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Nevada Forest Resources

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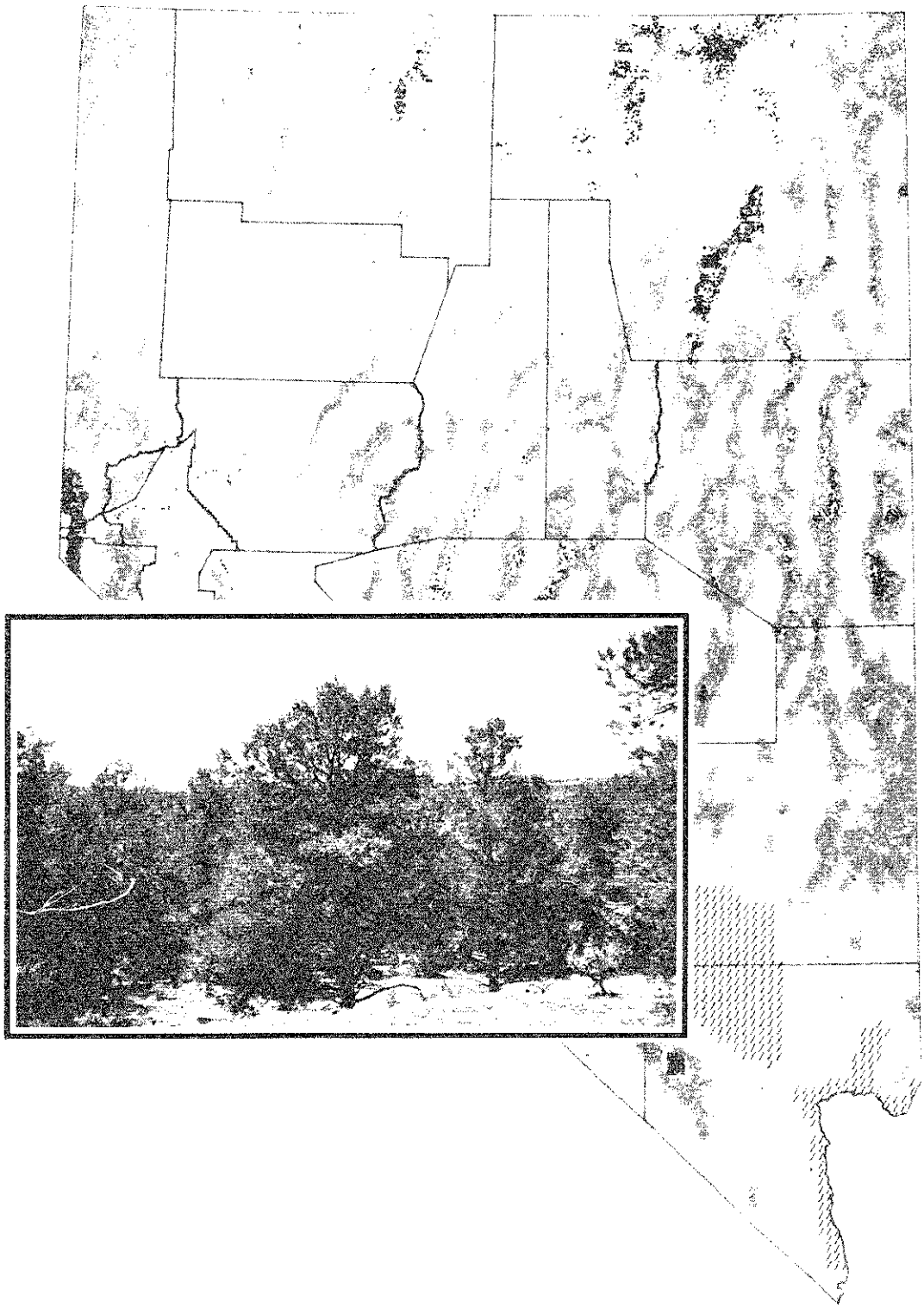

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RESEARCH SUMMARY

Forests in Nevada occupy about 9.8 million acres. Only 757,000 acres are timberland, including 65,000 acres reserved from timber harvesting. Roughly 59 percent of the nonreserved timberland is on National Forests, 25 percent is in private ownership, and most of the remainder is administered by the Bureau of Land Management. Although most of the timberland in Nevada is available for harvest, most stands are in high-elevation, steep areas, and these areas are managed primarily for scenic and watershed values.

The remaining area of forest land, some 9 million acres, is woodland, nearly all of which is nonreserved, and less than 7 percent is privately owned. Woodland net volume, found primarily in pinyon and juniper species, amounted to 4.1 billion cubic feet. In addition to fuelwood, Christmas trees, posts, and pinyon nuts are woodland products.

PREFACE

Forest Survey is a continuing nationwide undertaking conducted by the Forest Service, U.S. Department of Agriculture, with the primary objective of providing an assessment of the renewable resources on the Nation's forests. This requires periodic State-by-State resource inventories. Originally, forest inventories were authorized by the McSweeney-McNary Act of 1928. The current authorization is through the Renewable Resources Research Act of 1978.

The Forest Survey Program at the Intermountain Research Station with headquarters in Ogden, UT, administers the forest resource inventories on lands outside the National Forests for the Interior West States of Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, and Wyoming. These inventories provide information on the extent and condition of forest lands, volume of wood material, and rates of growth and mortality. These data, when combined with similar information for National Forest lands, provide a basis for forest policies and programs and for the orderly development and use of the resources.

ACKNOWLEDGMENTS

This report is the result of the combined efforts of numerous people on the Forest Survey staff and several cooperating organizations. We wish to acknowledge the following: the Bureau of Land Management, U.S. Department of the Interior, for contributing funding and resources to collect data to strengthen the survey and localize data for management planning; the Intermountain Region, Forest Service, U.S. Department of Agriculture, for providing data for National Forests not included in the survey; and Lowell (Lody) Smith, State Forester, and Nevada Division of Forestry personnel for providing additional support.

HIGHLIGHTS

Area

- Total land area of Nevada exceeds 70.0 million acres. Almost 14 percent of this area is forest land.
- About 757,000 acres are classified timberland, including 64,700 reserved from timber use. Most remaining timberland is valued more for scenic and watershed values than for producing timber products.
- Over 9 million acres of woodland are found in Nevada. Only about 25,000 acres are reserved from use for wood products.

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- Two-thirds of the woodland is managed by the Bureau of Land Management.
- Pinyon-juniper is the dominant forest type and occupies nearly 7.2 million acres. Most of the remaining woodland is in the pure juniper type.
- Half of the woodlands are on sites that are considered usable for wood production and are on slopes under 30 percent.

Volume

- Woodland total volume amounts to almost 4.4 billion cubic feet, including almost 262 million cubic feet of dead volume on live and dead trees.
- Pinyon accounts for almost 52 percent of woodland net volume, and juniper accounts for about 46 percent.

Growth and Mortality

- Woodland sites are typically low in productivity. The 43.5 million cubic feet of growth in 1988 represents an annual increase of less than 4.8 cubic feet per acre per year. However, about 3 percent of the sites may be producing in excess of 12 cubic feet per acre per year.
- Annual mortality was extremely low, averaging about 5 percent of growth. Catastrophic mortality, such as from fire, was not well represented in the inventory sample.

Forest Products

- Fuelwood is the primary wood product harvested from Nevada woodlands.
- Over 12,000 cords of fuelwood were reported as sold by the Forest Service and the Bureau of Land Management in 1989.
- About 40,000 Christmas trees were harvested in 1989.
- Posts and pinyon nuts are other important woodland products.

CONTENTS

Page

Perspective 1
Introduction 1
Geography and Vegetation 3
Forest Land 5
Timberland 6
Woodland 12
Woodland Forest Types 12
Pinyon-Juniper 12
Juniper 12
Other Woodland Types 13
The Woodland Resource 13
Number of Trees 13
Volume 13
Growth and Mortality 17
Inventory Change 19
Wood Products 19
Fuelwood and Wood Utilization 19
Christmas Trees 22
Posts 25
Pinyon Nuts 26
Management Considerations 28
Site Productivity 28
Woodland Profiles 28
Reforestation 29
Other Uses of the Woodland Resource 32
Grazing 32
Wildlife Habitat 33
Water 34
Recreation and Tourism 34
Inventory Procedure 34
Inventory Design 34
Primary Sample 35
Field Sample Locations 35
Data Compilation 35
Data Reliability 36
References 36
Appendix I: Terminology 39
Appendix II: Forest Survey Tables 44

Area

1. Total area by land class and ownership class, Nevada, 1989 44
2. Area of reserved and nonreserved timberland by county and ownership class, Nevada, 1989 45
3. Area of reserved and nonreserved woodland by county and ownership class, Nevada, 1989 45
4. Area of woodland by owner group, forest type, and productivity class, Nevada, 1989 46
5. Area of woodland by owner group, forest type, and volume class, Nevada, 1989 47
6. Area of woodland by owner group, forest type, and woodland profile, Nevada, 1989 48
7. Area of forest land by forest type group and tree canopy cover, Nevada, 1989 49

Sampling Error

8. Area, net volume, net annual growth, and annual mortality on woodland with percent standard error, Nevada 49

Number of Trees

9. Number of trees of woodland species on woodland by owner group, species, and diameter class, Nevada, 1989 50

Total Volume

10. Woodland area, net volume, dead volume, and total volume on woodland by average stand diameter class, Nevada, 1989 51

Net Volume

11. Net volume on woodland by species and owner group, Nevada, 1989 51
12. Net volume of woodland species on woodland by owner group, species, and diameter class, Nevada, 1989 52
13. Net volume on woodland by owner group, forest type, and productivity class, Nevada, 1989 53
14. Net volume on woodland by owner group, forest type, and volume class, Nevada, 1989 54
15. Net volume of woodland by owner group, forest type, and woodland profile, Nevada, 1989 55

Dead Volume

16. Net dead volume of woodland species on woodland by owner group, species, and diameter class, Nevada, 1989 56
17. Net dead volume of woodland species on woodland by owner group, forest type, and productivity class, Nevada, 1989 57
18. Net dead volume of woodland species on woodland by owner group, forest type, and volume class, Nevada, 1989 58
19. Net dead volume on woodland by owner group, forest type, and woodland profile, Nevada, 1989 59

Growth and Mortality

20. Net annual growth on woodland by species and owner group, Nevada, 1988 60
21. Net annual growth on woodland by owner group, forest type, and productivity class, Nevada, 1988 60
22. Annual mortality on woodland by species and owner group, Nevada, 1988 61

Christmas Trees

23. Number of pinyon Christmas trees on woodland by owner group, grade, and height class, Nevada, 1989 61
24. Number of pinyon Christmas trees on woodland by owner group, grade, and woodland profile, Nevada, 1989 62

Posts

25. Number of juniper fenceposts on woodland by owner group and type of post, Nevada, 1989 63
26. Number of juniper fenceposts on woodland by owner group, post grade, and woodland profile, Nevada, 1989 64

Figures

1. Mature singleleaf pinyon tree (*Pinus monophylla*) 2
2. A bristlecone pine (*Pinus aristata* var. *longaeva*), one of the oldest living plants on the earth 3
3. Pinyon-juniper on the slopes of Roberts Mountain 4
4. White fir occurs at higher elevations, with pinyon-juniper on lower slopes 4
5. Total area by land class and owner group, Nevada, 1989 5
6. Distribution of nonreserved forest land by timberland and woodland and owner group, Nevada, 1989 6
7. Distribution of forest land, Nevada, 1989 7
8. Distribution of forest land within National Forests, Nevada, 1989 8
9. Distribution of forest land for the Other Public owner group, Nevada, 1989. 9
10. Distribution of forest land for the Private owner group, Nevada, 1989 10
11. Total area of timberland by county and owner group, Nevada, 1989 11
12. Total area of woodland by county and owner group, Nevada, 1989 11
13. Distribution of woodland area by owner group and forest type, Nevada, 1989 13
14. Number of pinyon and juniper trees on woodland by diameter class, Nevada, 1989 14
15. Distribution of woodland total volume by owner group, Nevada, 1989 14
16. Woodland area by stand volume class and forest type, Nevada, 1989 15
17. Net volume on woodland by productivity class and forest type, Nevada, 1989 16
18. Net volume on woodland per acre by average stand diameter class, Nevada, 1989 16
19. Net volume of pinyon and juniper by diameter class, Nevada, 1989 17
20. Total cubic-foot volume on woodland by diameter class, Nevada, 1989 18
21. Fire killed pinyon and juniper near Ely, NV 20
22. Pinyon fuelwood cut and stacked 20
23. Fuelwood harvest estimates from BLM-administered lands, Nevada, 1973 through 1989 21

Page

24. Pinyon commercial fuelwood cutting area following harvest 22
25. Slash from fuelwood cutting not meeting full utilization 23
26. Christmas trees harvested from BLM-administered lands, Nevada, 1973 through 1989 23
27. Number of pinyon Christmas trees on woodland by owner group and grade, Nevada, 1989 24
28. Christmas trees commercially cut and loaded for transport 24
29. Christmas tree area in the Cherry Creek Range 25
30. Number of juniper fenceposts on woodland by owner group and grade, Nevada, 1989 26
31. Harvesting pinyon nuts near Ely, NV 27

Page

32. Pinyon nuts harvested from BLM-administered lands, Nevada 1983 through 1989 27
33. Area of woodland by woodland profile and owner group, Nevada, 1989 30
34. Net volume on woodland by woodland profile and owner group, Nevada, 1989 30
35. Woodland field sample locations on high site and slopes under 30 percent, Nevada, 1989 31
36. Woodland net volume per acre by woodland profile, Nevada, 1989 32
37. Selective pinyon-juniper cutting to improve wildlife habitat 33
38. Cercocarpus on a mountain top near Ely, NV. 34

Nevada Forest Resources

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PERSPECTIVE

On a warm late-summer afternoon in 1831, on a gentle mountain slope that would later become known as Ward Mountain of east-central Nevada, a family group from the Gosiute band of Shoshones was collecting green cones from a stand of pinyon trees. The seed-bearing cones would be stored for the cold winter to come and opened by fire when needed. As the elder of the group paused after beating the cones from a tree with his aihkon (forked stick) (Lanner 1981), he looked down the slope through the trees to the grassy valley. His eyes paused as he viewed a large juniper, with the thought of cutting the lower straight section for bow staves (Wilke 1988). He could not know that his son would help to harvest those trees 50 years in the future to supply kilns at the base of the slope (Ward Charcoal Ovens, Historic State Monument), which would produce charcoal for smelting ore, nor could he know that 150 years later more people would return to cut fuelwood from a new stand of pinyon and juniper trees.

Across that same valley, a lightning-caused fire was still smoldering from the day before. It had burned from the grass and sagebrush up the gentle slope into a stand of juniper, where now only blackened snags remain. It was a classic example of the end, or the beginning, of a cycle of succession from grass, to brush, and then to trees, with fire interrupting and restarting the cycle. Whether the succession to trees would be called reforestation or invasion in the future would depend upon the viewer's point in time and interest in use of the land. Future livestock grazing for cattle, sheep, and even wild horses would further complicate the successional cycle by reducing fuel for fire.

INTRODUCTION

This report summarizes the results of the first statewide forest inventory for Nevada. Several localized inventories have been conducted in the past but have not been published. Information is included about the extent and condition of the forest resources and recent forest products output.

The following discussion and the supporting tables do not include forest land that occurs within the military bombing and gunnery ranges, the Nevada Test Site, the Desert National Wildlife Range, Death Valley National Monument, or Lake Mead National Recreation Area. The occurrence of forest land within these areas is considered insignificant, either because of restricted access and use or scattered occurrence. The map on the cover and the owner group maps show these areas, by shading, as excluded. Technical terms used are defined in appendix I, and all references to tables in the text refer to tables shown in appendix II.

Pinyon, juniper, and other trees have contributed much to the development of Nevada, and they play an important role in the State today.

Native Americans used the trees for fuel, food, medicine, bow staves, and building materials. Several waves of settlers came to Nevada in the 1800's attracted largely by the California gold rush, which was followed by gold, silver, and copper mining. Pinyon and juniper likely provided material for shelter and fuel for their hearths and campfires (Young and Budy 1979).

As the railroads were built across northern Nevada, almost any tree in sight was used for fuel, ties, and building materials. However, except for local use and some continued mining activity, the pinyon and juniper woodlands were given a rest from the late 1800's until the 1940's, when livestock interests encouraged the conversion of woodlands—by chaining, pushing, or other means—to grasslands for forage. Conversion is still in practice, but is often combined with fuelwood or Christmas tree harvesting to improve forage for wildlife or livestock (Buckman and Wolters 1987). Demand for fuelwood increased dramatically due to oil shortages in the late 1970's, and during the last several years demand has remained considerably higher than before that period.

The singleleaf pinyon (*Pinus monophylla*), not surprisingly was designated as the State Tree for Nevada (fig. 1). In 1987, bristlecone pine (*Pinus aristata* var. *longaeva*) was designated to share that honor. Bristlecone pines are not common but are thought to be the oldest living plants on the earth, with some in Nevada estimated to be over 3,500 years old (fig. 2).

Figure 1—Mature singleleaf pinyon tree (*Pinus monophylla*).

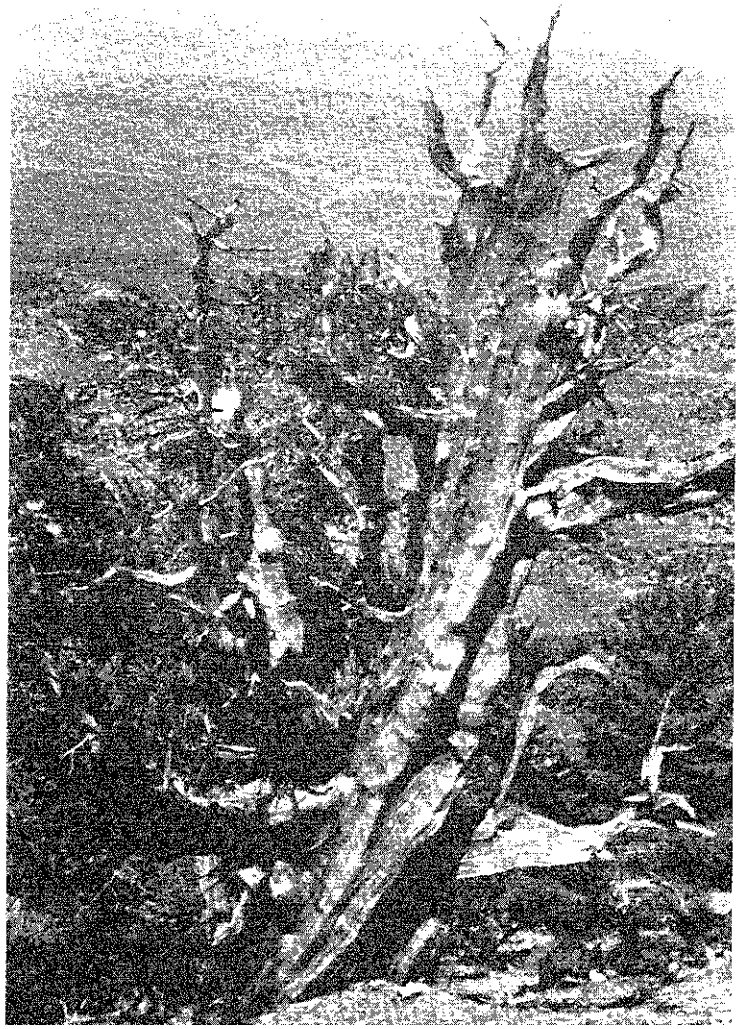


Figure 2—A bristlecone pine (*Pinus aristata* var. *longaeva*), one of the oldest living plants on the earth.

GEOGRAPHY AND VEGETATION

Most of Nevada is in the Great Basin physiographic province, which is characterized by over 300 mountain ranges separated by cold desert valleys. Sagebrush and salt desert shrubs dominate most of the lower elevations, which range from 500 to 6,500 feet, depending upon aspect and location in the State. Upper valley and lower mountain slopes are often covered with pinyon and juniper (fig. 3), with juniper predominating on the lower, drier sites and across the northern portions of the State. Aspen (*Populus tremuloides*) occurs predominantly in the central and northeastern part of the State at higher elevations and in riparian areas. White fir (*Abies concolor*) (fig. 4), limber pine (*Pinus flexilis*), and bristlecone pine occur to timberline at the higher elevations, which range to over 13,000 feet.

