126	-313	31,327	

Table 29--Net annual growth of sawtimber (International 4-inch rule) on timberland outside National Forests by species and diameter class in Arizona, 1984

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 4-inch rule -----													
Douglas-fir	5,980	2,195	3,382	2,347	919	1,204	906	1,082	591	678	399	19,683	
Ponderosa pine	34,074	14,648	15,156	13,221	8,239	6,719	6,896	4,927	5,567	1,226	-543	110,130	
Limber pine	1,275	216	34	-146	100	80	125	14	357	11	96	2,162	
Subalpine fir	408	96	262	52	-104	48	33	147	--	--	96	1,038	
White fir	935	307	385	397	328	296	392	75	172	-387	-263	2,637	
Engelmann spruce	2,435	1,412	1,857	239	-582	-1,587	-2,290	-182	421	-2,119	-2,014	-2,410	
Total softwoods	45,107	18,874	21,076	16,110	8,900	6,760	6,062	6,063	7,108	-591	-2,229	133,240	
Aspen	XXXXX	13,405	2,088	1,288	1,255	216	182	61	90	86	--	18,671	
Cottonwood	XXXXX	1,190	49	55	25	31	--	56	--	--	120	1,526	
Total hardwoods	XXXXX	14,595	2,137	1,343	1,280	247	182	117	90	86	120	20,197	
All species	45,107	33,469	23,213	17,453	10,180	7,007	6,244	6,180	7,198	-505	-2,109	153,437	

Table 30--Net annual growth of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in Arizona, 1984

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	5,386	1,905	2,961	2,105	816	1,073	813	975	525	611	359	17,529	
Ponderosa pine	28,134	13,090	13,704	12,039	7,549	6,020	6,186	4,419	5,001	1,104	-500	96,746	
Limber pine	1,148	195	31	-131	90	72	112	12	322	10	87	1,948	
Subalpine fir	368	86	236	47	-93	44	30	132	--	--	86	936	
White fir	842	277	346	358	295	267	353	68	155	-349	-237	2,375	
Engelmann spruce	2,193	1,272	1,673	215	-524	-1,429	-2,063	-164	379	-1,909	-1,814	-2,171	
Total softwoods	38,071	16,825	18,951	14,633	8,133	6,047	5,431	5,442	6,382	-533	-2,019	117,363	
Aspen	XXXXX	12,076	1,850	1,153	1,127	195	164	55	81	77	--	16,778	
Cottonwood	XXXXX	1,072	44	50	22	28	--	50	--	--	108	1,374	
Total hardwoods	XXXXX	13,148	1,894	1,203	1,149	223	164	105	81	77	108	18,152	
All species	38,071	29,973	20,845	15,836	9,282	6,270	5,595	5,547	6,463	-456	-1,911	135,515	

Table 31--Annual mortality of growing stock on timberland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		Total
	Other public	Private	
<hr/>			
	<hr/> <div>Thousand cubic feet</div> <hr/>		
Douglas-fir	--	649	649
Ponderosa pine	151	4,832	4,983
Limber pine	--	156	156
Subalpine fir	--	190	190
White fir	--	298	298
Engelmann spruce	--	3,431	3,431
<hr/>			
Total softwoods	151	9,556	9,707
<hr/>			
Aspen	--	1,713	1,713
Cottonwood	--	--	--
<hr/>			
Total hardwoods	--	1,713	1,713
<hr/>			
All species	151	11,269	11,420

Table 32--Annual mortality of sawtimber (International 4-inch rule) on timberland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		
	Other public	Private	Total
<hr/>			
- <u>Thousand board feet, International 4-inch rule</u> -			
Douglas-fir	--	3,026	3,026
Ponderosa pine	895	24,159	25,054
Limber pine	--	506	506
Subalpine fir	--	682	682
White fir	--	1,500	1,500
Engelmann spruce	--	19,838	19,838
<hr/>			
Total softwoods	895	49,711	50,606
<hr/>			
Aspen	--	5,533	5,533
Cottonwood	--	--	--
<hr/>			
Total hardwoods	--	5,533	5,533
<hr/>			
All species	895	55,244	56,139

Table 33--Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		
	Other public	Private	Total
- - - Thousand board feet, Scribner rule - - -			
Douglas-fir	--	2,726	2,726
Ponderosa pine	796	21,723	22,519
Limber pine	--	456	456
Subalpine fir	--	615	615
White fir	--	1,351	1,351
Engelmann spruce	--	17,872	17,872
Total softwoods	796	44,743	45,539
Aspen	--	4,985	4,985
Cottonwood	--	--	--
Total hardwoods	--	4,985	4,985
All species	796	49,728	50,524