The southern part of the State includes portions of the Mojave Desert at lower elevations. Here salt desert shrubs are often interspersed with Joshua-tree (*Yucca brevifolia*) and other species of yucca.

At the western edge of the State, around Lake Tahoe, the Sierra Nevada Range causes an abrupt change in vegetation and climate. The eastern slopes rapidly change from cover of pinyon and juniper, to pure pinyon, to aspen and pine, and then to large mixed conifer forests near the crest.

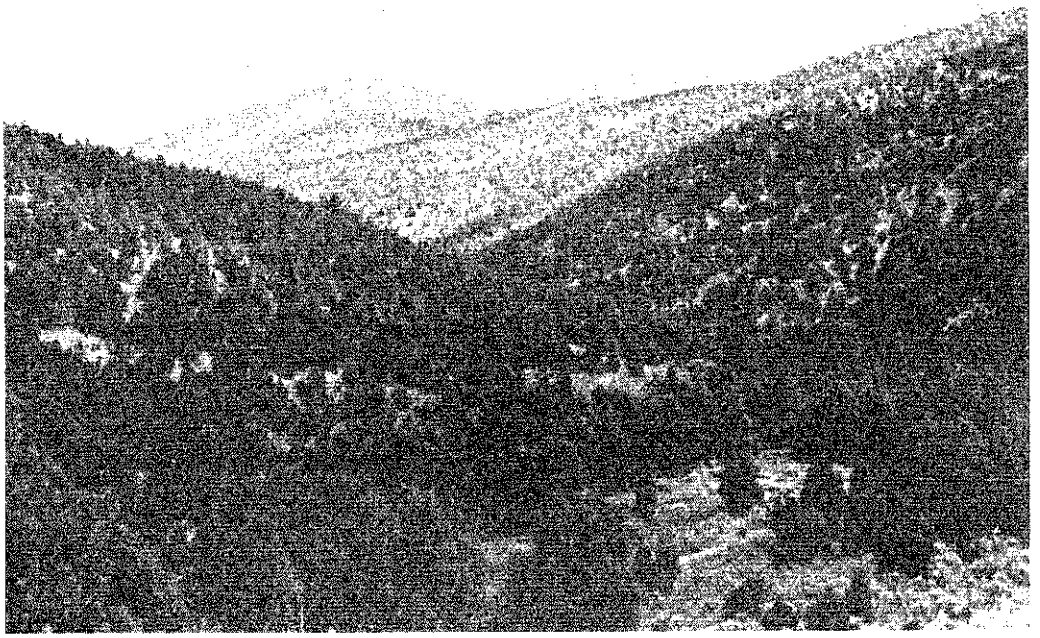


Figure 3—Pinyon-juniper on the slopes of Roberts Mountain.

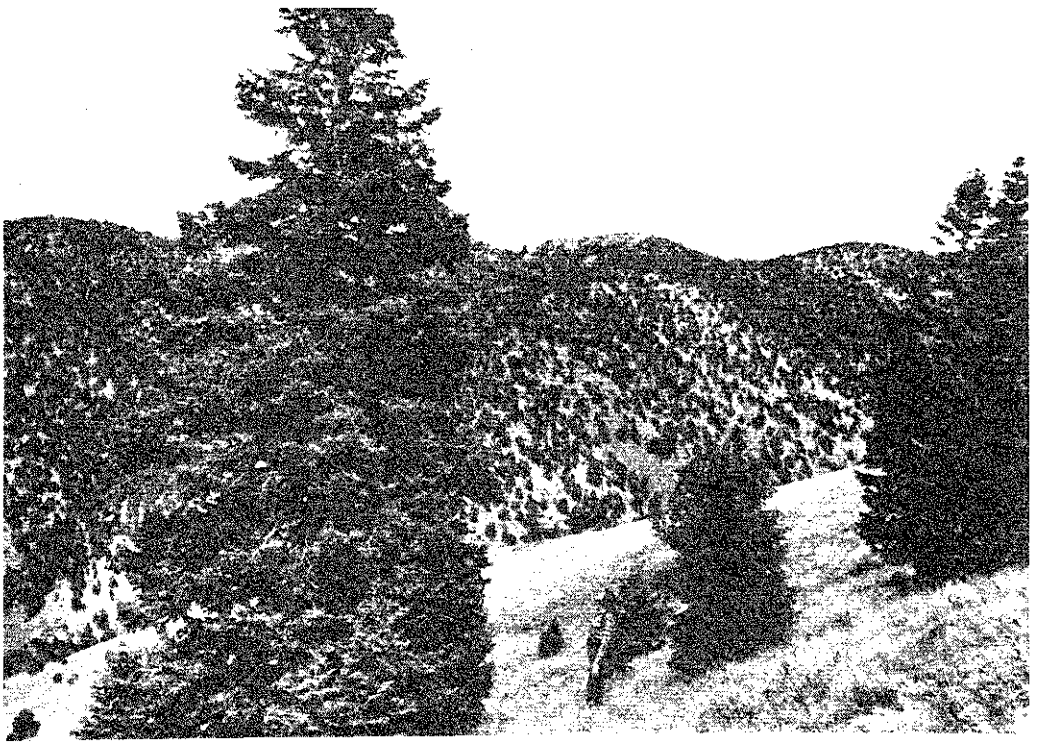


Figure 4—White fir occurs at higher elevations, with pinyon-juniper on lower slopes.

FOREST LAND

Although Nevada is best known for gambling and other recreational activities, the forests are rarely out of sight and contribute greatly to the scenic values of the area. The State is less than 14 percent forested with 9.8 million acres (fig. 5), but because the occurrence of trees is associated with the mountain ranges, tree-covered slopes are visible for great distances.

Forest land falls into two major categories—timberland and woodland—based on levels of tree species stocking. Timberland is forest land where tree species traditionally used for industrial wood products, such as ponderosa pine (*Pinus ponderosa*) or white fir, make up at least 10 percent stocking. Woodlands are other forest lands where nontimber species, such as pinyon and juniper, are typically not used for industrial products, but are an important source for fuelwood, posts, and in some cases, Christmas trees. Nevada has about 757,000 acres of timberland, including some 65,000 acres that are reserved, meaning that tree utilization is precluded by statute or administrative designation. The remaining forest land, over 9 million acres, is classified as woodland, of which only 25,000 acres are reserved. Over 92 percent of the forest land in Nevada is managed by Federal agencies. Of the Federal forest land almost 80 percent of the timberland is in National Forests (fig. 6). The Bureau of Land Management (BLM) administers two-thirds of the nonreserved forest land, with over 6 million acres of nonreserved woodland to manage.

Only about 750,000 acres of forest land is in private ownership. Most of the private holdings are scattered, with Indian trust lands occurring in some concentration. Private timberland occurs predominantly near Lake Tahoe and the northern Ruby Mountains. Some of the private woodland is in alternating sections of land within 20 miles of the railroads, an economic incentive by the Federal government for constructing the original railroads across the State.

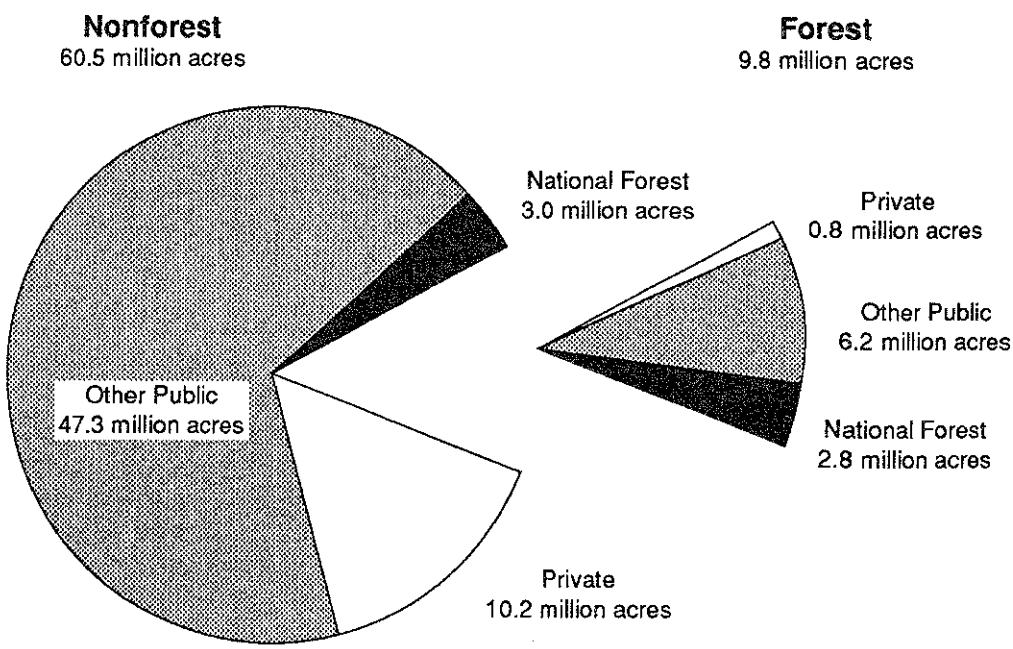


Figure 5—Total area by land class and owner group, Nevada, 1989.

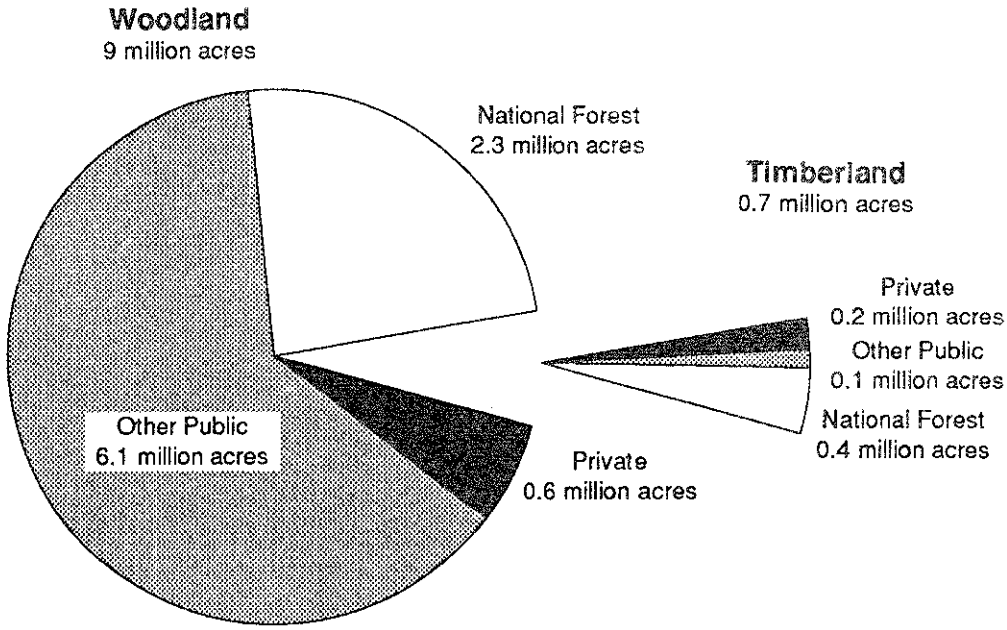


Figure 6—Distribution of nonreserved forest land by timberland and woodland and owner group, Nevada, 1989.

Figure 7 shows the statewide distribution of forest land by timberland and woodland. Figures 8, 9, and 10 show the distributions by the respective owner groups of National Forests, Other Public, and Private. Indian lands, those Native American lands held in trust by the Federal government, are included under the Private category in all tables.

With the exception of the Lake Tahoe area, the greatest concentration of forest land is in the northeast and east-central portions of the State. White Pine County has the most, with almost 2.1 million acres. The next most forested county is Lincoln County with 1.8 million acres, and then Nye County with 1.6 million acres. Elko County has over 1.4 million acres, and the remaining counties each have less than 500,000 acres (figs. 11 and 12).

TIMBERLAND

Because timberlands were not field sampled in Nevada, the inventory data are limited to area information. Some detailed information is available from National Forests or other management agencies, but the available data are not adequate to compile inventory estimates for the State.

Most of the timberland in the State occurs in higher elevations in the northeast quarter and around Lake Tahoe on the western border. The timberland in Elko, White Pine, and Nye Counties is composed primarily of white fir and limber pine or aspen. Douglas-fir (*Pseudotsuga menziesii*) and Engelmann spruce (*Picea engelmannii*) are associates in many areas of the eastern portion of the State, and subalpine fir (*Abies lasiocarpa*) can be found in Elko and White Pine Counties. Black cottonwood (*Populus trichocarpa*) can be found throughout the State in riparian areas.

Scenic and watershed values are high where timberland occurs on eastern and central mountain ranges of the State, and accessibility would be poor for harvest. Scattered remnant trees indicate that some timberland

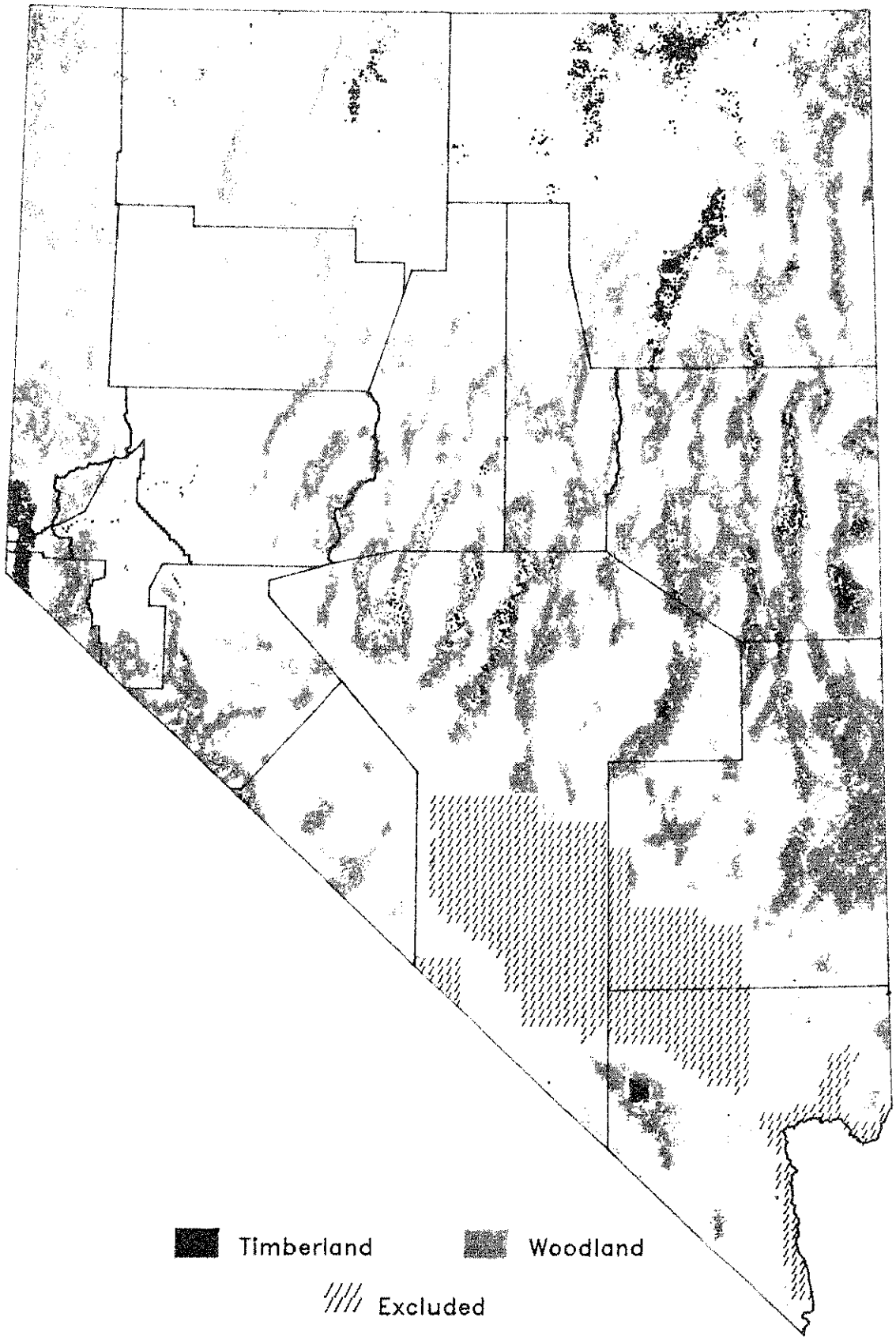


Figure 7—Distribution of forest land, Nevada, 1989.

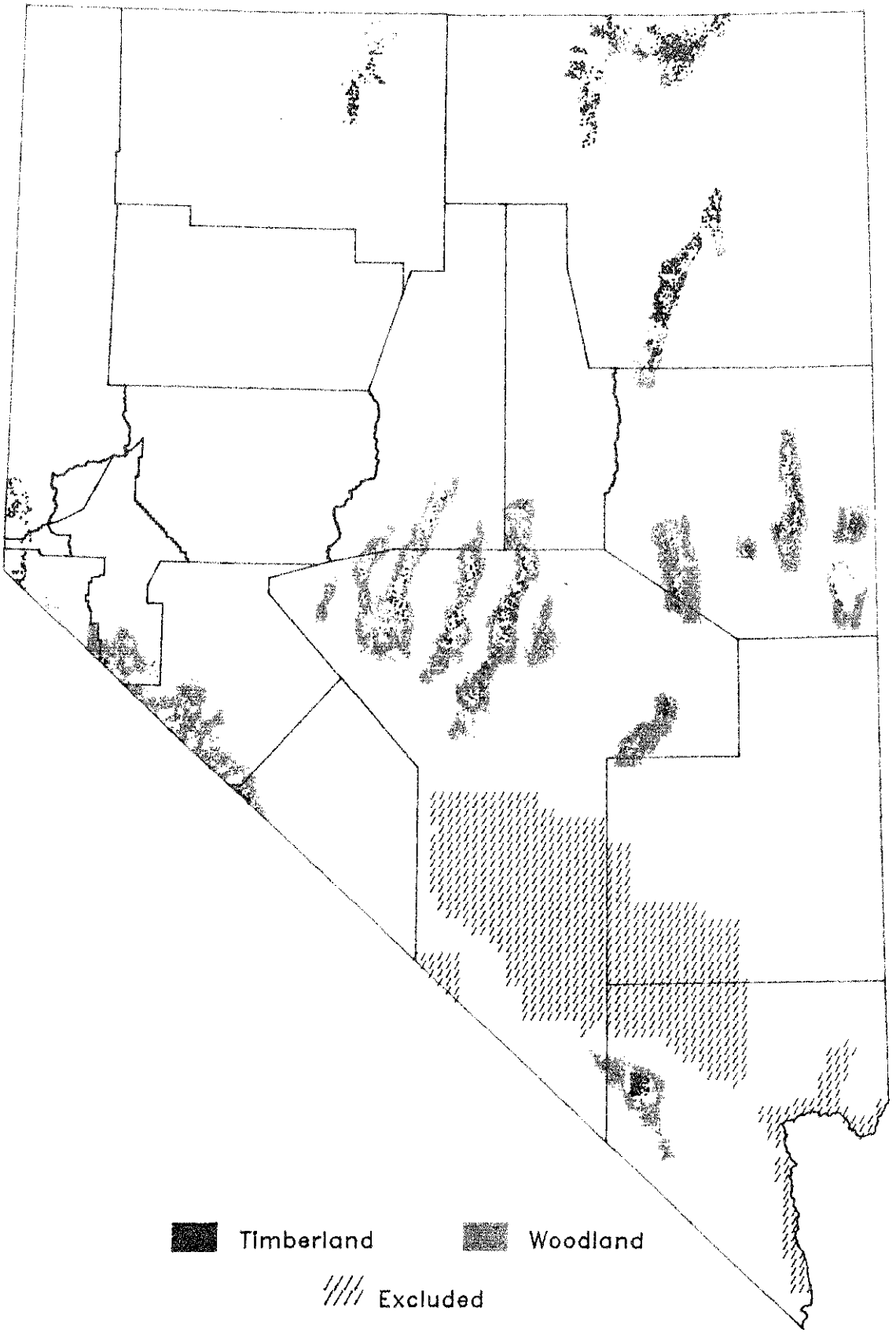


Figure 8—Distribution of forest land within National Forests, Nevada, 1989.

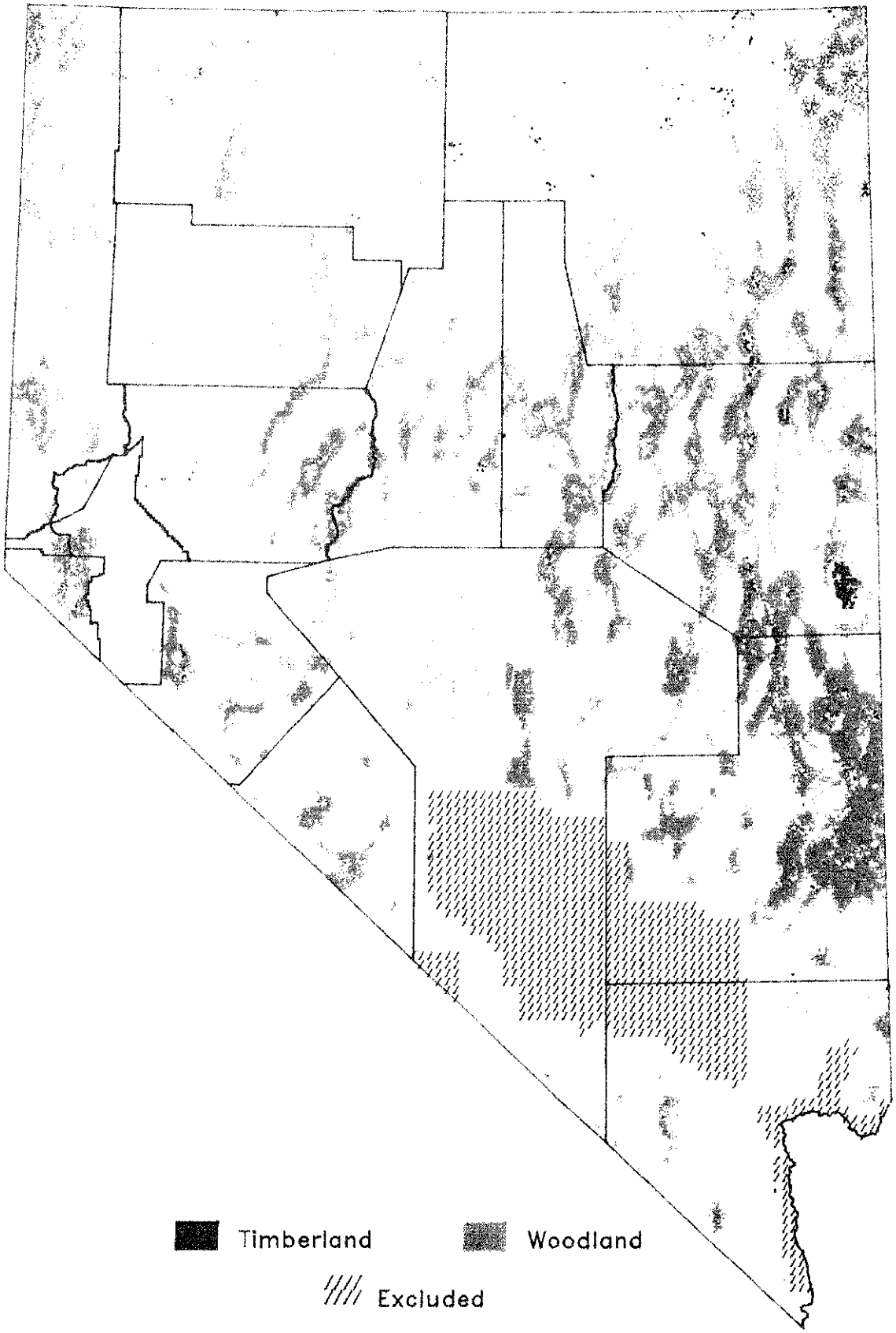


Figure 9—Distribution of forest land for the Other Public owner group, Nevada, 1989.

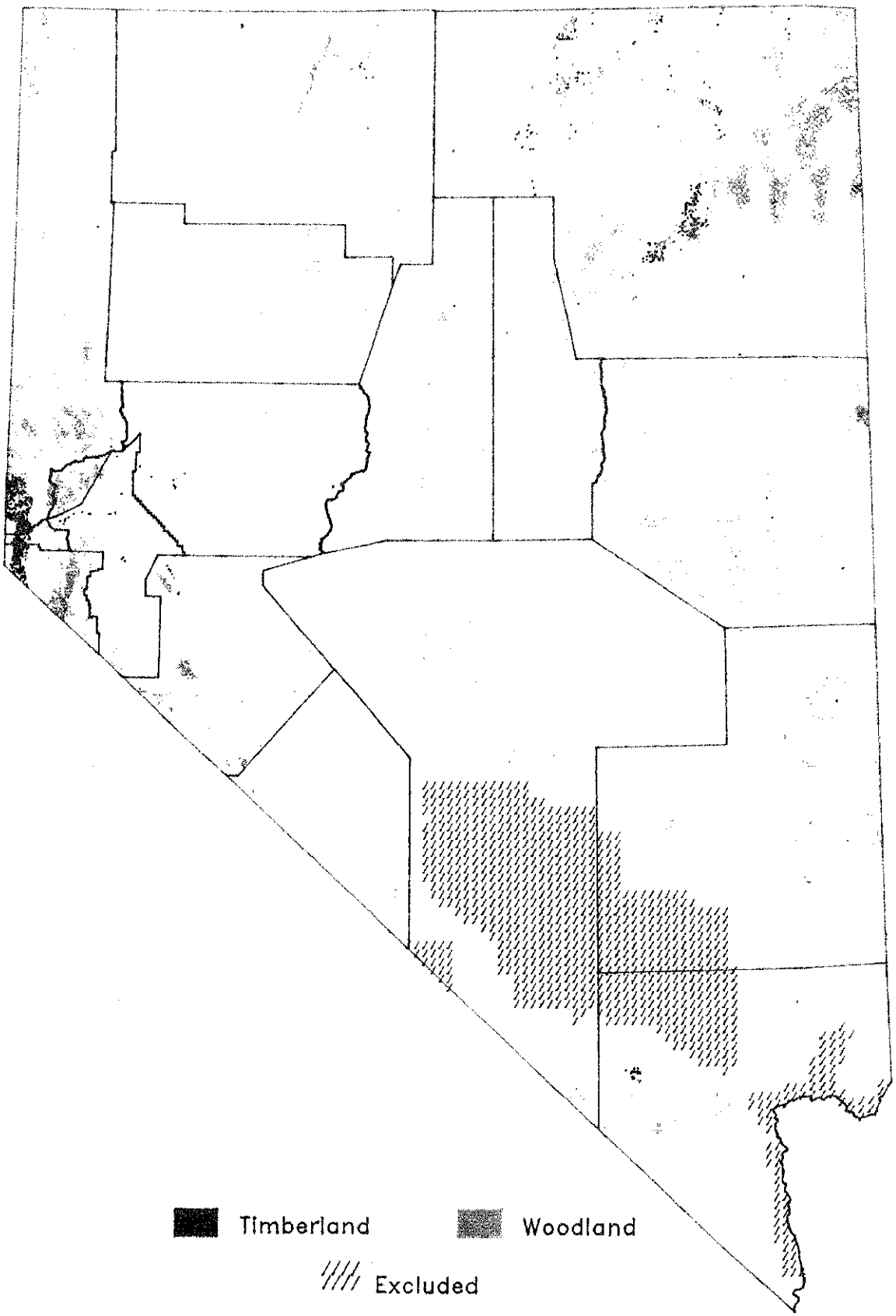


Figure 10—Distribution of forest land for the Private owner group, Nevada, 1989.

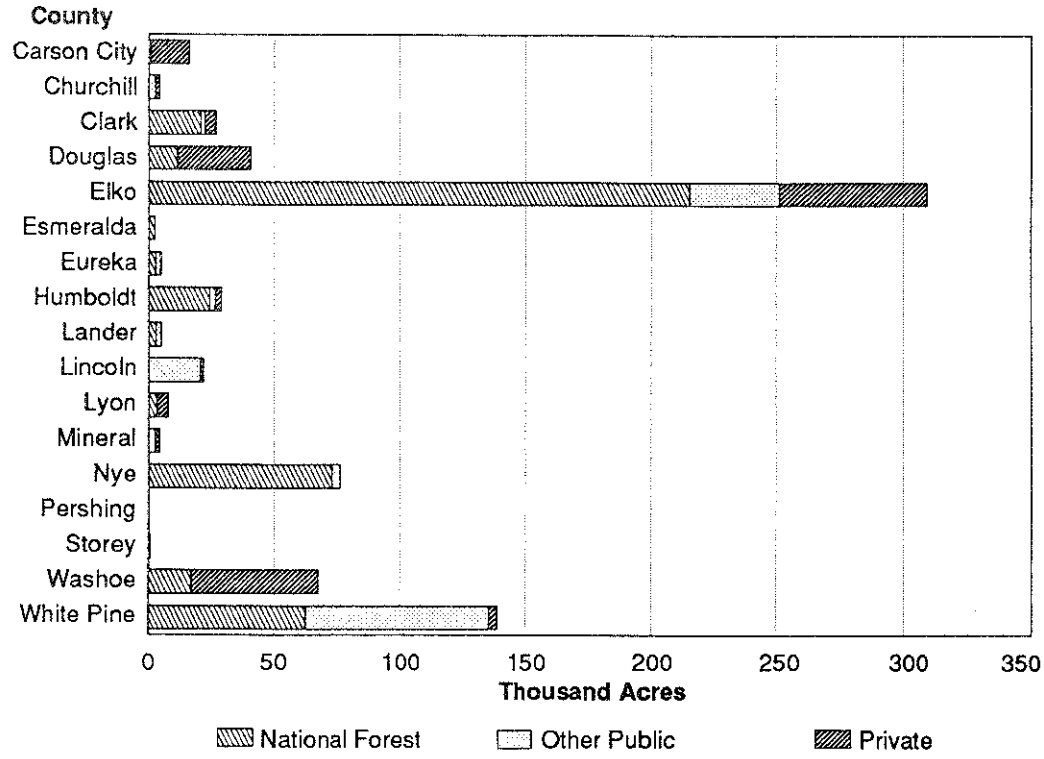


Figure 11—Total area of timberland by county and owner group, Nevada, 1989.

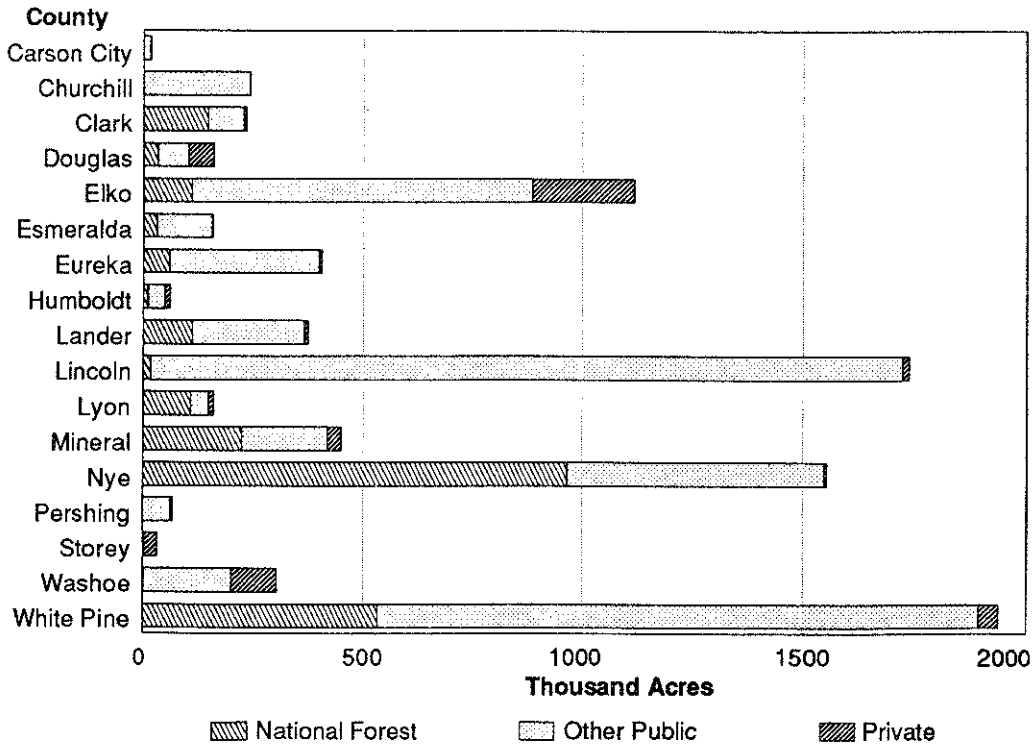


Figure 12—Total area of woodland by county and owner group, Nevada, 1989.

likely occurred at more accessible lower elevations in the past but was cut to support earlier settlement, mining, and railroad activities.

The mixed conifer type in the Sierra Nevada Range near Lake Tahoe offers some timber-harvesting opportunities, but most of the timberland not in the Toiyabe National Forest is in private ownership and is in homesites and other recreation sites not likely to be used for wood products beyond occasional fuelwood cutting. The Sierra mixed conifer type includes some interesting tree species or subspecies not found elsewhere. Ponderosa pine and the closely related Jeffrey pine (*Pinus jeffreyi*) and Washoe pine (*Pinus washoensis*) occur, as well as sugar pine (*Pinus lambertiana*). Both lodgepole pine (*Pinus contorta* var. *murrayana*) and western juniper (*Juniperus occidentalis*) grow to unusually large size in the area but are not abundant.

Other species that may be encountered are California red fir (*Abies magnifica*), western white pine (*Pinus monticola*), Douglas-fir, and mountain hemlock (*Tsuga mertensiana*).

The distribution of timberland by county is shown in figure 11. Maps showing the distribution of forest land by owner group can be found in figures 8 through 10.

WOODLAND

Woodlands are found throughout Nevada, but the greatest concentrations occur from the eastern side of the State on the slopes of the mountain ranges, westward through the central mountain ranges to the Sierra Nevada Mountains (fig. 7). The most vigorous and dense stands typically are found on bajadas—a Spanish expression for the sloping alluvial deposits at the base of mountain ranges. Some of the best stands are also found in the Pine Nut Mountains in the west, which are situated in the moisture shadow of the Sierra Nevada Range.

Most of the woodland acreage occurs in White Pine, Lincoln, Nye, and Elko Counties (fig. 12). However, the acreage is not evenly distributed by owner group. Considerable National Forest acreage is concentrated in White Pine and Nye Counties, while land in the Other Public owner group, which is mostly lands administered by the BLM, is predominantly located in Lincoln, White Pine, and Elko Counties. Private woodlands are most prevalent in Elko County, but a significant acreage of private woodlands occurs in the smaller counties east of Lake Tahoe.

Woodland Forest Types

Pinyon-Juniper—The pinyon-juniper type includes a wide range of mixtures of pinyon and juniper species as well as pure pinyon stands. Singleleaf pinyon is the most abundant pinyon species in Nevada. Occasionally, where it occurs with single and two-needle clusters, it is thought to be a cross with common pinyon (*Pinus edulis*), which occurs a few miles to the east in Utah. In Nevada, pinyon is usually associated with Utah juniper (*Juniperus osteosperma*) or occasionally Rocky Mountain juniper (*Juniperus scopulorum*), when in mixed stands. The pinyon-juniper type accounts for 80 percent of the woodland, or about 7 million acres (fig. 13).

Juniper—The juniper type includes several species types in Nevada. On lower and drier sites juniper occurs without pinyon, and may be associated with other species such as oak or yucca. Utah juniper is by far the most common juniper and occurs in most of the State, but Rocky Mountain

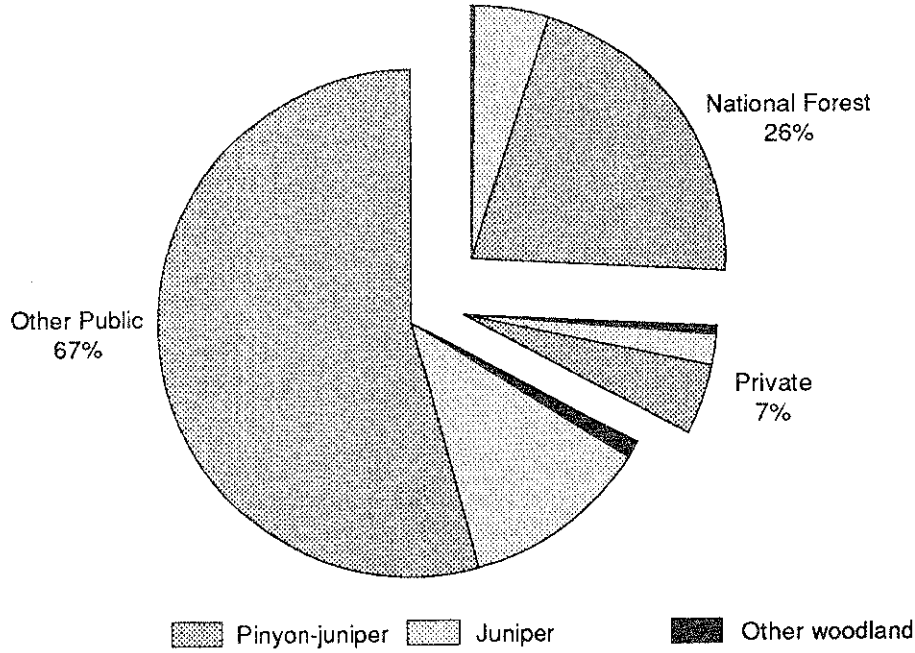


Figure 13—Distribution of woodland area by owner group and forest type, Nevada, 1989.

juniper occurs in scattered pockets throughout the eastern third of the State. California juniper (*Juniperus californica*) occurs only at the southern tip of the State, while the woodland form of western juniper can be found in the northwestern portion of the State.

Other Woodland Types—Other woodland types in aggregate account for less than 2 percent of the woodland area in Nevada. The most prevalent type is mountain-mahogany or cercocarpus. In Nevada, cercocarpus in tree form is mostly curlleaf cercocarpus (*Cercocarpus ledifolius*) but may include some alderleaf cercocarpus (*Cercocarpus montanus*). Gambel oak (*Quercus gambelii*) and shrub live oak (*Quercus turbinella*) occur near the southern tip of Nevada, but often in shrub form. A number of willow (*Salix* spp.) species as well as maple (*Acer* spp.) and cherry (*Prunus* spp.) are found in riparian areas but seldom reach tree size.

The Woodland Resource

Number of Trees—Of an estimated 1.8 million woodland trees on nonreserved land in Nevada, over 56 percent are pinyon and about 41 percent are juniper, so the remaining species are of little concern. At times, pinyon reproduction may be sparse because of weather cycles or seed source, but overall both pinyon and juniper appear to have a desirable distribution of number of trees by diameter class (fig. 14).

Volume—The total wood volume in woodland forest types was estimated to be almost 4.4 billion cubic feet. About 6 percent of that volume was dead material—mostly on live trees (fig. 15). Over 70 percent of the total volume is on lands managed by the BLM. National Forests account for almost 23 percent of the remainder, leaving only about 7 percent of the volume attributed to other owners.