Table 34--Annual mortality of growing stock on timberland outside National Forests by species and diameter class in Arizona, 1984

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- 30.9	31.0- 32.9	33.0- 34.9	
	Thousand cubic feet															
Douglas-fir	80	46	42	35	22	--	22	82	--	--	55	--	265	649		
Ponderosa pine	499	264	175	123	181	258	810	495	496	556	73	348	705	4,983		
Limber pine	21	26	13	8	26	62	--	--	--	--	--	--	--	156		
Subalpine fir	16	24	27	20	50	21	32	--	--	--	--	--	--	190		
White fir	31	14	16	8	--	17	--	--	--	--	--	74	138	298		
Engelmann spruce	51	86	85	121	247	406	548	567	535	108	--	300	377	3,431		
Total softwoods	698	460	358	315	526	764	1,412	1,144	1,031	664	128	722	1,485	9,707		
Aspen	229	224	261	323	399	165	32	80	--	--	--	--	--	1,713		
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Total hardwoods	229	224	261	323	399	165	32	80	--	--	--	--	--	1,713		
All species	927	684	619	638	925	929	1,444	1,224	1,031	664	128	722	1,485	11,420		

Table 35--Annual mortality of sawtimber (International 4-inch rule) on timberland outside National Forests by species and diameter class in Arizona, 1984

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 4-inch rule												
Douglas-fir	122	95	93	--	119	476	--	--	321	--	1,800	3,026	
Ponderosa pine	505	399	805	1,320	4,493	2,991	3,096	3,667	489	2,244	5,045	25,054	
Limber pine	36	33	118	319	--	--	--	--	--	--	--	506	
Subalpine fir	77	68	236	111	190	--	--	--	--	--	--	682	
White fir	46	21	--	79	--	--	--	--	--	453	901	1,500	
Engelmann spruce	246	432	1,139	2,196	3,221	3,559	3,493	747	--	2,119	2,686	19,838	
Total softwoods	1,032	1,048	2,391	4,025	8,023	7,026	6,589	4,414	810	4,816	10,432	50,606	
Aspen	XXXXX	1,652	2,226	965	197	493	--	--	--	--	--	5,533	
Cottonwood	XXXXX	--	--	--	--	--	--	--	--	--	--	--	
Total hardwoods	XXXXX	1,652	2,226	965	197	493	--	--	--	--	--	5,533	
All species	1,032	2,700	4,617	4,990	8,220	7,519	6,589	4,414	810	4,816	10,432	56,139	

Table 36--Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and diameter class in Arizona, 1984

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	109	85	84	--	108	429	--	--	289	--	1,622	--	2,726
Ponderosa pine	455	359	725	1,190	4,006	2,695	2,789	3,303	440	2,012	4,545	--	22,519
Limber pine	33	29	107	287	--	--	--	--	--	--	--	--	456
Subalpine fir	69	61	213	100	172	--	--	--	--	--	--	--	615
White fir	42	19	--	71	--	--	--	--	--	408	811	--	1,351
Engelmann spruce	221	389	1,026	1,978	2,902	3,207	3,147	673	--	1,909	2,420	--	17,872
Total softwoods	929	942	2,155	3,626	7,188	6,331	5,936	3,976	729	4,329	9,398	--	45,539
Aspen	XXXXX	1,489	2,005	869	177	445	--	--	--	--	--	--	4,985
Cottonwood	XXXXX	--	--	--	--	--	--	--	--	--	--	--	--
Total hardwoods	XXXXX	1,489	2,005	869	177	445	--	--	--	--	--	--	4,985
All species	929	2,431	4,160	4,495	7,365	6,776	5,936	3,976	729	4,329	9,398	--	50,524

Table 37--Annual mortality of growing stock on timberland outside National Forests by species and cause of death in Arizona, 1984

Species	Cause of death							Total
	Insects	Disease	Fire	Animal	Weather	Suppression	Logging	
	Thousand cubic feet							
Douglas-fir	1	119	28	1	352	2	66	649
Ponderosa pine	364	267	485	16	1,341	43	1,421	4,983
Limber pine	--	--	67	23	3	25	38	156
Subalpine fir	9	--	--	26	58	--	11	190
White fir	3	--	1	14	99	--	8	298
Engelmann spruce	1,630	120	--	69	779	3	263	3,431
Total softwoods	2,007	506	581	149	2,632	73	1,807	9,707
Aspen	--	741	34	20	426	35	277	1,713
Cottonwood	--	--	--	--	--	--	--	--
Total hardwoods	--	741	34	20	426	35	277	1,713
All species	2,007	1,247	615	169	3,058	108	2,084	11,420

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.