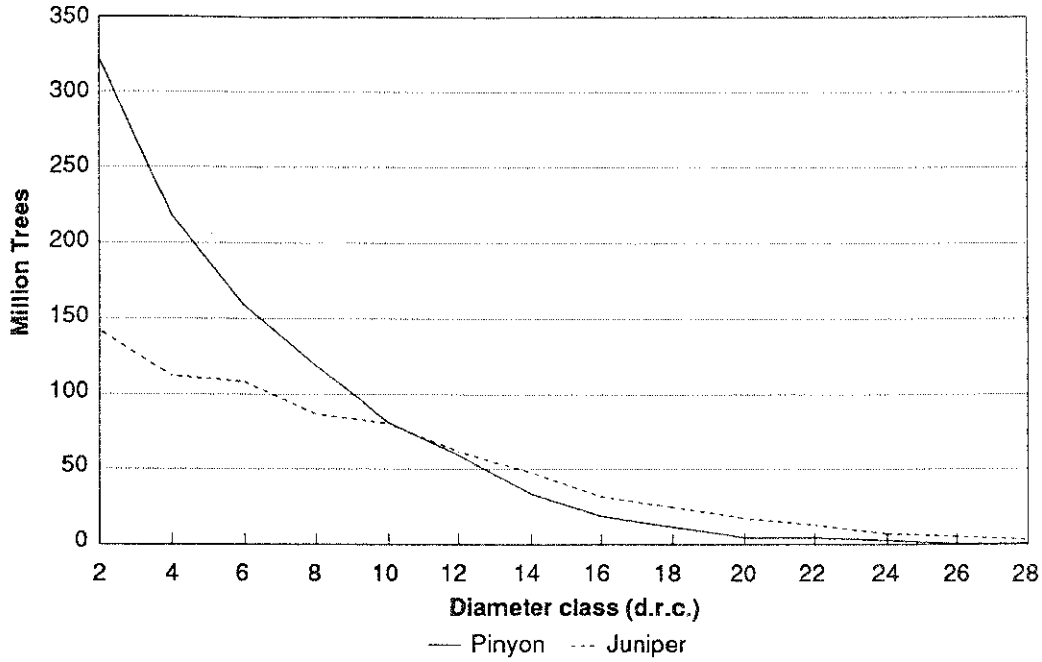


Figure 14—Number of pinyon and juniper trees on woodland by diameter class, Nevada, 1989.

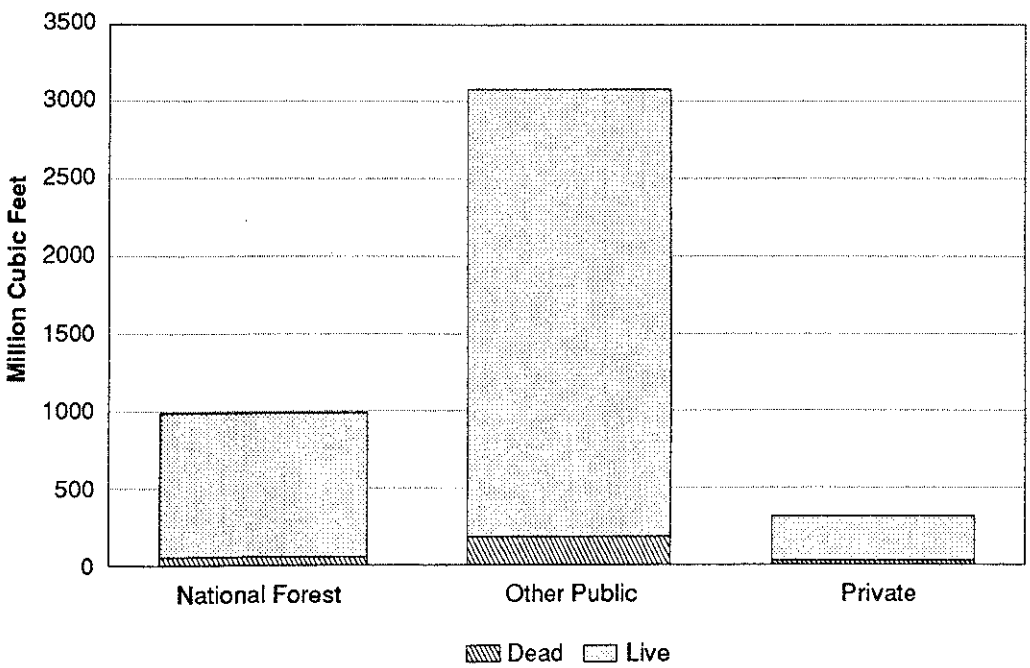


Figure 15—Distribution of woodland total volume by owner group, Nevada, 1989.

About 52 and 46 percent of the total woodland volume is in pinyon and juniper species, respectively. Of the remainder, most of the volume is in cercocarpus, with token amounts in timber species, oak, and miscellaneous hardwoods. Pinyon-juniper and juniper types are distributed across the volume-per-acre classes (fig. 16), but, as would be expected, the area decreases as the volume per acre increases. However, total woodland volume peaks at about 500 cubic feet per acre, or about 7 cords. The highest volume class, which has a considerable amount of old, residual stands, contains the most volume of any class. Many of these stands are not in readily accessible or convenient locations and were passed by during the vigorous harvest activity of the last century and a half. This class represents only about 8 percent of the total woodland area but averages an impressive 13 cords per acre.

Nevada woodland averages about 6.5 cords per acre, with some variation by owner group, site class, and stand size. The Other Public owner group averages slightly higher volumes than National Forests, and this volume difference may be caused by cutting history or actual differences in land quality, but is likely the result of inventory sample variation. Site-class volume differences are slight by owner group, but high sites—lands forested with woodland species and considered of adequate site capability to grow crops of wood material—have an average volume of 7.3 cords per acre. High site lands overall account for about three-fourths of the woodland volume (fig. 17).

There is a predominance of volume in stands with average stand diameter below 17 inches (fig. 18). The average stand diameter represents the tree of average basal area of the trees in a stand. Many of the stands below 17 inches in average diameter have been cut over or burned during the last 150 years and are still increasing in volume at a relatively fast rate. Over

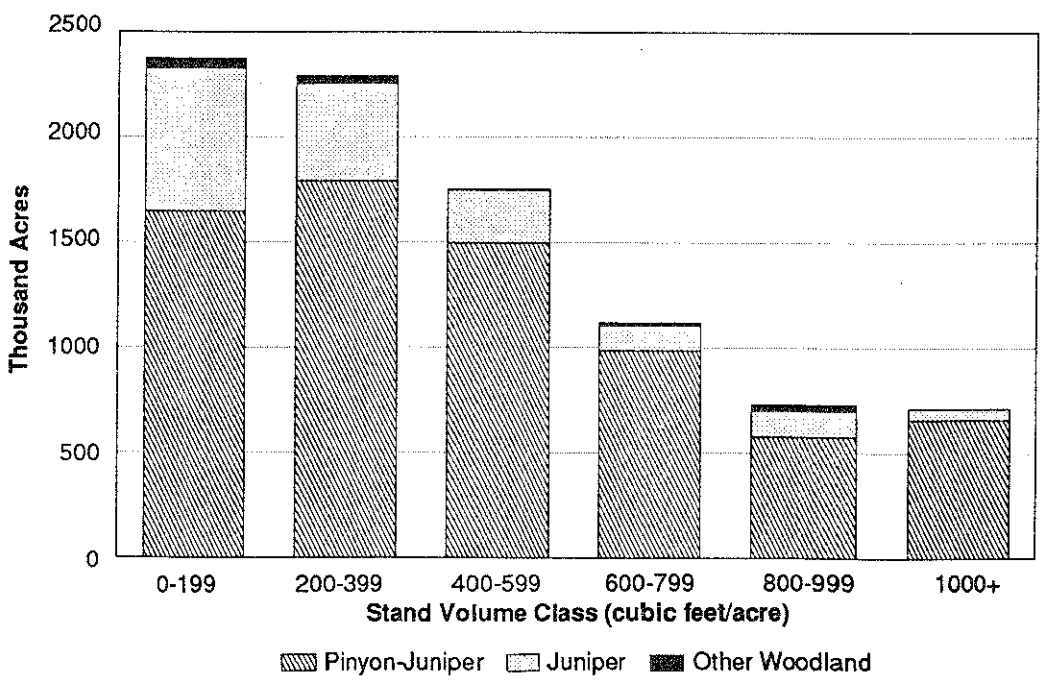


Figure 16—Woodland area by stand volume class and forest type, Nevada, 1989.

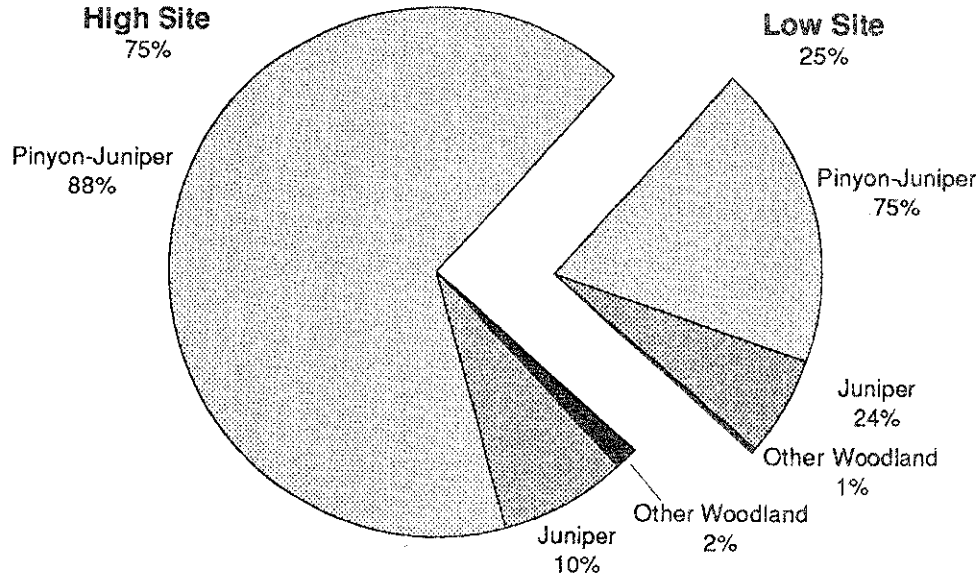


Figure 17—Net volume on woodland by productivity class and forest type, Nevada, 1989.

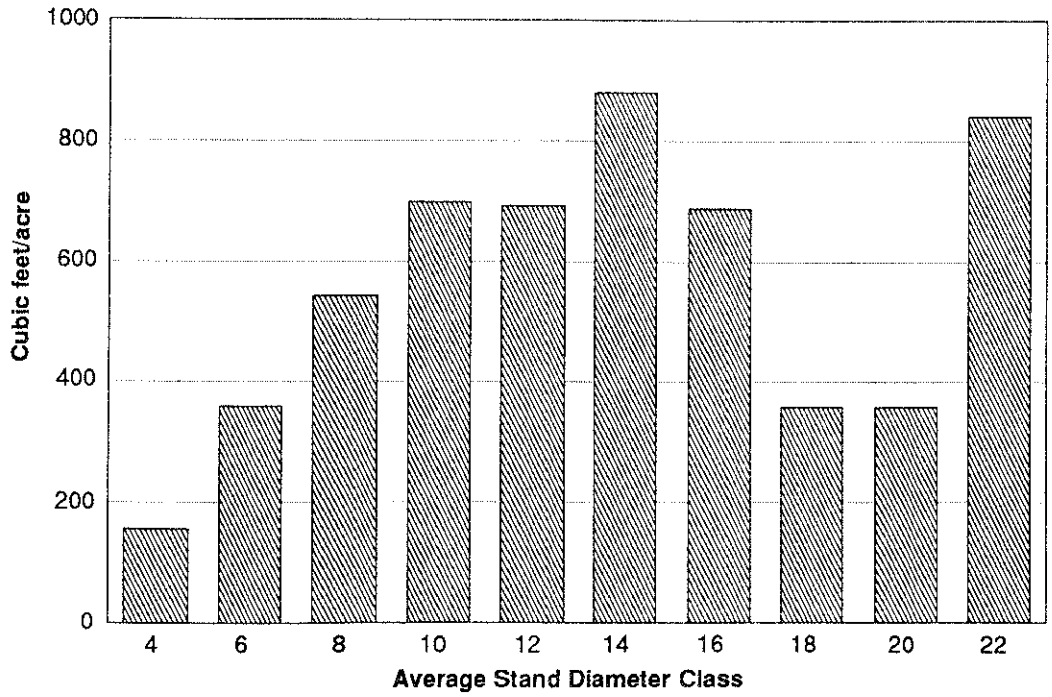


Figure 18—Net volume on woodland per acre by average stand diameter class, Nevada, 1989.

80 percent of the woodland area and volume is in stands with an average stand diameter between 5 and 11 inches, and about two-thirds of the area and volume is in stands between 5 and 9 inches.

Although age information was difficult to obtain for pinyon-juniper stands because of tree form and difficulty in boring juniper, the available data indicate that the largest diameter stands are generally the oldest.

The larger stands shown in figure 19 are likely very old and thus show average volume per acre exceeding 800 cubic feet, or over 11.2 cords. Yet the stands with average stand diameter of 14 inches average over 11.7 cords per acre. These stands are mostly younger, and most are on the better sites and illustrate that pinyon-juniper stands can produce relatively high volume. Ten individual sample sites in Nevada were found to have in excess of 30 cords per acre, but these sites represent less than 1 percent of the sample. About 5 percent of the sample sites exceeded 1,000 cubic feet per acre, or over 13 cords.

From an individual tree standpoint, present woodland volume peaks at the 12-inch diameter class (fig. 19). Pinyon has the most volume that peaks at the 12-inch diameter class. Juniper volume peaks at lower total volume, but more juniper volume is in the larger diameter classes.

Dead material is of considerable interest in pinyon and juniper because it contributes to fuelwood volume, and many fuelwood cutters usually prefer it over green material. Total dead volume, at 5.9 percent of total volume, generally is an increasing percentage of total volume in the larger diameter classes (fig. 20). However, dead volume does not exceed 9.1 percent in any class, indicating that stands are not in bad condition and are not showing the effects of excessive age (although some are extremely old). Also, these percentages of dead volume are lower than many woodland areas in other Rocky Mountain States, again indicating that these stands are relatively young. However, there is not a definite increase in the percentage of dead material with increasing average stand diameter (table 10).

Growth and Mortality—Growth for woodland species is characteristically low, thus it is difficult to measure. Also, much of the growth is contained in multiple stems and branches. The growth rate for all Nevada woodland is about 1 percent, but pinyon is growing at about twice the rate of juniper.

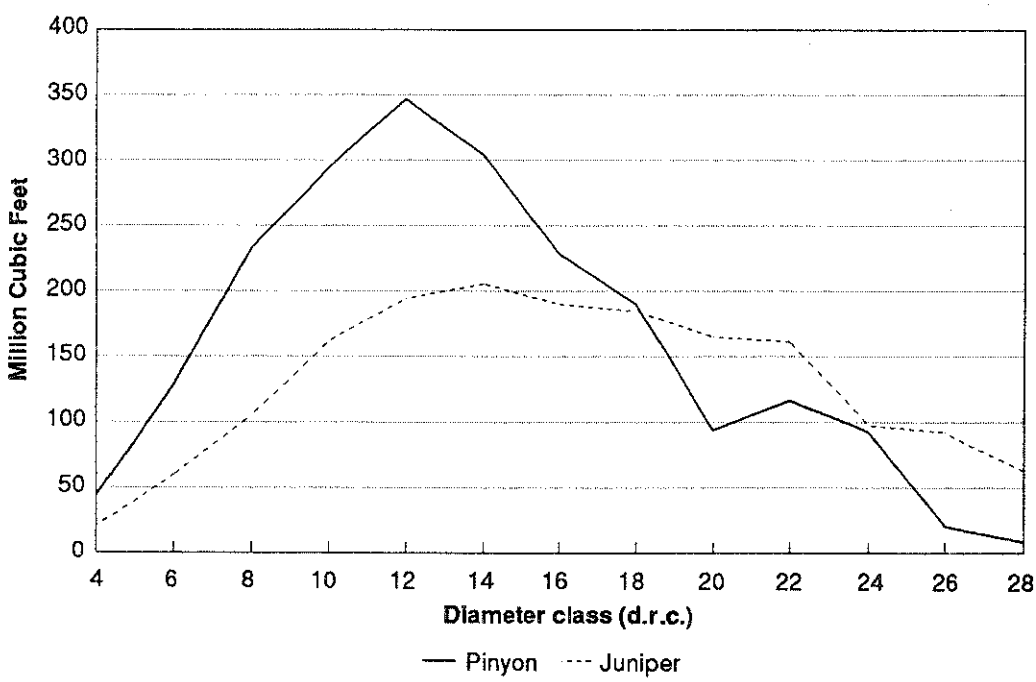


Figure 19—Net volume of pinyon and juniper by diameter class, Nevada, 1989.

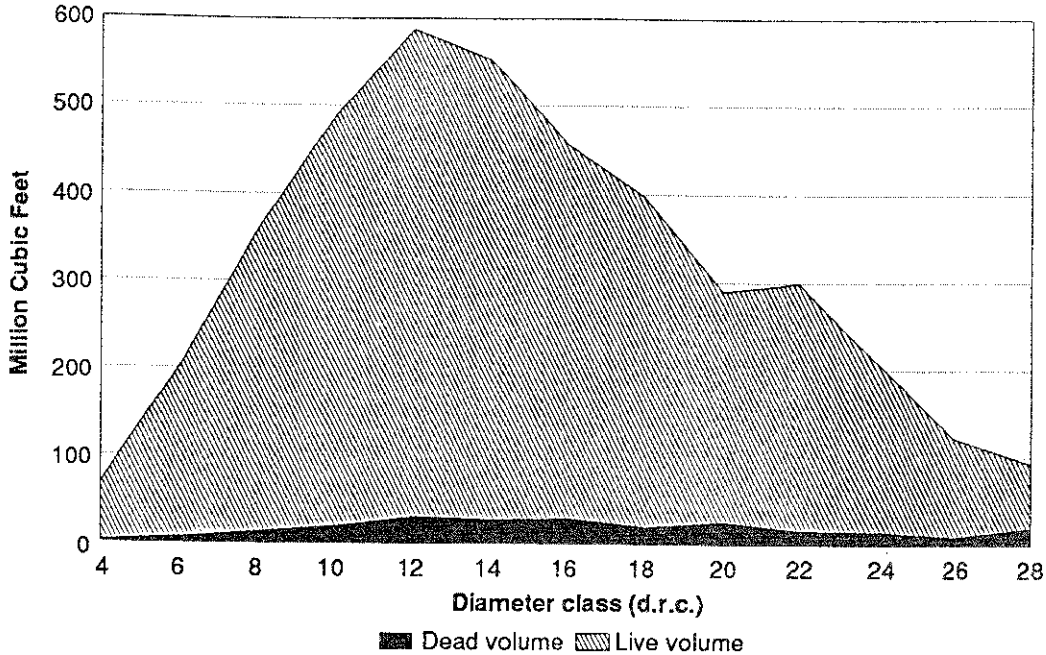


Figure 20—Total cubic-foot volume on woodland by diameter class, Nevada, 1989.

The total mortality observed is only about 5 percent of growth and is even more difficult to measure than growth. Almost all of the observed mortality was for pinyon, and one might infer that old juniper trees never die but just fade away as the volume of dead material increases. Branches, and even portions of main stems, die on juniper trees over time, but the trees continue to live on—some for hundreds of years. Meeuwig (1979) found that pinyon-juniper stands live so long that there was no evidence to indicate a culmination of basal area or biomass. As figure 14 tends to verify, there is relatively low mortality of both pinyon and juniper, and the total distribution shown would be flatter without the predominance of smaller diameter stands.

Catastrophic mortality, such as fire, occurs in Nevada but in such localized areas that it is difficult to adequately sample, so the annual loss from this type of mortality is not known. Various agencies have information concerning area burned, but concentrated areas of mortality, such as from root disease or insects, may be undetected.

A cursory examination of woodland field sample data revealed some interesting relationships. Although the variability is high and data are not available for all sites, stand age data showed a rough correlation with both stand volume and average stand diameter. For example, a "typical" stand at 100 years of age has about 500 cubic feet per acre and an average stand diameter of about 7 inches. At 150 years the volume has increased to about 750 cubic feet, or 10 cords, and an average stand diameter of about 8.5 inches. This indicates that actual average growth may be in the vicinity of 5 cubic feet per acre per year for the average stand. About 3 percent of the sample sites exceeded 1,000 cubic feet in less than 150 years with an average production of about 12 cubic feet per acre per year. This compares well with the growth curves developed by Chojnacky (1986) for Nevada.

Age data were not available for about 38 percent of the field samples, which included the full range of conditions from nonstocked to old juniper stands. About 50 percent of the woodland sample sites had stands known to be under 150 years old, and only 12 percent of the sites were known to be older stands. Based on this information, perhaps 70 to 80 percent of woodland stands may be under 150 years old.

Inventory Change—This is the first statewide forest survey for Nevada, so comparisons with past surveys are not possible. Several estimates of the extent of pinyon-juniper and juniper woodlands have been made previously (Tueller and others 1979) but are difficult to compare because of definitions and methodology. However, most previous estimates are somewhat higher for total woodland area than this inventory indicates. The actual acreage of these types is thought to be increasing, rather than decreasing, and the discrepancies in estimates are likely due to procedural differences. The Forest Survey definition for a tree (see appendix I) excludes woodland species when they occur as a shrub form, such as juniper in some areas of northwestern Nevada. Also, the reserved areas, described earlier, contain some acreage of woodland, but information or access were not available to inventory these areas.

Normal successional trends would tend to increase the area of pinyon-juniper and juniper because the present level of cutting affects only a small percentage of the woodland area. However, the situation is complex, primarily because of the interaction between natural succession and fire, grazing, and treatments by humans. In Nevada, fire control, grazing, and the reduction in conversion—or removal—of these types to promote grassland for forage are all indicative of an environment favoring an increase in tree cover. Although the demand for fuelwood and other woodland products has increased considerably, most of the sites cut over will remain available for growing trees. And a high percentage of sites converted for forage production eventually return to tree cover because few are maintained to prevent reforestation.

On the other hand, a reduction in grazing intensities could change the ecological relationship between fire and woodlands. A reduction in grazing would allow an increase in herbaceous fuels for natural or human-caused fires, which in turn would increase fire-caused mortality in woodlands (fig. 21). More land would tend to remain as grassland because movement of pinyon and juniper into grassland areas would be restricted by the occurrence of fires.

Wood Products

Fuelwood and Wood Utilization—The use of woodlands for fuel has always been important in Nevada. Use began with Native Americans, then early settlers. Later, woodlands were used to provide fuel for charcoal kilns, which in turn produced charcoal for early mining. Local subsistence use continued, but as fossil fuels became more available and mining declined, demand waned. With the shortage of fossil fuels in the late 1970's, there was a resurgence of demand that peaked about 1982, but the demand for fuelwood for supplemental heating remains fairly steady (fig. 22). Records of sales from the National Forests and the BLM cover a high percentage of the fuelwood harvest. Although records for past use are not complete, estimates from past years provide trends, as shown for BLM

Figure 21—Fire killed pinyon and juniper near Ely, NV.

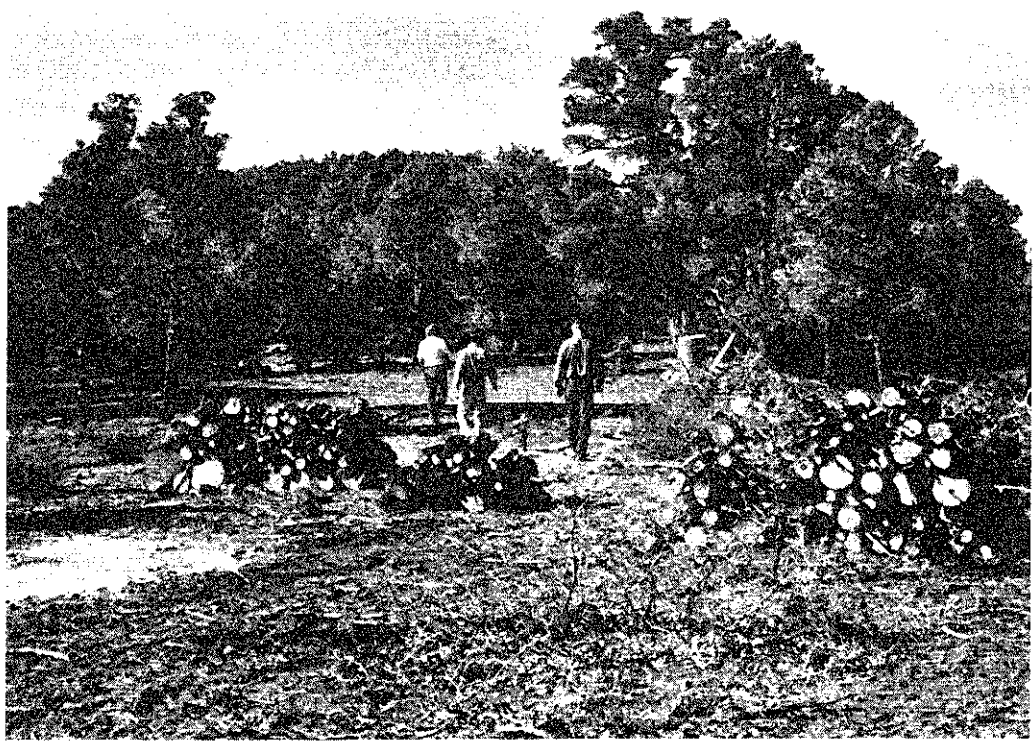


Figure 22—Pinyon fuelwood cut and stacked.

administered lands in figure 23. Recent records are more likely to reflect actual use. The amounts reported for 1989 are:

	National Forests	Bureau of Land Management
Fuelwood sold, cords	4,054	8,042

The sum of fuelwood sold, 12,096 cords, is a small fraction of the total net annual growth for the State of about 581,000 cords. Realistically, only a fraction of this material is available because of accessibility, quality, or restrictions on use. When compared to the annual growth of the best 3 percent of pinyon-juniper stands in the State, the annual fuelwood harvest is still only about 70 percent of annual growth for these areas. According to Ffolliott and Clary (1986) fuelwood sales, or interest in pinyon and juniper for other products, could increase considerably if price or transportation costs or both were to change. Transportation costs to major population centers appear to be a limiting factor in accessing markets.

Pinyon and juniper have been tested and tried for a number of potential wood products. Transportation costs and the cost of accessing a large area with low volumes of material have often precluded an economic return on investments. A discussion of potential woodland products for Nevada can be found in Murphy (1987).

An important consideration in relating fuelwood harvest to inventory volume and management planning is the level of utilization, or the minimum size of the material harvested. Forest Survey volume computations have been developed to a minimum diameter of 1.5 inches for woodland tree stems and branches, which represents nearly all the potentially usable fuelwood in a tree. Material approaching this minimum diameter is commonly harvested either by acceptance or preference, particularly where fuelwood demand is high (fig. 24). Conversion factors have been developed

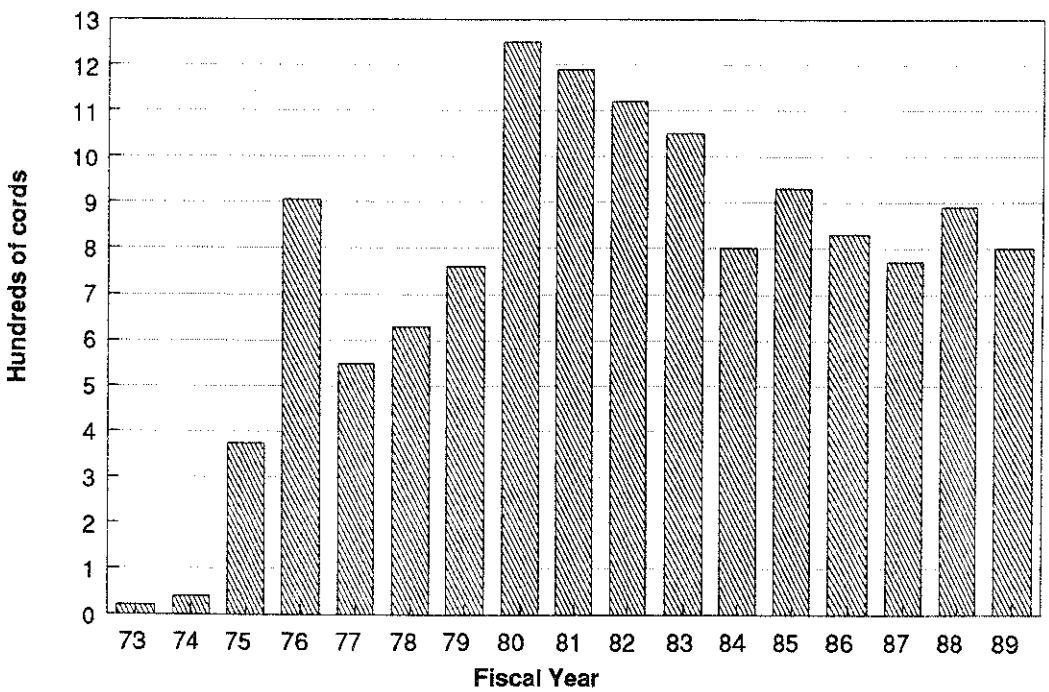


Figure 23—Fuelwood harvest estimates from BLM-administered lands, Nevada, 1973 through 1989.

Figure 24—Pinyon commercial fuelwood cutting area following harvest.

for larger minimum diameters for areas where utilization is not as high or estimates are needed for other potential products requiring larger pieces (Chojnacky and Wraith 1987).

There are good reasons to encourage the use of smaller material. The existing resource is extended by higher utilization, and less debris is left on the ground. The larger the material, the slower it is to decay (fig. 25), although some scattered debris tends to foster the establishment of herbaceous vegetation for forage and soil retention and for tree reproduction (Evans 1988).

Christmas Trees—The market for pinyon Christmas trees has been good for a number of years as indicated by BLM records (fig. 26). Data are not available for other lands. Pinyon Christmas trees compete well with tree-farm trees and appeal to those desiring a natural (unsheared) look and a pleasant aroma. Prices in recent years for Nevada pinyon along the Wasatch Front near Salt Lake City, UT, are comparable to prices (personal observation) for several species of Montana tree-farm trees. The number of Christmas trees sold by the primary public sources in 1989 are:

	National Forests	Bureau of Land Management
Number of Christmas trees	10,536	28,925

Assuming that the 1989 total of 39,461 trees is representative of the annual harvest, the number of trees could be increased considerably in the future if more trees could be made available to purchasers, particularly contract purchasers. Nevada has a good supply of potential Christmas trees (fig. 27), but the difficulty is in locating enough high-quality trees concentrated in an area accessible for sale. Most trees are sold by bid to dealers or wholesalers who transport them to population centers (fig. 28), but there also is local demand from the cut-your-own market (fig. 29).

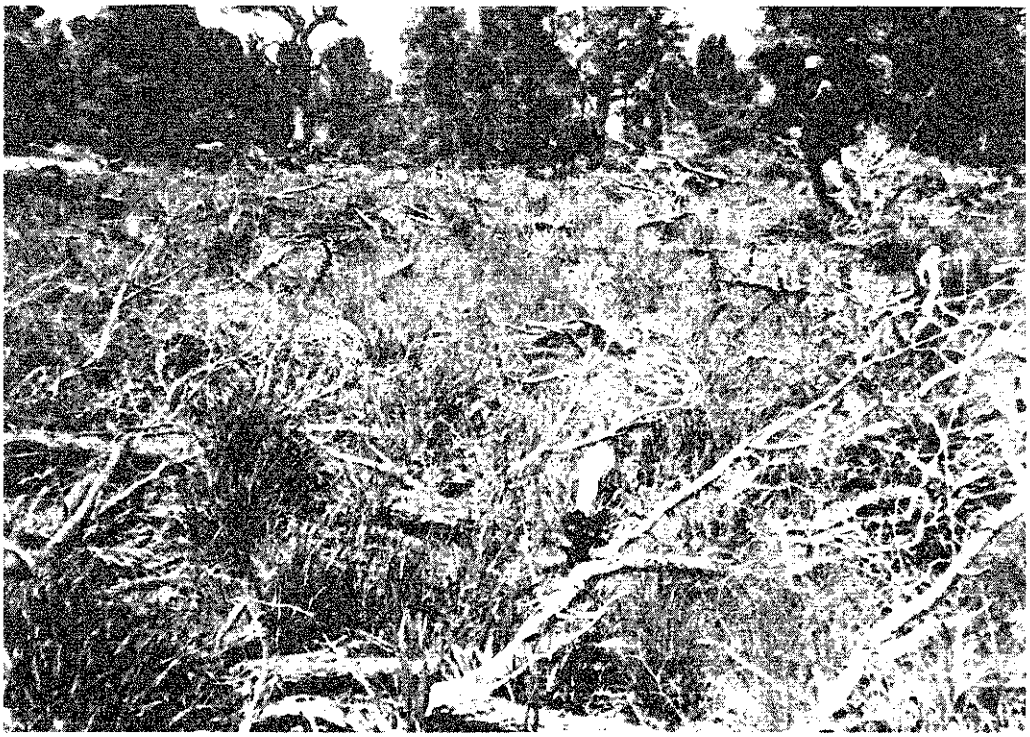


Figure 25—Slash from fuelwood cutting not meeting full utilization.

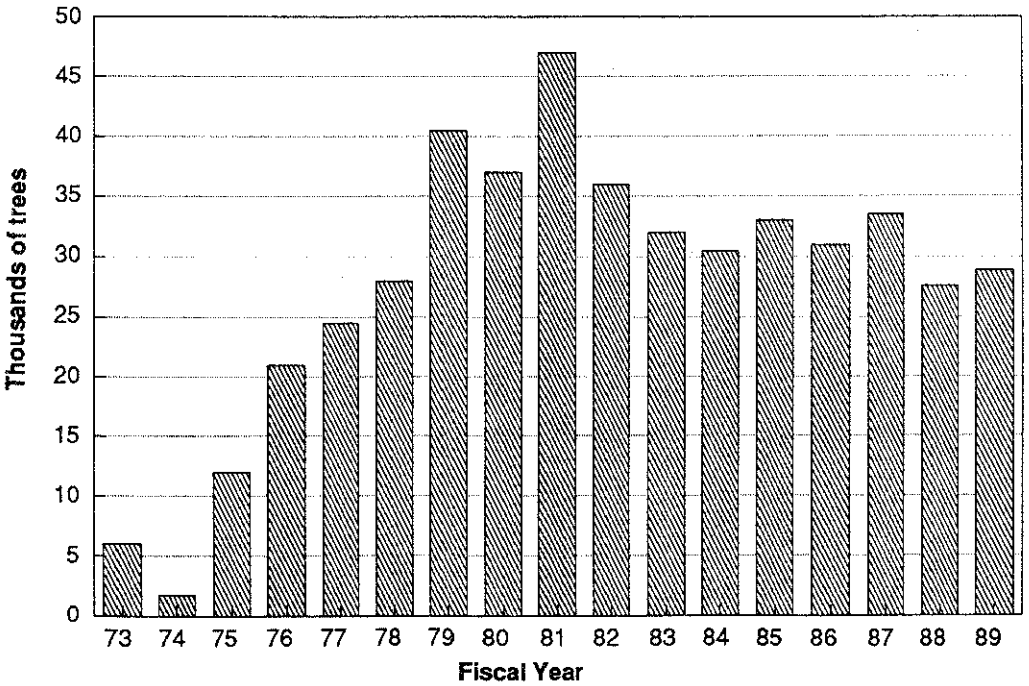


Figure 26—Christmas trees harvested from BLM-administered lands, Nevada, 1973 through 1989.

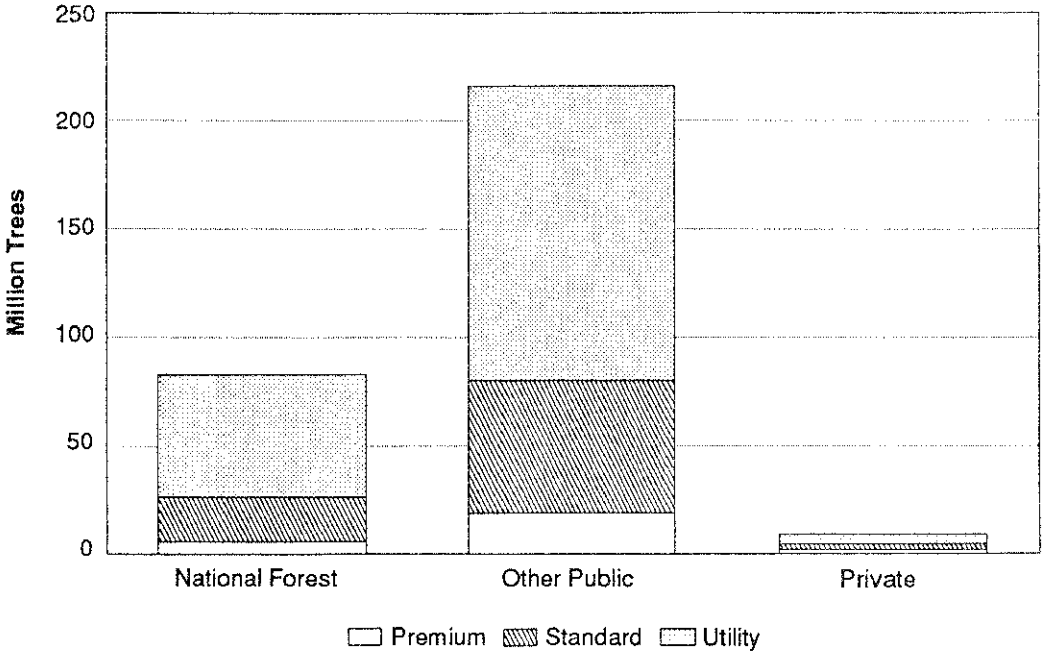


Figure 27—Number of pinyon Christmas trees on woodland by owner group and grade, Nevada, 1989.

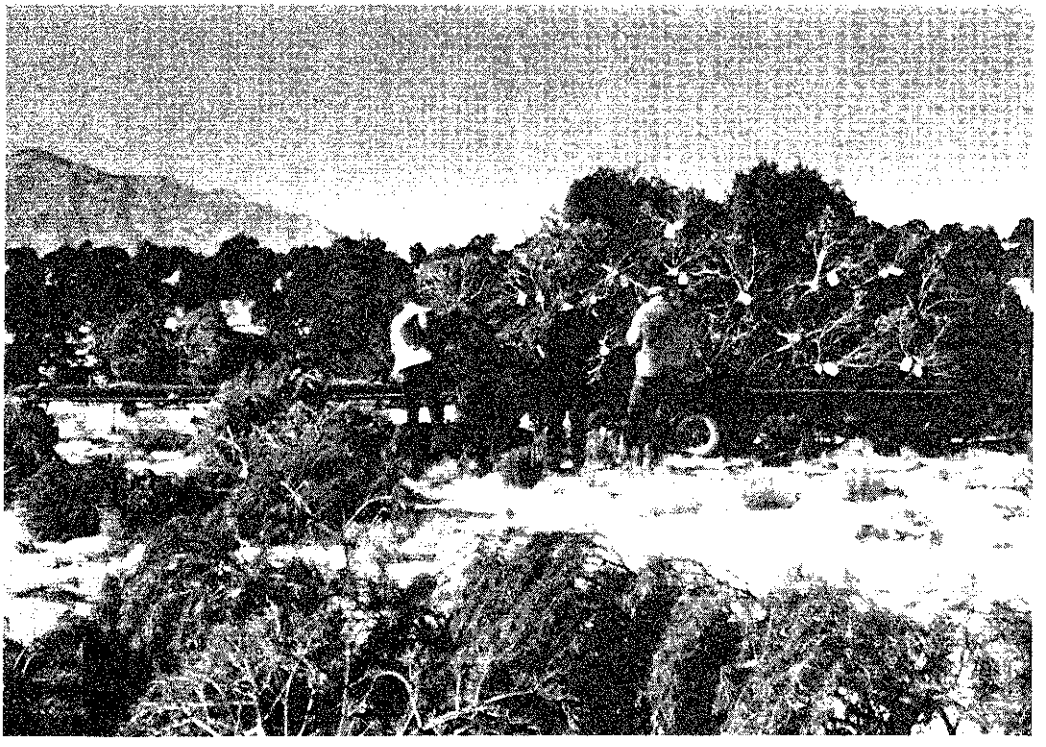


Figure 28—Christmas trees commercially cut and loaded for transport.