Table 38--Annual mortality of sawtimber (International 4-inch rule) on timberland outside National Forests by species and cause of death in Arizona, 1984

Species	Cause of death									
	Insects	Disease	Fire	Animal	Weather	Suppression	Logging	Unknown	Total	
	- - - - -	- - - - -	- - - - -	<u>Thousand board feet, International 4-inch rule</u>						- - - - -
Douglas-fir	--	554	26	--	2,033	--	62	350	3,025	
Ponderosa pine	2,011	1,168	1,675	9	7,425	101	6,533	6,132	25,054	
Limber pine	--	--	296	26	--	123	62	--	507	
Subalpine fir	17	--	--	72	292	--	--	302	683	
White fir	--	--	--	18	469	--	--	1,013	1,500	
Engelmann spruce	9,960	543	--	160	4,481	--	1,411	3,283	19,838	
Total softwoods	11,988	2,265	1,997	285	14,700	224	8,068	11,080	50,607	
Aspen	--	2,345	79	77	1,655	--	780	596	5,532	
Cottonwood	--	--	--	--	--	--	--	--	--	
Total hardwoods	--	2,345	79	77	1,655	--	780	596	5,532	
All species	11,988	4,610	2,076	362	16,355	224	8,848	11,676	56,139	

Table 39--Annual mortality of sawtimber (Scribner rule) on timberland outside National Forests by species and cause of death in Arizona, 1984

Species	Cause of death								
	Insects	Disease	Fire	Animal	Weather	Suppression	Logging	Unknown	Total
	-	-	-	-	-	Thousand board feet, Scribner rule	-	-	-
Douglas-fir	--	499	24	--	1,832	--	56	315	2,726
Ponderosa pine	1,802	1,052	1,509	8	6,647	91	5,886	5,524	22,519
Limber pine	--	--	267	23	--	111	55	--	456
Subalpine fir	15	--	--	65	263	--	--	272	615
White fir	--	--	--	16	422	--	--	913	1,351
Engelmann spruce	8,973	489	--	144	4,037	--	1,271	2,958	17,872
Total softwoods	10,790	2,040	1,800	256	13,201	202	7,268	9,982	45,539
Aspen	--	2,113	71	70	1,491	--	703	537	4,985
Cottonwood	--	--	--	--	--	--	--	--	--
Total hardwoods	--	2,113	71	70	1,491	--	703	537	4,985
All species	10,790	4,153	1,871	326	14,692	202	7,971	10,519	50,524

Table 40--Area of woodland outside National Forests by forest type and ownership class in Arizona, 1985

Forest type	Ownership class		
	Other public	Private	Total
	- - - - - Acres - - - - -		
Pinyon-juniper	954,515	4,515,091	5,469,606
Juniper	645,884	1,226,714	1,872,598
Total woodland softwoods	1,600,399	5,741,805	7,342,204
Oak	104,976	360,016	464,992
Mesquite	479,785	699,168	1,178,953
Other woodland	64,473	82,975	147,448
Total woodland hardwoods	649,234	1,142,159	1,791,393
All types	2,249,633	6,883,964	9,133,597

Table 41--Area of woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1985

Ownership class	Forest type	Productivity class		
		High	Low	All classes
		- - - - - Acres - - - - -		
Other public:	Pinyon-juniper	895,454	59,061	954,515
	Juniper	546,988	98,895	645,883
	Oak	104,976	--	104,976
	Mesquite	378,059	101,727	479,786
	Other woodland	24,706	39,767	64,473
	Total	1,950,183	299,450	2,249,633
Private:	Pinyon-juniper	3,578,607	936,485	4,515,092
	Juniper	968,401	258,313	1,226,714
	Oak	326,674	33,342	360,016
	Mesquite	436,223	262,944	699,167
	Other woodland	44,651	38,324	82,975
	Total	5,354,556	1,529,408	6,883,964
Total:	Pinyon-juniper	4,474,061	995,546	5,469,607
	Juniper	1,515,389	357,208	1,872,597
	Oak	431,650	33,342	464,992
	Mesquite	814,282	364,671	1,178,953
	Other woodland	69,357	78,091	147,448
	Total	7,304,739	1,828,858	9,133,597

Table 42--Area of woodland outside National Forests by ownership class, forest type, and volume class in Arizona, 1985