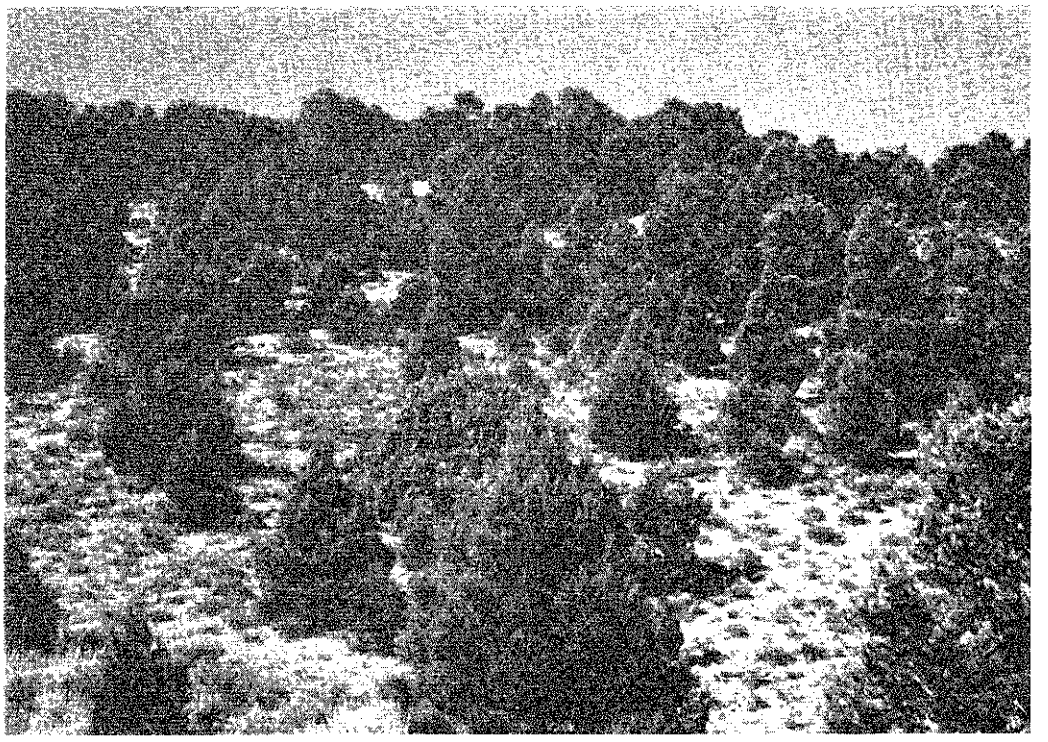


Figure 29—Christmas tree area in the Cherry Creek Range.

Although pinyon Christmas trees are not sold directly by grade, higher quality trees—those with better crown shape and density—are much more marketable. Naturally grown trees have a large percentage with poorly shaped crowns and, of the total number of trees meeting Christmas tree criteria in the State, about 38 percent were considered suitable as premium or standard Christmas trees. This amounts to over 100 million trees, of which half were in the desired 6- to 12-foot height range. The remainder were shorter and represent a stock of future Christmas trees.

By eliminating areas with slopes over 30 percent, and selecting those stands with predominately smaller trees, then about 40 percent or roughly 40 million trees are potentially available as Christmas trees. This estimate does not consider location, other than slope, so some of these trees are not easily accessible to transportation routes or are not in areas of high demand.

Future supplies of Christmas trees will also depend to a large extent on the acreage of more mature stands harvested. If not utilized in a reasonable length of time, currently available trees will become too large to be usable as Christmas trees.

Posts—Historically, juniper fenceposts have been one of the basic fencepost materials of the West. A juniper fencepost is seldom as straight and smooth as a pine post, but is far more durable. Tests indicate that juniper posts could last half a century or more (Barger and Ffolliott 1972). Fenceposts sold in Nevada during 1989 by the principal Federal agencies are:

	National Forests	Bureau of Land Management
Number of posts	27,800	10,082

The number of posts harvested annually in Nevada has little influence on the supply as there is an average of more that 30 posts per acre on all woodland (fig. 30). Even on low site lands there are almost as many potential posts per acre as on high site lands. Posts are a part of potential fuelwood volume, but the value for posts is sufficiently greater, so integrating post harvests with fuelwood harvests would result in a more profitable operation than fuelwood alone.

Posts are inventoried as line or corner posts, depending on size. More than a third of potential posts were the larger corner posts. About 94 percent of potential posts occur on public lands.

Pinyon Nuts—The singleleaf pinyon has a large nut with a thin shell, is very high in carbohydrates, and provides most food requirements necessary to sustain human life (Lanner 1981). Native Americans have taken advantage of this knowledge for centuries, as pinyon nuts were—and still are—one of their basic winter foods. Gathering pinyon nuts has become a recreational activity for other residents, and gathering nuts on a commercial scale (fig. 31) is usually limited primarily by the fickle changes in weather patterns that affect cone crops. Recent drought years have reduced the pinyon nut harvest, and the 1989 harvest shown below is the smallest commercial harvest ever reported by the BLM (fig. 32):

	National Forests	Bureau of Land Management
Pinyon nuts, pounds	4,710	3,000

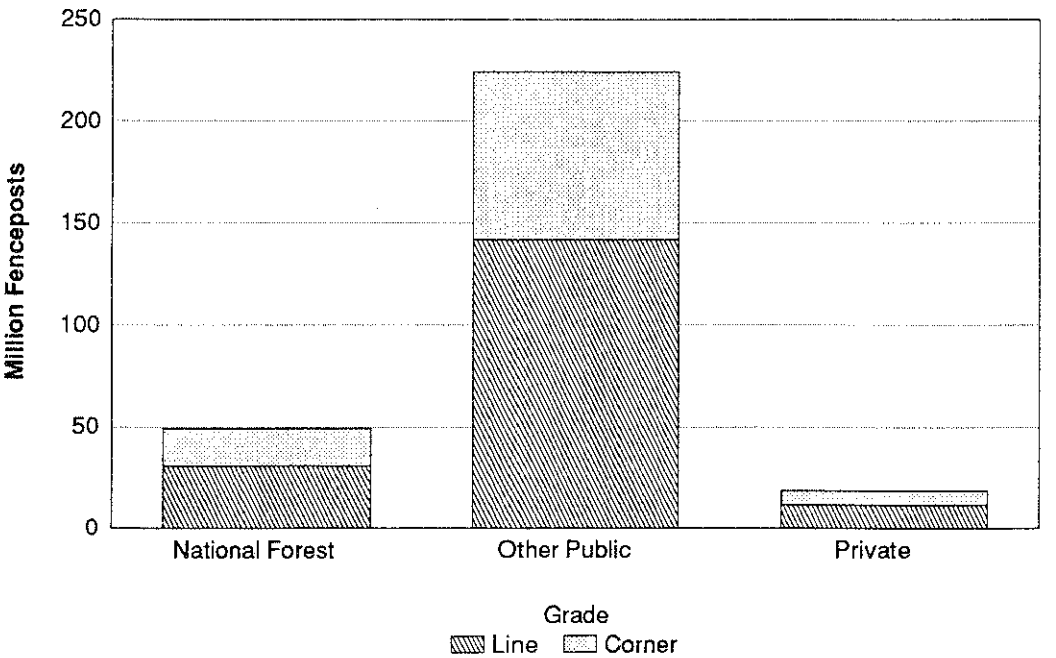


Figure 30—Number of juniper fenceposts on woodland by owner group and grade, Nevada, 1989.

Figure 31—Harvesting pinyon nuts near Ely, NV.

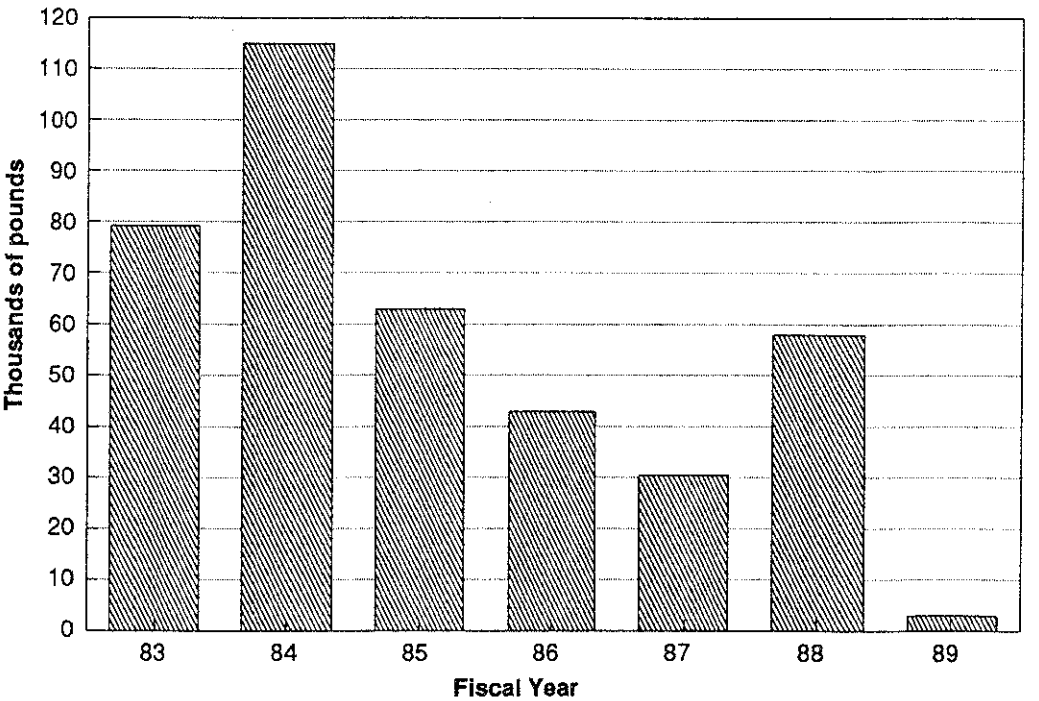


Figure 32—Pinyon nuts harvested from BLM-administered lands, Nevada, 1983 through 1989.

Management Considerations

Site Productivity—Site productivity models for wood production generally have not been available for woodland forest types because of the great diversity in species composition and site conditions under which they grow and because of a history of disturbance. Results from the few studies done over the last several decades (Daniel and others 1966; Howell 1940) were seldom applied, but the recent interest in woodlands for wood products has generated more studies (Chojnacky 1987; Smith and Schuler 1988; Tausch and Tueller 1990). However these studies have produced tools that are relatively crude in comparison to similar work for timber species because of inherent variability in the data and the lack of tree measurements over time.

Because woodland types occupy many sites where the combination of tree form, growth rate, stocking, and rates of reproduction are inadequate to support practical management for wood material, a subjective classification of high site and low site has been used in the inventory. Woodlands considered usable for growing wood products were classified high site. Future studies will likely refine procedures to identify such areas, but meanwhile the low site classification essentially identifies areas not suitable for the production of wood products. Although some material may be used from these areas, restocking may be extremely slow and may affect other resource values.

Land classification has been difficult for pinyon and juniper sites because of longevity, lack of understory vegetation, and disturbance (Hironaka 1987). Although considerable work has been done in the State (West 1984), a classification system has not been completed. Further classification work has been done by Everett and others (1983), and work continues (Everett and Bruner 1990). A final classification system is on the horizon for the Great Basin, which includes most of Nevada (Tausch 1991).

High site woodlands occupy about 5.9 million acres, or about two-thirds of the woodland area in Nevada. Because low site lands have relatively lower stocking and tree size, volume for these areas accounts for only one-fourth of the net volume of all woodland types. Pinyon-juniper and juniper types have, respectively, 30 and 53 percent of the area classified as low site, indicating that generally the presence of pinyon is an indicator of better sites. Pinyon usually is found on higher, more moist sites than pure juniper, and when pinyon or pinyon-juniper is classified low site, other factors such as low stocking or presence of rock have likely come into consideration.

Woodland Profiles—The practical side of managing woodlands for the production of wood fiber indicates that the effort should be concentrated on those areas offering the best chance for success, both ecologically and economically. The site quality classification has been combined with steepness of slope, volume per acre, and tree canopy cover to rank woodlands as to potential suitability for management and the harvest of wood products. These items have been grouped into 10 classes or "woodland profiles":

Woodland profile	Site class	Slope class	Volume class	Tree canopy cover
		Percent	*Ft³*	*Percent*
1	High	0-10	501+	55+
2	High	10-30	1,001+	55+
3	High	10-30	501-1,000	55+
4	High	0-30	1,001+	0-54
5	High	0-30	501-1,000	0-54
6	High	30+	all	all
7	High	0-30	0-500	all
8	Low	all[1]	all	all
9	High	all	seed/sap and nonstocked[2]	all
10	Low	all	seed/sap and nonstocked[2]	all

[1]Low site has precedence over slope.
[2]Seed/sap and nonstocked has precedence over volume.

What may be a management opportunity for one manager may not be for another, so there is no "best" answer as to which profiles represent the better areas for managing woodlands for wood products. However, certain profiles obviously identify woodlands less desirable for wood products and can be used as a starting point in identifying the acreage and associated volume of lands of interest to managers (figs. 33 and 34). Generally, higher quality, more accessible sites have lower numbers, except that the last two classes are for seedling-sapling and nonstocked areas. Profiles 8 and 10 together identify all low site lands, and profile 6 identifies high site woodlands on slopes of 30 percent and over.

For example, almost 17 percent of the woodland area and 21 percent of the woodland total volume on public lands in Nevada occur on steep slopes. Taken together, with appropriate reductions for low site lands, a total of 50.5 percent of the woodland area and 43.3 percent of the volume could be considered unsuitable for management for wood products—given these two criteria. Field sample locations that would not be eliminated by these criteria are shown in figure 35, except for National Forests, where all woodland locations are shown because data are not available for classification into woodland profiles.

Figure 36 shows the profiles on a volume-per-acre basis, which indicates that indeed the highest volumes are in the first five profiles. Profiles 2 and 4 are similar and differ mostly in tree canopy cover percentage, which has proven to be a poor indicator of age or volume per acre with this data set. There is a general relationship for both variables, but cutting and other types of disturbance have had a confounding effect.

Reforestation—Generally, woodlands will eventually reforest themselves without intervention by humans, unless restricted by fire. Those interested in forage for livestock would indicate that woodlands reproduce far too well because many areas have been "invaded" by pinyon and juniper, facilitated by the control of fire and a history of overgrazing in some areas. On the other hand, the lack of seed source or weather conducive to seedling survival may restrict the more valuable pinyon from becoming established, so juniper occupies entire sites formerly occupied by a mixture of pinyon and juniper. During the last several years, both the Forest Service and the BLM in Nevada—in cooperation with the State Division of Forestry and

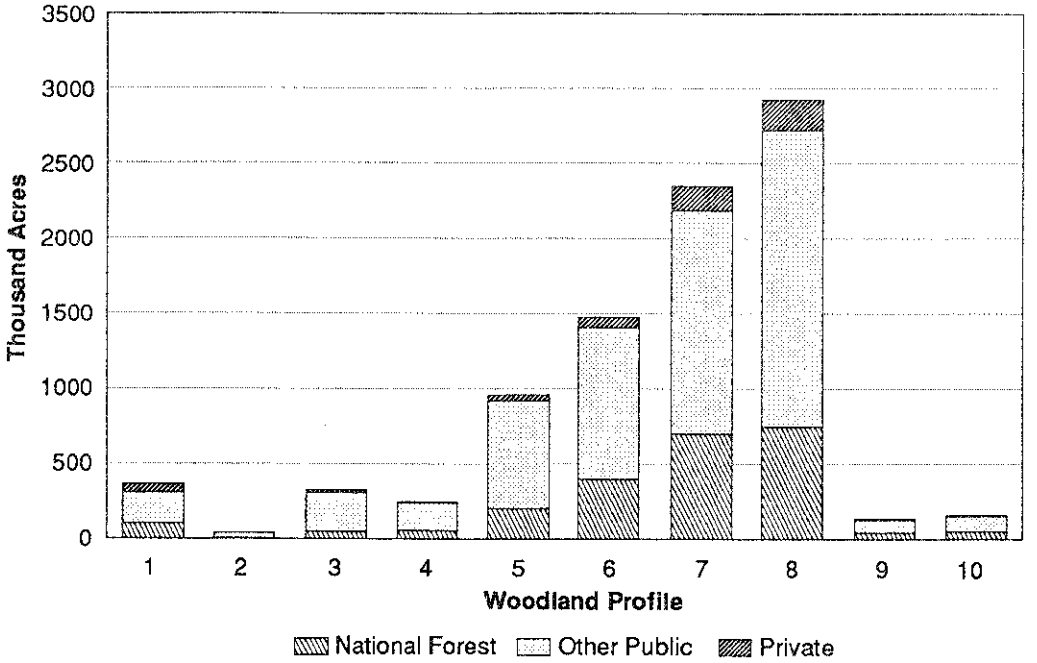


Figure 33—Area of woodland by woodland profile and owner group, Nevada, 1989.

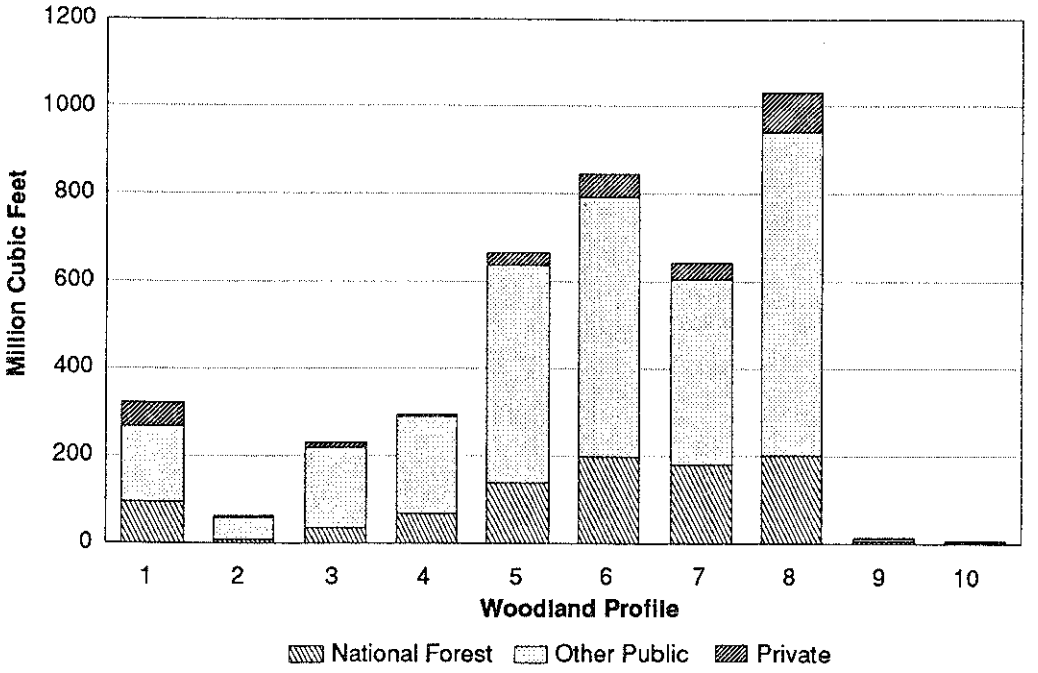
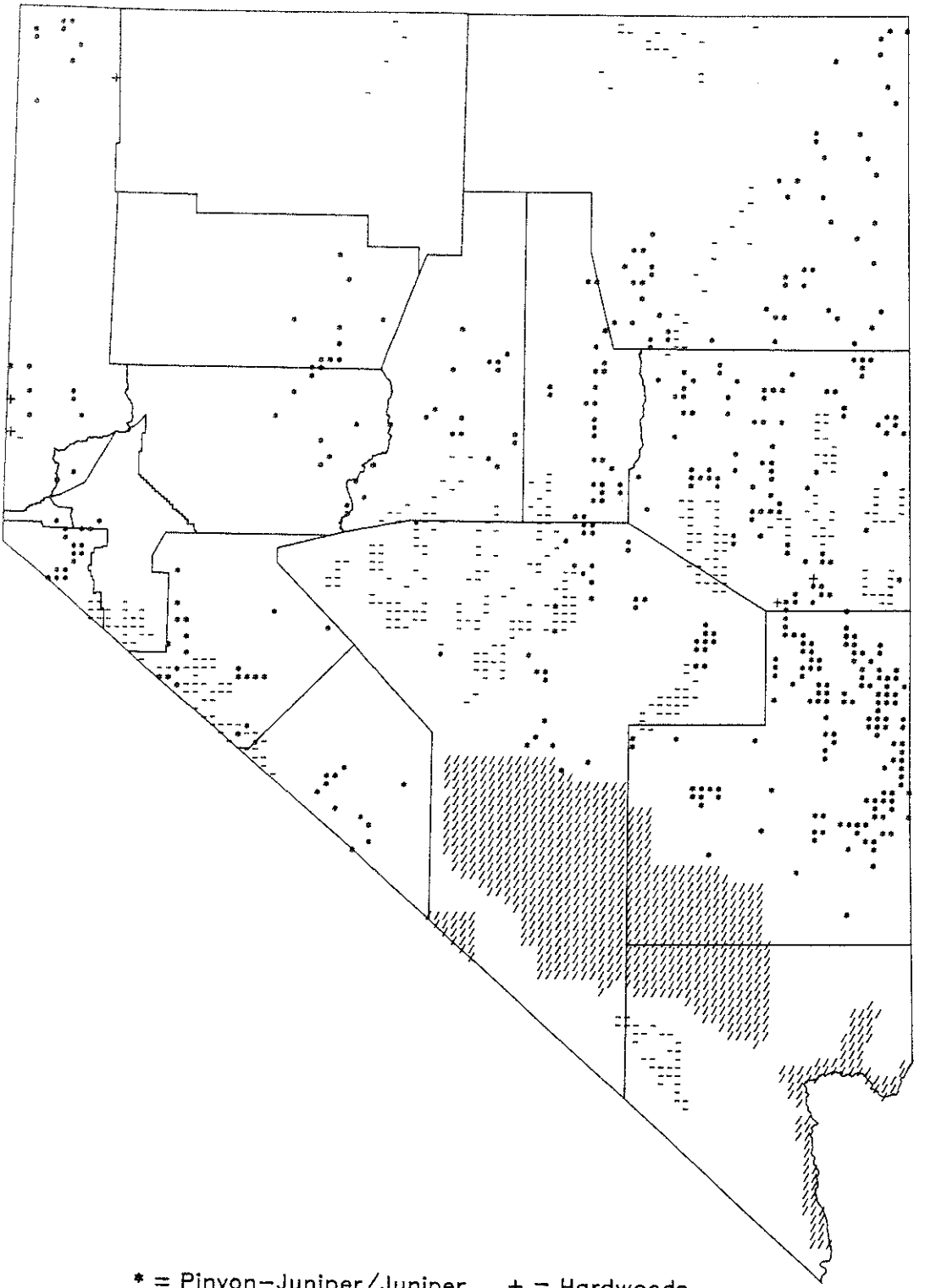