Ownership class	Forest type	Volume class							All classes
		0 - 199 ft ³ /acre	200 - 399 ft ³ /acre	400 - 599 ft ³ /acre	600 - 799 ft ³ /acre	800 - 999 ft ³ /acre	1,000+ ft ³ /acre		
		----- Acres -----							
Other public:	Pinyon-juniper	299,715	238,527	152,831	97,947	64,979	100,516	954,515	
	Juniper	234,419	166,319	117,987	85,923	--	41,236	645,884	
	Oak	69,985	17,328	17,663	--	--	--	104,976	
	Mesquite	409,370	58,258	12,157	--	--	--	479,785	
	Other woodland	64,473	--	--	--	--	--	64,473	
	Total	1,077,962	480,432	300,638	183,870	64,979	141,752	2,249,633	
Private:	Pinyon-juniper	1,016,351	1,146,080	820,783	756,350	304,676	470,851	4,515,091	
	Juniper	511,038	264,241	187,564	130,381	54,771	78,719	1,226,714	
	Oak	110,353	99,453	13,348	27,326	43,024	66,512	360,016	
	Mesquite	568,584	63,404	31,007	4,325	31,848	--	699,168	
	Other woodland	64,604	6,584	2,928	--	--	8,859	82,975	
	Total	2,270,930	1,579,762	1,055,630	918,382	434,319	624,941	6,883,964	
Total:	Pinyon-juniper	1,316,066	1,384,607	973,614	854,297	369,655	571,367	5,469,606	
	Juniper	745,457	430,560	305,551	216,304	54,771	119,955	1,872,598	
	Oak	180,338	116,781	31,011	27,326	43,024	66,512	464,992	
	Mesquite	977,954	121,662	43,164	4,325	31,848	--	1,178,953	
	Other woodland	129,077	6,584	2,928	--	--	8,859	147,448	
	Total	3,348,892	2,060,194	1,356,268	1,102,252	499,298	766,693	9,133,597	

Table 43--Number of trees on woodland outside National Forests by ownership class, species, and diameter class in Arizona, 1985

Ownership class and species	Diameter class (inches at root collar)																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 -----																	
Other public:																	
Pinyon	26,277	14,501	8,594	5,619	3,695	2,257	1,225	413	--	107	53	64	66	--	--	--	62,871
Juniper	36,871	19,160	21,746	15,003	14,593	11,191	6,394	6,860	4,566	3,905	2,122	1,720	1,005	1,154	1,510	--	147,800
Oak	--	4,104	3,757	1,642	1,001	557	793	--	114	--	--	--	--	--	--	--	11,968
Mesquite	15,615	5,190	5,622	4,708	2,837	1,429	949	446	182	170	--	--	--	--	--	--	37,148
Other woodland	3,123	1,866	1,100	498	601	182	61	306	61	--	63	--	--	63	--	--	7,924
Total	81,886	44,821	40,819	27,470	22,727	15,616	9,422	8,025	4,923	4,182	2,238	1,784	1,071	1,217	1,510	--	267,711
Private:																	
Pinyon	141,512	65,622	58,897	36,821	27,164	14,191	6,726	5,107	1,516	1,131	165	137	29	53	--	--	359,071
Juniper	96,353	43,002	48,700	39,644	34,279	33,251	27,395	21,932	16,857	13,559	10,565	6,925	4,748	3,927	5,162	--	406,299
Oak	24,148	24,397	26,294	17,347	9,016	5,046	3,945	1,850	1,819	400	358	377	193	16	88	--	115,294
Mesquite	37,951	15,680	11,466	6,384	4,563	2,385	1,017	773	448	72	87	--	--	--	--	--	80,826
Other woodland	8,681	2,321	1,471	697	457	58	236	43	127	38	29	--	--	--	23	--	14,181
Total	308,645	151,022	146,828	100,893	75,479	54,931	39,319	29,705	20,767	15,200	11,204	7,439	4,970	3,996	5,273	--	975,671
Total:																	
Pinyon	167,789	80,123	67,491	42,440	30,859	16,448	7,951	5,520	1,516	1,238	218	201	95	53	--	--	421,942
Juniper	133,224	62,162	70,446	54,647	48,872	44,442	33,789	28,792	21,423	17,464	12,687	8,645	5,753	5,081	6,672	--	554,099
Oak	24,148	28,501	30,051	18,989	10,017	5,603	4,738	1,850	1,933	400	358	377	193	16	88	--	127,262
Mesquite	53,566	20,870	17,088	11,092	7,400	3,814	1,966	1,219	630	242	87	--	--	--	--	--	117,974
Other woodland	11,804	4,187	2,571	1,195	1,058	240	297	349	188	38	92	--	--	63	23	--	22,105
Total	390,531	195,843	187,647	128,363	98,206	70,547	48,741	37,730	25,690	19,382	13,442	9,223	6,041	5,213	6,783	--	1,243,382

Table 44--Net volume on woodland outside National Forests by species and ownership class in Arizona, 1985

Species	Ownership class		Total
	Other public	Private	
<hr/>			
	<u>Thousand cubic feet</u>		
Douglas-fir	--	1,178	1,178
Ponderosa pine	--	42,913	42,913
Cottonwood	--	276	276
Pinyon	94,161	600,208	694,369
Juniper	511,023	1,604,546	2,115,569
Oak	17,839	223,321	241,160
Mesquite	40,734	76,491	117,225
Other woodland	6,769	8,114	14,883
<hr/>			
All species	670,526	2,557,047	3,227,573

Table 45--Net volume of woodland species on woodland outside National Forests by ownership class, species, and diameter class in Arizona, 1985

Ownership class and species	Diameter class (inches at root collar)														29.0+	All classes
	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			
----- Thousand cubic feet -----																
Other public:																
Pinyon	4,710	9,216	15,315	16,994	17,273	14,353	5,189	--	3,450	1,469	2,113	4,079	--	--	--	94,161
Juniper	4,624	14,801	22,592	39,098	47,193	38,573	58,387	55,472	52,891	40,812	27,567	22,323	39,687	47,003	--	511,023
Oak	668	2,330	2,043	2,601	1,293	7,159	--	1,745	--	--	--	--	--	--	--	17,839
Mesquite	1,601	4,224	7,469	6,842	6,950	5,835	2,467	2,773	2,573	--	--	--	--	--	--	40,734
Other woodland	225	380	338	803	525	298	1,803	385	--	748	--	--	1,264	--	--	6,769
Total	11,828	30,951	47,757	66,338	73,234	66,218	67,846	60,375	58,914	43,029	29,680	26,402	40,951	47,003		670,526
Private:																
Pinyon	20,841	60,747	86,104	118,898	96,557	68,441	75,475	30,336	27,704	6,234	3,345	2,234	3,292	--	--	600,208
Juniper	11,391	34,414	56,585	85,129	127,916	144,564	160,690	161,509	164,022	153,844	132,474	104,785	89,926	177,297	--	1,604,546
Oak	8,819	28,647	32,933	26,876	22,990	29,250	18,450	24,211	7,109	5,670	8,497	5,288	241	4,340	--	223,321
Mesquite	4,475	7,730	10,637	14,285	14,224	8,570	7,063	7,004	931	1,572	--	--	--	--	--	76,491
Other woodland	631	769	1,306	228	168	755	153	1,357	549	854	--	--	--	1,344	--	8,114
Total	46,157	132,307	187,565	245,416	261,855	251,580	261,831	224,417	200,315	168,174	144,316	112,307	93,459	182,981		2,512,680
Total:																
Pinyon	25,551	69,963	101,419	135,892	113,830	82,794	80,664	30,336	31,154	7,703	5,458	6,313	3,292	--	--	694,369
Juniper	16,015	49,215	79,177	124,227	175,109	183,137	219,077	216,981	216,913	194,656	160,041	127,108	129,613	224,300	--	2,115,569
Oak	9,487	30,977	34,976	29,477	24,283	36,409	18,450	25,956	7,109	5,670	8,497	5,288	241	4,340	--	241,160
Mesquite	6,076	11,954	18,106	21,127	21,174	14,405	9,530	9,777	3,504	1,572	--	--	--	--	--	117,225
Other woodland	856	1,149	1,644	1,031	693	1,053	1,956	1,742	549	1,602	--	--	1,264	1,344	--	14,883
Total	57,985	163,258	235,322	311,754	335,089	317,798	329,677	284,792	259,229	211,203	173,996	138,709	134,410	229,984		3,183,206

Table 46--Net volume on woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1985

Ownership class	Forest type	Productivity class		
		High	Low	All classes
- - - - - <u>Thousand cubic feet</u> - - - - -				
Other public:	Pinyon-juniper	371,418	8,485	379,903
	Juniper	218,517	10,109	228,626
	Oak	14,902	--	14,902
	Mesquite	40,782	4,122	44,904
	Other woodland	1,745	446	2,191
	Total	647,364	23,162	670,526
Private:	Pinyon-juniper	1,627,383	248,975	1,876,358
	Juniper	340,898	49,239	390,137
	Oak	195,358	3,015	198,373
	Mesquite	72,138	8,553	80,691
	Other woodland	9,338	2,150	11,488
	Total	2,245,115	311,932	2,557,047
Total:	Pinyon-juniper	1,998,801	257,460	2,256,261
	Juniper	559,415	59,348	618,763
	Oak	210,260	3,015	213,275
	Mesquite	112,920	12,675	125,595
	Other woodland	11,083	2,596	13,679
	Total	2,892,479	335,094	3,227,573