Figure 34—Net volume on woodland by woodland profile and owner group, Nevada, 1989.



* = Pinyon–Juniper/Juniper + = Hardwoods
– = National Forest Woodland Locations (Not Classified) //// = Excluded

Figure 35—Woodland field sample locations on high site and slopes under 30 percent, Nevada, 1989.

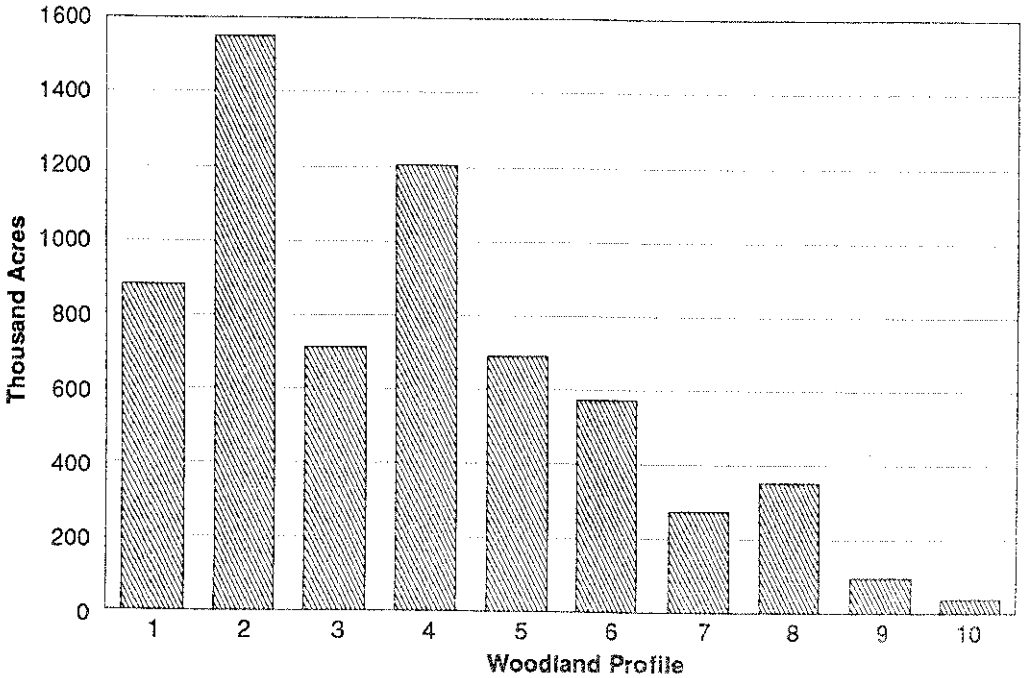


Figure 36—Woodland net volume per acre by woodland profile, Nevada, 1989.

Forest Service nurseries—have been growing seedlings and planting selected sites. During 1989 the State of Nevada reported production of 255,000 trees, a portion of which were pinyon and several timber species. The Forest Service reported that out of 540 woodland owners assisted, 255 received reforestation assistance (USDA Forest Service 1990).

Other Uses of the Woodland Resource

Grazing—To anyone familiar with woodlands, particularly pinyon and juniper woodlands, it could go without saying that grazing has had a profound effect on woodlands—and vice versa. The web of history involving grazing, fire, humans, and weather effects is difficult to untangle, but Jameson (1987) and others have done much better in reviewing the issue than can be done here. Woodlands are forest land, and woodlands can be rangeland—at least until the crown cover of woodlands approaches about 40 percent cover and little understory vegetation survives. Functionalism by and within land management agencies has promoted classification of woodlands as rangeland or forest land, but not both. Fortunately, the trend is toward integrated land management, which, for a given site and point in time, fosters the best mix of values to meet land management goals. Global warming, forest health monitoring, biodiversity, and other recent issues have become vehicles for public and professional awareness of the need for better and more intensive land management. Future changes in grazing policies for public lands may have an indirect effect on the extent and character of woodlands.

In Nevada during 1989, the Forest Service reported 281,707 animal unit months of grazing use—placing Nevada 12th in the Nation for grazing on National Forests. Although 12th for total grazing and for cattle, Nevada

National Forests placed second for wild horse grazing and fifth for sheep grazing. The BLM reported additional fee use of 1,497,297 animal unit months, which does not include about 35,000 wild horses (USDI Bureau of Land Management 1990). An unknown but significant percentage of this grazing use occurs on lands classified as woodlands.

Data are not available to indicate how much area of woodlands are grazed, but virtually all areas are available to livestock. The abundance of understory forage depends upon the site but decreases rapidly—even on the best sites—as tree canopy cover occupies 10 percent of the area or more (Clary 1987).

Wildlife Habitat—Woodlands are used heavily by many wildlife species, from big game to birds. Much of current vegetation manipulation, including removal of pinyon-juniper and oak stands, is to improve habitat and forage for wildlife. Treatment to alter the successional stage or tree canopy cover (fig. 37)—but not necessarily deforestation—often helps to improve wildlife habitat (Stevens 1987).

Riparian areas are often occupied by timber and woodland species. Recent concern for the management of these areas for forage productivity and fish and wildlife habitat has caused considerable research activity (Clary and Medin 1990). Table 7 was developed from aerial photo interpretation data collected by technical staff of the Forest Service and each BLM district. This table, by forest type group and tree canopy cover class, should be helpful in program management for wildlife and other activities. A similar table by owner class and county has been provided to cooperators and is available upon request.

Cercocarpus, known locally as mountain-mahogany, is greatly valued for wildlife browse and cover. Although unsurpassed as fuelwood, because of

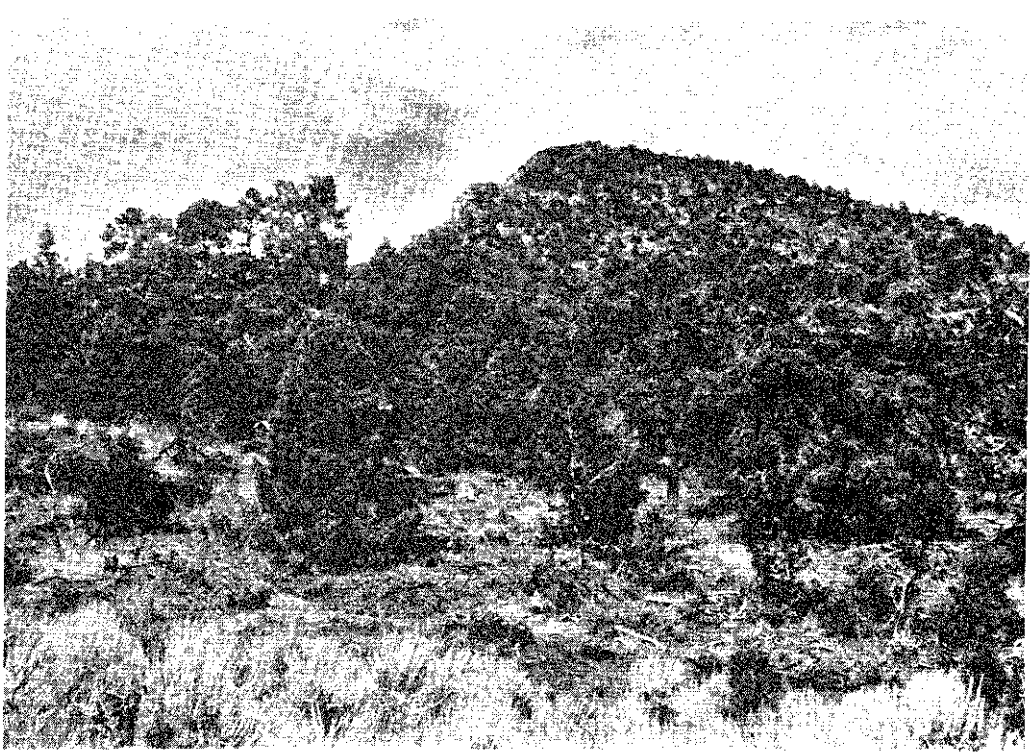


Figure 37—Selective pinyon-juniper cutting to improve wildlife habitat.

its density and former use to make charcoal for mining, most existing stands of cercocarpus are not conveniently located for harvesting because they occur above the pinyon-juniper zone (fig. 38).

Water—The interaction between woodlands and water is not well understood (Schmidt 1987), and more research is needed. Woodlands tend to perform differently in relation to water—retention, use, sediment movement, runoff, and so on—depending upon the degree of stand development and the amount of understory vegetation. Also, woodlands occur on a wide variety of soil conditions, further complicating classification and water yield studies.

Recreation and Tourism—Nevada is known primarily as having the entertainment capital of the world—Las Vegas. But many visitors combine their desire for gambling and entertainment with many outdoor activities related to the forests of the State. Federal and State agencies and Indian tribes offer various forms of outdoor activities related to camping, fishing, hiking, and enjoying the history of the State. Included is the newest National Park, Great Basin, where forested slopes give way to alpine scenery and the entrance to Lehman Caves.

INVENTORY PROCEDURE

Inventory Design

The data for this report were collected using a sample-based inventory design. The statistical design utilized map data, aerial photo interpretation, and field sample locations combined in a stratified two-phase process to compute estimates for the tables in appendix II. All sample data are referenced to the Universal Transverse Mercator (UTM) grid system (USDD Army 1973) to provide uniform sampling and to accommodate retrieval with geographic information systems.

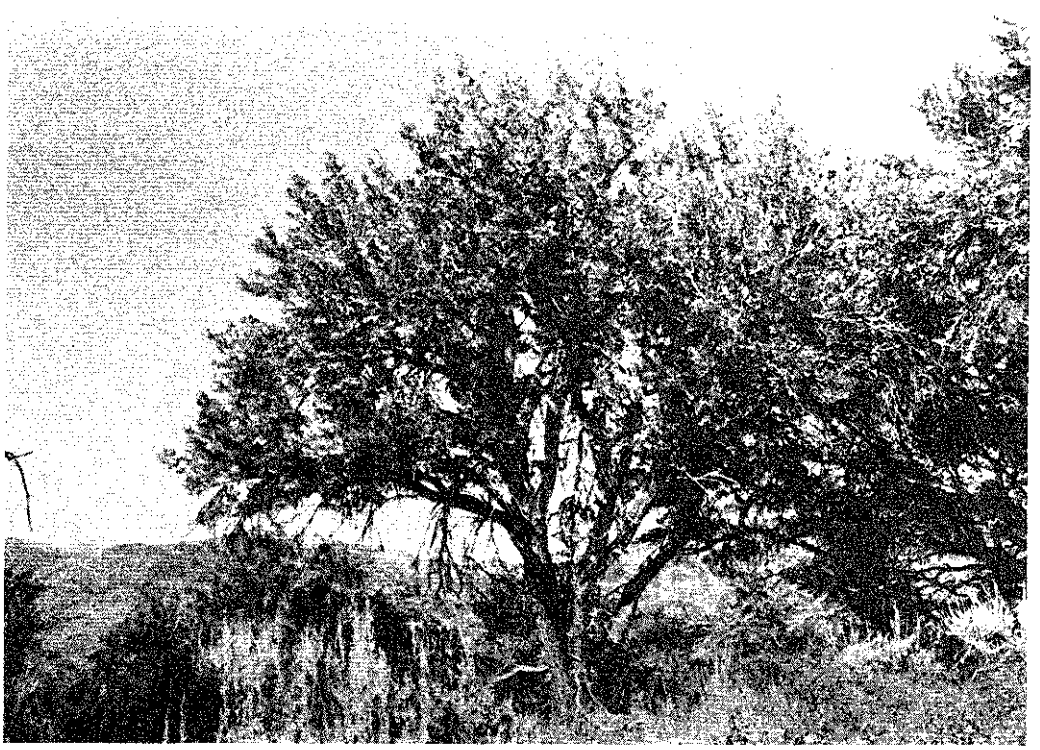


Figure 38—Cercocarpus on a mountain top near Ely, NV.

Primary Sample

Map and aerial photograph data were sampled on a 1,000-m interval UTM grid covering the State, except for about 4.5 million acres of excluded areas. This sample of 268,000 points, of which 39,525 points were forested, was summarized to develop stratum weights, or acres, to expand the secondary field sample locations to a population, or total, level. The State was divided into sample areas to localize the data, which were BLM Resource Areas, National Forests, and a block of non-Federal land in the vicinity of Carson City. The aerial photo sample points were summarized directly to provide estimates for some area tables, such as area by forest type group and crown density class.

Field Sample Locations

At each 5,000-m interval on the 1,000-m grid, a secondary field sample was selected, and if forested, measurements and observations were made on the ground. In some areas the field sample was intensified to provide an increased level of reliability for management planning. National Forests were not field sampled, and data from other samples nearby were used to develop stratum means for National Forest lands.

Of 12,247 potential field locations, 1,123 were visited and measured in woodland, and 108 were visited in timberland. Of the woodland field locations, 934 were on lands managed by the BLM, as were 76 timberland locations. Because the primary purpose of the work was to inventory and describe woodland resources, detailed measurements were not taken on timberland at most sites.

The woodland field procedures were the first procedures developed for a statewide inventory, and they were developed jointly with Nevada staff of the BLM (USDA Forest Service 1982). These procedures formed a basis for subsequent woodland inventories in all Western States by the Forest Service, the BLM, the Bureau of Indian Affairs and Indian tribes, and other cooperators.

The Nevada field data were collected by crews from the BLM and the Forest Service, Intermountain Research Station Forest Survey Program. The data were entered into computer files and edited for correctness and consistency.

Data Compilation

Following the data editing, the data were used to compute additional tree variables of interest—such as gross and net volumes, tree class, growth, mortality, and numbers of trees, posts, and Christmas trees per acre. Each sample location was analyzed for classification and summarization of the individual tree variables. Volumes were computed using volume models developed by Chojnacky (1984, 1985). Forest Survey quality control crews, using a visual segmentation technique (Born and Chojnacky 1985), collected the data for the pinyon, juniper, and cercocarpus volume and growth models.

Field sample data at the per-acre level were stratified by the land classes of timberland, woodland, nonforest, noncensus water, and census water, and the stratum acreages were derived from the primary photo sample. The areas were reconciled to agency land records and Bureau of the Census gross acreages by county.

Data Reliability

Table 8 shows sampling errors at the 67 percent confidence level for total volume, growth, and mortality at the State level. As previously indicated, the State was subdivided into sample areas of interest, and sampling errors were computed for each of these areas to indicate reliability of the results for local management planning.

Individual table cells should be used with caution because some are based on small sample sizes, with corresponding high probability of error. Generally, table cells with small values are based on relatively small sample sizes.

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APPENDIX I: 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.

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 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 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—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 utilized 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.

APPENDIX II: FOREST SURVEY TABLES

Area

Table 1—Total area by land class and ownership class, Nevada, 1989

Ownership class	Land class: Nonreserved: Timberland	Nonreserved: Woodland	Nonreserved: Nonforest	Reserved: Timberland	Reserved: Woodland	Reserved: Nonforest	Total Area[1]
	Acres						
Land:							
Public:							
National Forest	408,720	2,348,534	2,920,727	26,688	5,684	32,296	5,742,649
Other public:							
Bureau of Land Management[2]	106,504	6,024,048	41,627,386	—	—	204,698	47,962,636
National Parks[2,3]	—	—	—	38,055	19,769	720,637	778,461
Miscellaneous Federal[2]	3,460	30,147	546,584	—	—	4,079,781	4,659,972
State	—	—	213,891	—	—	—	213,891
County and municipal	—	—	—	—	—	—	—
Total other public	109,964	6,054,195	42,387,861	38,055	19,769	5,005,116	53,614,960
Total public	518,684	8,402,729	45,308,588	64,743	25,453	5,037,412	59,357,609
Private:							
Indian Trust	5,436	37,067	1,181,316	—	—	—	1,223,819
Other private	168,529	544,383	9,035,189	—	—	2,369	9,750,470
Total private	173,965	581,450	10,216,505	—	—	2,369	10,974,289
Total land area[4]	692,649	8,984,179	55,525,093	64,743	25,453	5,039,781	70,331,898
Water							426,982
Total land and water							70,758,880

[1]On this and all following tables, totals may vary due to rounding.
[2]Includes several areas, in this table only, which are excluded from the inventory area because of withdrawn or reserved status. A minor portion of these areas is forested, but the predominate land use precludes other uses. Includes Bombing Range, Department of Energy Test Site, Death Valley National Monument, and Lake Mead National Recreation Area.
[3]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 3 only.
[4]U.S. Department of Commerce, Bureau of Census, 1980.