Table 47--Net volume on woodland outside National Forests by ownership class, forest type, and volume class in Arizona, 1985

Ownership class	Forest type	Volume class							All classes
		0 - 199 ft ³ /acre	200 - 399 ft ³ /acre	400 - 599 ft ³ /acre	600 - 799 ft ³ /acre	800 - 999 ft ³ /acre	1,000+ ft ³ /acre		
		-	-	-	-	-	-	-	-
		Thousand cubic feet							-
Other public:	Pinyon-juniper	24,998	70,661	62,649	52,172	52,128	117,295	379,903	
	Juniper	18,043	45,708	48,610	51,736	--	64,529	228,626	
	Oak	5,285	2,749	6,868	--	--	--	14,902	
	Mesquite	25,247	15,158	4,499	--	--	--	44,904	
	Other woodland	2,191	--	--	--	--	--	2,191	
	Total	75,764	134,276	122,626	103,908	52,128	181,824	670,526	
Private:	Pinyon-juniper	95,569	278,216	317,563	399,207	209,381	576,423	1,876,359	
	Juniper	40,353	68,045	75,565	72,305	39,626	94,242	390,136	
	Oak	5,233	27,845	5,941	15,428	29,026	114,900	198,373	
	Mesquite	28,433	14,594	10,936	3,228	23,500	--	80,691	
	Other woodland	1,146	1,319	1,561	--	--	7,462	11,488	
	Total	170,734	390,019	411,566	490,168	301,533	793,027	2,557,047	
Total:	Pinyon-juniper	120,567	348,877	380,212	451,379	261,509	693,718	2,256,262	
	Juniper	58,396	113,753	124,175	124,041	39,626	158,771	618,762	
	Oak	10,518	30,594	12,809	15,428	29,026	114,900	213,275	
	Mesquite	53,680	29,752	15,435	3,228	23,500	--	125,595	
	Other woodland	3,337	1,319	1,561	--	--	7,462	13,679	
	Total	246,498	524,295	534,192	594,076	353,661	974,851	3,227,573	

Table 48--Net dead volume of woodland species on woodland outside National Forests by ownership class, species, and diameter class in Arizona, 1985

Ownership class and species	Diameter class (inches at root collar)															All classes
	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 cubic feet -----																
Other public:																
Pinyon	93	373	918	2,283	2,529	566	--	--	--	77	564	--	--	--	--	7,403
Juniper	163	1,147	1,735	3,023	6,954	10,524	13,148	7,614	13,661	16,248	9,782	6,859	3,669	26,095	--	120,622
Oak	118	751	412	378	698	211	--	205	677	--	--	--	--	--	--	3,450
Mesquite	176	633	562	730	930	1,604	797	800	686	--	--	--	--	--	--	6,918
Other woodland	103	163	163	261	111	40	848	118	--	200	--	1,292	195	--	--	3,494
Total	653	3,067	3,790	6,675	11,222	12,945	14,793	8,737	15,024	16,525	10,346	8,151	3,864	26,095	--	141,887
Private:																
Pinyon	723	4,510	10,070	19,764	16,001	11,292	9,208	5,566	4,166	385	2,851	394	173	--	--	85,103
Juniper	274	1,994	5,292	12,589	25,016	41,543	44,965	50,259	51,423	47,368	51,916	41,311	36,238	79,400	--	489,588
Oak	1,531	2,286	3,393	2,706	3,227	3,501	4,461	7,117	1,540	2,692	1,849	696	1,127	933	--	37,059
Mesquite	680	1,887	2,408	2,273	2,485	1,762	1,517	102	215	77	--	--	--	--	--	13,406
Other woodland	86	359	124	669	97	353	41	181	461	--	--	--	--	978	--	3,349
Total	3,294	11,036	21,287	38,001	46,826	58,451	60,192	63,225	57,805	50,522	56,616	42,401	37,538	81,311	--	628,505
Total:																
Pinyon	816	4,883	10,988	22,047	18,530	11,858	9,208	5,566	4,166	462	3,415	394	173	--	--	92,506
Juniper	437	3,141	7,027	15,612	31,970	52,067	58,113	57,873	65,084	63,616	61,698	48,170	39,907	105,495	--	610,210
Oak	1,649	3,037	3,805	3,084	3,925	3,712	4,461	7,322	2,217	2,692	1,849	696	1,127	933	--	40,509
Mesquite	856	2,520	2,970	3,003	3,415	3,366	2,314	902	901	77	--	--	--	--	--	20,324
Other woodland	189	522	287	930	208	393	889	299	461	200	--	1,292	195	978	--	6,843
Total	3,947	14,103	25,077	44,676	58,048	71,396	74,985	71,962	72,829	67,047	66,962	50,552	41,402	107,406	--	770,392

Table 49--Net dead volume of woodland species on woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1985

Ownership class	Forest type	Productivity class		
		High	Low	All classes
- - - - <u>Thousand cubic feet</u> - - - -				
Other public:	Pinyon-juniper	84,273	3,390	87,663
	Juniper	38,021	3,599	41,620
	Oak	2,274	--	2,274
	Mesquite	8,843	983	9,826
	Other woodland	342	162	504
	Total	133,753	8,134	141,887
Private:	Pinyon-juniper	366,316	114,425	480,741
	Juniper	90,628	10,044	100,672
	Oak	28,005	687	28,692
	Mesquite	12,853	2,024	14,877
	Other woodland	2,070	1,453	3,523
	Total	499,872	128,633	628,505
Total:	Pinyon-juniper	450,589	117,815	568,404
	Juniper	128,649	13,643	142,292
	Oak	30,279	687	30,966
	Mesquite	21,696	3,007	24,703
	Other woodland	2,412	1,615	4,027
	Total	633,625	136,767	770,392

Table 50--Net dead volume of woodland species on woodland outside National Forests by ownership class, forest type, and volume class in Arizona, 1985

Ownership class	Forest type	Volume class							All classes
		0 - 199 ft ³ /acre	200 - 399 ft ³ /acre	400 - 599 ft ³ /acre	600 - 799 ft ³ /acre	800 - 999 ft ³ /acre	1,000+ ft ³ /acre		
		Thousand cubic feet							
Other public:	Pinyon-juniper	4,231	2,616	13,526	14,015	9,082	44,193	87,663	
	Juniper	4,489	4,651	9,323	6,529	--	16,628	41,620	
	Oak	888	1,175	211	--	--	--	2,274	
	Mesquite	6,278	2,383	1,165	--	--	--	9,826	
	Other woodland	504	--	--	--	--	--	504	
Total		16,390	10,825	24,225	20,544	9,082	60,821	141,887	
Private:	Pinyon-juniper	13,871	62,687	79,811	126,236	61,863	136,273	480,741	
	Juniper	6,166	13,013	15,322	19,735	12,336	34,100	100,672	
	Oak	1,375	3,840	958	4,306	7,918	10,295	28,692	
	Mesquite	6,193	4,052	1,619	224	2,789	--	14,877	
	Other woodland	97	138	88	--	--	3,200	3,523	
Total		27,702	83,730	97,798	150,501	84,906	183,868	628,505	
Total:	Pinyon-juniper	18,102	65,303	93,337	140,251	70,945	180,466	568,404	
	Juniper	10,655	17,664	24,645	26,264	12,336	50,728	142,292	
	Oak	2,263	5,015	1,169	4,306	7,918	10,295	30,966	
	Mesquite	12,471	6,435	2,784	224	2,789	--	24,703	
	Other woodland	601	138	88	--	--	3,200	4,027	
Total		44,092	94,555	122,023	171,045	93,988	244,689	770,392	

Table 51--Net annual growth on woodland outside National Forests by ownership class, forest type, and productivity class in Arizona, 1984

Ownership class	Forest type	Productivity class		
		High	Low	All classes
<hr/>				
		- - - - - <u>Thousand cubic feet</u> - - - - -		
Other public:	Pinyon-juniper	3,293	80	3,373
	Juniper	1,379	90	1,469
	Oak	195	--	195
	Mesquite	1,665	212	1,877
	Other woodland	10	13	23
	Total	6,542	395	6,937
<hr/>				
Private:	Pinyon-juniper	13,449	2,015	15,464
	Juniper	2,434	296	2,730
	Oak	2,035	-26	2,009
	Mesquite	2,953	496	3,449
	Other woodland	117	10	127
	Total	20,988	2,791	23,779
<hr/>				
Total:	Pinyon-juniper	16,742	2,095	18,837
	Juniper	3,813	386	4,199
	Oak	2,230	-26	2,204
	Mesquite	4,618	708	5,326
	Other woodland	127	23	150
	Total	27,530	3,186	30,716

Table 52--Annual mortality on woodland outside National Forests by species and ownership class in Arizona, 1984

Species	Ownership class		
	Other public	Private	Total
- - - - - <u>Thousand cubic feet</u> - - - - -			
Douglas-fir	--	--	--
Ponderosa pine	--	168	168
Cottonwood	--	--	--
Pinyon	--	220	220
Juniper	--	140	140
Oak	26	97	123
Mesquite	--	68	68
Other woodland	--	--	--
All species	26	693	719

Table 53--Number of pinyon Christmas trees on woodland outside National Forests by ownership class, grade, and height class in Arizona, 1985

Ownership class	Christmas-tree grade	Height class			All classes
		0-5 ft	6-10 ft	11-12 ft	
- - - - - <u>Thousand trees</u> - - - - -					
Other public:	Premium	--	647	155	802
	Standard	795	2,809	481	4,085
	Utility	1,664	3,138	786	5,588
	Total	2,459	6,594	1,422	10,475
Private:	Premium	678	1,525	218	2,421
	Standard	17,880	8,620	1,685	28,185
	Utility	22,364	19,197	4,779	46,340
	Total	40,922	29,342	6,682	76,946
Total:	Premium	678	2,172	373	3,223
	Standard	18,675	11,429	2,166	32,270
	Utility	24,028	22,335	5,565	51,928
	Total	43,381	35,936	8,104	87,421

Table 54--Number of fenceposts on woodland outside National Forests by ownership class, species, and type of post in Arizona, 1985

Ownership class	Species	Type of post		
		Line	Corner	Total
<hr/>				
		- - - -	<u>Thousand fenceposts</u>	- - - -
Other public:	Juniper	29,378	15,741	45,119
	Oak	243	--	243
	Total	29,621	15,741	45,362
<hr/>				
Private:	Juniper	77,772	47,051	124,823
	Oak	15,780	7,009	22,789
	Total	93,552	54,060	147,612
<hr/>				
Total:	Juniper	107,150	62,792	169,942
	Oak	16,023	7,009	23,032
	Total	123,173	69,801	192,974

Table 55--Area of timberland and woodland outside National Forests by county in Arizona, 1985

County	Timberland	Woodland
- - - - - <u>Acres</u> - - - - -		
Apache	597,363	1,627,271
Cochise	--	332,762
Coconino	103,135	1,633,669
Gila	78,250	533,735
Graham	84,566	501,556
Greenlee	--	48,470
La Paz	--	--
Maricopa	--	220,448
Mohave	27,861	1,314,214
Navajo	465,825	1,557,773
Pima	--	425,577
Pinal	49	277,761
Santa Cruz	--	62,078
Yavapai	14,964	598,283
Yuma	--	--
Total	1,372,013	9,133,597

Collins, Dennis C. 1989. Timberland and woodland resources outside National Forests in Arizona, 1985. Resour. Bull. INT-66. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 61 p.

Provides land area, timberland and woodland area, associated volume, and components of change for forest lands outside National Forests in Arizona.

KEYWORDS: Forest Survey, inventory volume, forest land

The Intermountain Research Station provides scientific knowledge and technology to improve management, protection, and use of the forests and rangelands of the Intermountain West. Research is designed to meet the needs of National Forest managers, Federal and State agencies, industry, academic institutions, public and private organizations, and individuals. Results of research are made available through publications, symposia, workshops, training sessions, and personal contacts.

The Intermountain Research Station territory includes Montana, Idaho, Utah, Nevada, and western Wyoming. Eighty-five percent of the lands in the Station area, about 231 million acres, are classified as forest or rangeland. They include grasslands, deserts, shrublands, alpine areas, and forests. They provide fiber for forest industries, minerals and fossil fuels for energy and industrial development, water for domestic and industrial consumption, forage for livestock and wildlife, and recreation opportunities for millions of visitors.

Several Station units conduct research in additional western States, or have missions that are national or international in scope.

Station laboratories are located in:

Boise, Idaho

Bozeman, Montana (in cooperation with Montana State University)

Logan, Utah (in cooperation with Utah State University)

Missoula, Montana (in cooperation with the University of Montana)

Moscow, Idaho (in cooperation with the University of Idaho)

Ogden, Utah

Provo, Utah (in cooperation with Brigham Young University)

Reno, Nevada (in cooperation with the University of Nevada)

USDA policy prohibits discrimination because of race, color, national origin, sex, age, religion, or handicapping condition. Any person who believes he or she has been discriminated against in any USDA-related activity should immediately contact the Secretary of Agriculture, Washington, DC 20250.