Table 2—Area of reserved and nonreserved timberland by county and ownership class, Nevada, 1989

County	Ownership class						Total
	BLM	Indian	National Forest	National Park	Other public	Private	
	Acres						
Carson City	—	—	741	—	—	15,568	16,309
Churchill	1,483	—	—	—	1,236	1,977	4,696
Clark	1,483	—	21,004	—	—	4,448	26,935
Douglas	741	—	11,120	—	—	28,912	40,773
Elko	36,078	3,460	215,233	—	—	54,858	309,629
Esmeralda	—	—	2,471	—	—	—	2,471
Eureka	2,224	—	2,718	—	—	247	5,189
Humboldt	1,977	—	24,464	—	—	2,718	29,159
Lander	2,224	—	2,965	—	—	247	5,436
Lincoln	20,757	—	—	—	—	1,236	21,993
Lyon	247	—	3,212	—	—	4,448	7,907
Mineral	494	741	—	—	2,224	1,236	4,695
Nye	3,460	—	72,650	—	—	—	76,110
Pershing	—	—	—	—	—	—	—
Storey	—	—	—	—	—	494	494
Washoe	247	247	16,803	—	—	49,916	67,213
White Pine	35,090	988	62,025	38,055	—	2,224	138,382
Total	106,505	5,436	435,406	38,055	3,460	168,529	757,391

Table 3—Area of reserved and nonreserved woodland by county and ownership class, Nevada, 1989

County	Ownership class						Total
	BLM	Indian	National Forest	National Park	Other public	Private	
	Acres						
Carson City	14,332	—	—	—	—	1,977	16,309
Churchill	241,674	—	—	—	—	1,977	243,651
Clark	80,064	—	147,772	—	247	7,413	235,496
Douglas	69,685	—	32,124	—	—	58,318	160,127
Elko	771,972	5,436	111,447	—	—	228,577	1,117,432
Esmeralda	125,038	—	31,383	—	—	1,483	157,904
Eureka	337,058	—	60,295	—	—	6,425	403,778
Humboldt	36,325	—	9,637	—	2,718	12,108	60,788
Lander	251,311	—	112,188	—	—	9,143	372,642
Lincoln	1,705,800	—	16,556	—	—	16,309	1,738,665
Lyon	41,020	—	107,493	—	—	12,108	160,621
Mineral	169,023	6,919	224,376	—	22,734	25,699	448,751
Nye	577,743	—	966,447	—	494	5,931	1,550,615
Pershing	61,036	—	—	—	—	6,425	67,461
Storey	2,224	—	—	—	—	29,900	32,124
Washoe	196,205	16,556	1,730	—	3,954	85,747	304,192
White Pine	1,343,537	8,155	532,769	19,769	—	34,843	1,939,073
Total	6,024,047	37,066	2,354,217	19,769	30,147	544,383	9,009,629

Table 4—Area of woodland by owner group, forest type, and productivity class, Nevada, 1989

Owner group	Forest type	Productivity class: High	Productivity class: Low	Total
		Acres		
National Forest:	Pinyon-juniper	1,312,954	562,594	1,875,548
	Juniper	213,433	223,772	437,205
	Other woodland	23,557	12,224	35,781
	All types	1,549,944	798,590	2,348,534
Other public:	Pinyon-juniper	3,431,990	1,456,279	4,888,269
	Juniper	489,773	585,399	1,075,172
	Other woodland	57,736	33,018	90,754
	All types	3,979,499	2,074,696	6,054,195
Private:	Pinyon-juniper	262,564	129,589	392,153
	Juniper	90,169	81,020	171,189
	Other woodland	15,897	2,211	18,108
	All types	368,630	212,820	581,450
Total:	Pinyon-juniper	5,007,508	2,148,462	7,155,970
	Juniper	793,375	890,191	1,683,566
	Other woodland	97,190	47,453	144,643
	All types	5,898,073	3,086,106	8,984,179

Table 5—Area of woodland by owner group, forest type, and volume class, Nevada, 1989

Owner group	Forest type	Volume class: 0-199 cu ft/acre	200-399 cu ft/acre	400-599 cu ft/acre	600-799 cu ft/acre	800-999 cu ft/acre	1,000+ cu ft/acre	Total
		Acres						
National Forest:	Pinyon-juniper	501,760	551,276	382,113	188,256	126,336	125,807	1,875,548
	Juniper	220,803	117,955	42,704	21,237	26,735	7,771	437,205
	Other woodland	11,657	9,950	—	4,790	9,384	—	35,781
	All types	734,220	679,181	424,817	214,283	162,455	133,578	2,348,534
Other public:	Pinyon-juniper	1,063,493	1,149,961	1,049,969	737,728	403,701	483,416	4,888,268
	Juniper	389,173	303,752	181,043	83,779	75,559	41,866	1,075,172
	Other woodland	36,380	24,746	2,855	10,110	16,664	—	90,755
	All types	1,489,046	1,478,459	1,233,867	831,617	495,924	525,282	6,054,195
Private:	Pinyon-juniper	82,217	88,288	66,746	60,507	45,389	49,007	392,154
	Juniper	68,138	39,463	25,587	11,777	21,010	5,214	171,189
	Other woodland	1,095	7,742	367	2,210	6,693	—	18,107
	All types	151,450	135,493	92,700	74,494	73,092	54,221	581,450
Total:	Pinyon-juniper	1,647,470	1,789,525	1,498,828	986,491	575,426	658,230	7,155,970
	Juniper	678,114	461,170	249,334	116,793	123,304	54,851	1,683,566
	Other woodland	49,132	42,438	3,222	17,110	32,741	—	144,643
	All types	2,374,716	2,293,133	1,751,384	1,120,394	731,471	713,081	8,984,179

Table 6—Area of woodland by owner group, forest type, and woodland profile, Nevada, 1989

Owner group and forest type	Woodland profile 1	2	3	4	5	6	7	8	9	10	Total
	Acres										
National Forest:											
Pinyon-juniper	82,509	4,942	40,361	46,764	164,708	369,556	580,801	512,921	23,314	49,673	1,875,549
Juniper	12,561	—	4,790	7,771	38,589	20,781	109,780	220,592	19,161	3,180	437,205
Other woodland	9,383	—	—	—	—	4,790	9,383	12,224	—	—	35,780
All types	104,453	4,942	45,151	54,535	203,297	395,127	699,964	745,737	42,475	52,853	2,348,534
Other public:											
Pinyon-juniper	181,456	30,201	247,712	164,885	618,253	906,663	1,222,511	1,383,855	60,309	72,424	4,888,269
Juniper	16,895	2,854	14,442	20,328	84,912	79,976	252,782	558,885	17,584	26,514	1,075,172
Other woodland	3,486	—	—	—	16,032	23,287	8,648	33,018	6,283	—	90,754
All types	201,837	33,055	262,154	185,213	719,197	1,009,926	1,483,941	1,975,758	84,176	98,938	6,054,195
Private:											
Pinyon-juniper	50,436	2,305	13,269	3,196	24,098	59,786	108,066	127,674	1,408	1,915	392,153
Juniper	2,130	366	4,276	2,351	15,083	9,391	49,070	76,418	7,501	4,603	171,189
Other woodland	6,709	—	—	—	351	2,194	6,518	2,211	125	—	18,108
All types	59,275	2,671	17,545	5,547	39,532	71,371	163,654	206,303	9,034	6,518	581,450
Total:											
Pinyon-juniper	314,401	37,448	301,342	214,845	807,059	1,336,005	1,911,378	2,024,450	85,031	124,012	7,155,971
Juniper	31,586	3,220	23,508	30,450	138,584	110,148	411,632	855,895	44,246	34,297	1,683,566
Other woodland	19,578	—	—	—	16,383	30,271	24,549	47,453	6,408	—	144,642
All types	365,565	40,668	324,850	245,295	962,026	1,476,424	2,347,559	2,927,798	135,685	158,309	8,984,179

Table 7—Area of forest land by forest type group and tree canopy cover, Nevada, 1989

Forest type group	Tree canopy cover				Total
	0-9 percent	10-39 percent	40-69 percent	70-100 percent	
	Acres				
Sierra conifer	—	64,743	43,986	20,263	128,992
Other conifer	74,380	78,334	89,948	33,113	275,775
Aspen	47,445	99,338	127,262	56,094	330,139
Cottonwood	494	16,062	3,954	741	21,251
Total timberland	122,319	258,477	265,150	110,211	756,157
Pinyon-juniper	75,863	3,168,939	2,688,804	404,272	6,337,878
Juniper	715,878	963,976	312,841	16,309	2,009,004
Riparian	9,637	12,603	7,413	494	30,147
Other woodland	59,554	123,061	94,396	15,568	292,579
Total woodland	860,932	4,268,579	3,103,454	436,643	8,669,608
Nonstocked	341,259	—	—	—	341,259
Total	1,324,510	4,527,056	3,368,604	546,854	9,767,024

Sampling Error

Table 8—Area, net volume, net annual growth, and annual mortality on woodland with percent standard error, Nevada

Woodland		Percent standard error
Area (Acres)	8,984,179	±0.1
Volume, 1989 (M cubic feet)	4,118,140	±2.3
Growth, 1988 (M cubic feet)	43,552	±3.1
Mortality, 1988 (M cubic feet)	2,347	±36.1

Table 9—Number of trees of woodland species on woodland by owner group, species, and diameter class, Nevada, 1989

Owner group and species	Diameter class (inches at root collar) 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+	Total
	Thousand trees															
National Forest:																
Pinyon	75,665	61,649	41,744	30,626	21,777	16,616	9,715	4,506	3,494	970	894	1,089	79	1	94	268,919
Juniper	35,978	20,283	18,351	14,234	13,934	10,024	9,166	6,144	5,013	3,781	3,000	1,613	1,169	259	1,278	144,227
Oak	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cercocarpus	938	407	2,272	1,251	1,680	2,020	639	235	188	375	236	48	—	48	—	10,337
Other woodland	17	1	80	117	79	41	40	117	39	—	—	1	—	—	—	532
All species	112,598	82,340	62,447	46,228	37,470	28,701	19,560	11,002	8,734	5,126	4,130	2,751	1,248	308	1,372	424,015
Other public:																
Pinyon	236,771	147,090	109,796	81,912	54,432	38,762	21,037	12,418	7,366	2,872	3,003	1,362	362	148	289	717,620
Juniper	99,099	84,616	83,024	67,198	61,104	47,463	35,029	23,290	17,927	12,232	8,996	4,989	3,475	2,658	5,507	556,607
Oak	4,160	1,165	333	250	83	—	83	83	—	—	—	—	—	—	—	6,157
Cercocarpus	2,753	5,551	5,030	5,026	4,521	2,450	1,755	643	124	57	85	201	32	41	—	28,269
Other woodland	205	260	242	203	149	85	158	192	64	—	—	10	—	—	—	1,568
All species	342,988	238,682	198,425	154,589	120,289	88,760	58,062	36,626	25,481	15,161	12,084	6,562	3,869	2,847	5,796	1,310,221
Private:																
Pinyon	9,539	9,811	7,371	6,367	4,975	4,061	2,537	1,673	755	375	286	454	25	23	67	48,319
Juniper	6,966	7,548	7,107	5,470	5,406	4,366	3,380	2,212	1,675	1,197	806	438	443	232	605	47,851
Oak	32	9	3	2	1	—	1	1	—	—	—	—	—	—	—	49
Cercocarpus	723	310	1,628	853	986	1,228	317	161	131	254	145	22	—	18	—	6,776
Other woodland	22	3	7	5	5	4	3	4	1	—	—	1	—	—	—	55
All species	17,282	17,681	16,116	12,697	11,373	9,659	6,238	4,051	2,562	1,826	1,237	915	468	273	672	103,050
Total:																
Pinyon	321,975	218,550	158,911	118,905	81,184	59,439	33,289	18,597	11,615	4,217	4,183	2,905	466	172	450	1,034,858
Juniper	142,043	112,447	108,482	86,902	80,444	61,853	47,575	31,646	24,615	17,210	12,802	7,040	5,087	3,149	7,390	748,685
Oak	4,192	1,174	336	252	84	—	84	84	—	—	—	—	—	—	—	6,206
Cercocarpus	4,414	6,268	8,930	7,130	7,187	5,698	2,711	1,039	443	686	466	271	32	107	—	45,382
Other woodland	244	264	329	325	233	130	201	313	104	—	—	12	—	—	—	2,155
All species	472,868	338,703	276,988	213,514	169,132	127,120	83,860	51,679	36,777	22,113	17,451	10,228	5,585	3,428	7,840	1,837,286

Total Volume

Table 10—Woodland area, net volume, dead volume, and total volume on woodland by average stand diameter class, Nevada, 1989

Average stand diameter class	Area	Net volume	Dead volume	Total volume
Inches	*Acres*	*Thousand cubic feet*		
0.0 - 0.9	129,876	1,330	2,188	3,518
1.0 - 2.9	26,795	171	1	172
3.0 - 4.9	617,336	89,677	6,708	96,385
5.0 - 6.9	3,033,237	1,022,776	65,056	1,087,832
7.0 - 8.9	2,868,386	1,484,742	75,552	1,560,294
9.0 - 10.9	1,379,813	908,178	56,765	964,943
11.0 - 12.9	605,518	392,159	27,305	419,464
13.0 - 14.9	180,945	136,685	22,392	159,077
15.0 - 16.9	48,132	30,812	2,361	33,173
17.0 - 18.9	22,619	7,580	510	8,090
19.0 - 20.9	27,343	9,765	26	9,791
21.0 - 22.9	44,179	34,265	2,894	37,159
23.0 - 24.9	—	—	—	—
25.0 - 26.9	—	—	—	—
27.0 - 28.9	—	—	—	—
29.0+	—	—	—	—
Total	8,984,179	4,118,140	261,758	4,379,898

Net Volume

Table 11—Net volume on woodland by species and owner group, Nevada, 1989

Species	Owner group: National Forest	Owner group: Other public	Owner group: Private	Total
	Thousand cubic feet			
Ponderosa pine	420	3,386	310	4,116
White fir	197	—	—	197
Aspen	—	1,178	151	1,329
Pinyon	548,905	1,437,842	153,812	2,140,559
Juniper	361,110	1,407,143	120,898	1,889,151
Oak	—	4,189	32	4,221
Cercocarpus	20,773	41,116	12,882	74,771
Other woodland	1,272	2,474	50	3,796
All species	932,677	2,897,328	288,135	4,118,140

Table 12—Net volume of woodland species on woodland by owner group, species, and diameter class, Nevada, 1989

Owner group and species	Diameter class (inches at root collar) 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+	Total
	Thousand cubic feet														
National Forest:															
Pinyon	12,734	35,030	60,778	76,041	91,027	84,570	52,845	53,686	19,178	22,070	30,907	2,064	23	7,953	548,906
Juniper	3,443	10,147	17,624	28,415	32,151	41,222	37,850	36,496	36,164	38,839	21,631	23,144	3,674	30,310	361,110
Oak	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cercocarpus	104	1,164	1,419	2,645	5,106	2,655	1,090	683	2,385	2,095	201	—	1,226	—	20,773
Other woodland	—	26	105	75	107	172	578	209	—	—	—	—	—	—	1,272
All species	16,281	46,367	79,926	107,176	128,391	128,619	92,363	91,074	57,727	63,004	52,739	25,208	4,923	38,263	932,061
Other public:															
Pinyon	29,196	88,176	160,101	200,089	231,980	196,999	155,794	124,464	66,683	86,739	47,531	16,983	7,002	26,105	1,437,842
Juniper	15,611	46,511	81,178	124,185	150,172	151,006	140,995	136,988	118,334	113,487	69,909	60,353	54,816	143,598	1,407,143
Oak	346	389	676	462	—	1,016	1,299	—	—	—	—	—	—	—	4,188
Cercocarpus	1,025	2,683	5,293	8,600	6,316	8,117	3,341	676	499	810	2,603	109	1,044	—	41,116
Other woodland	29	95	173	124	177	579	953	344	—	—	—	—	—	—	2,474
All species	46,207	137,854	247,421	333,460	388,645	357,717	302,382	262,472	185,516	201,036	120,043	77,445	62,862	169,703	2,892,763
Private:															
Pinyon	1,990	5,824	12,237	17,855	23,534	22,555	20,070	11,908	7,873	7,802	13,972	1,379	1,139	5,673	153,811
Juniper	1,086	3,321	5,985	9,334	11,976	13,274	11,235	11,231	10,660	9,316	5,820	8,529	4,024	15,107	120,898
Oak	3	3	5	3	—	8	10	—	—	—	—	—	—	—	32
Cercocarpus	63	816	1,015	1,647	3,242	1,454	749	489	1,612	1,194	130	—	472	—	12,883
Other woodland	([1])	1	4	3	4	9	21	8	—	—	—	—	—	—	50
All species	3,142	9,965	19,246	28,842	38,756	37,300	32,085	23,636	20,145	18,312	19,922	9,908	5,635	20,780	287,674
Total:															
Pinyon	43,920	129,030	233,116	293,985	346,541	304,124	228,709	190,058	93,734	116,611	92,410	20,426	8,164	39,731	2,140,559
Juniper	20,140	59,979	104,787	161,934	194,299	205,502	190,080	184,715	165,158	161,642	97,360	92,026	62,514	189,015	1,889,151
Oak	349	392	681	465	—	1,024	1,309	—	—	—	—	—	—	—	4,220
Cercocarpus	1,192	4,663	7,727	12,892	14,664	12,226	5,180	1,848	4,496	4,099	2,934	109	2,742	—	74,772
Other woodland	29	122	282	202	288	760	1,552	561	—	—	—	—	—	—	3,796
All species	65,630	194,186	346,593	469,478	555,792	523,636	426,830	377,182	263,388	282,352	192,704	112,561	73,420	228,746	4,112,498

[1]Less than 500 cubic feet.

Table 13—Net volume on woodland by owner group, forest type, and productivity class, Nevada, 1989

Owner group	Forest type	Productivity class: High	Productivity class: Low	Total
		Thousand cubic feet		
National Forest:	Pinyon-juniper	637,119	162,336	799,455
	Juniper	75,607	41,183	116,790
	Other woodland	15,676	756	16,432
	All types	728,402	204,275	932,677
Other public:	Pinyon-juniper	1,924,418	559,598	2,484,016
	Juniper	203,075	178,478	381,553
	Other woodland	26,907	4,852	31,759
	All types	2,154,400	742,928	2,897,328
Private:	Pinyon-juniper	155,648	59,762	215,410
	Juniper	31,993	29,969	61,962
	Other woodland	10,176	587	10,763
	All types	197,817	90,318	288,135
Total:	Pinyon-juniper	2,717,185	781,696	3,498,881
	Juniper	310,675	249,630	560,305
	Other woodland	52,759	6,195	58,954
	All types	3,080,619	1,037,521	4,118,140

Table 14—Net volume on woodland by owner group, forest type, and volume class, Nevada, 1989

Owner group	Forest type	Volume class: 0-199 cu ft/acre	200-399 cu ft/acre	400-599 cu ft/acre	600-799 cu ft/acre	800-999 cu ft/acre	1,000+ cu ft/acre	Total
		Thousand cubic feet						
National Forest:	Pinyon-juniper	44,979	159,777	188,564	129,264	110,305	166,564	799,453
	Juniper	17,741	33,395	21,229	13,758	22,161	8,507	116,791
	Other woodland	554	3,549	—	3,482	8,848	—	16,433
	All types	63,274	196,721	209,793	146,504	141,314	175,071	932,677
Other public:	Pinyon-juniper	99,742	334,569	507,497	514,790	352,186	675,232	2,484,016
	Juniper	36,692	84,165	87,811	54,200	65,929	52,756	381,553
	Other woodland	2,011	7,528	1,259	6,547	14,414	—	31,759
	All types	138,445	426,262	596,567	575,537	432,529	727,988	2,897,328
Private:	Pinyon-juniper	8,447	26,253	32,431	41,668	39,653	66,958	215,410
	Juniper	6,900	10,897	12,273	7,345	17,870	6,677	61,962
	Other woodland	70	2,723	162	1,526	6,282	—	10,763
	All types	15,417	39,873	44,866	50,539	63,805	73,635	288,135
Total:	Pinyon-juniper	153,168	520,599	728,492	685,722	502,144	908,754	3,498,879
	Juniper	61,333	128,457	121,313	75,303	105,960	67,940	560,306
	Other woodland	2,635	13,800	1,421	11,555	29,544	—	58,955
	All types	217,136	662,856	851,226	772,580	637,648	976,694	4,118,140

Table 15—Net volume of woodland by owner group, forest type, and woodland profile, Nevada, 1989

Owner group and forest type	Woodland profile 1	2	3	4	5	6	7	8	9	10	Total
	Thousand cubic feet										
National Forest:											
Pinyon-juniper	78,758	7,532	31,948	58,880	112,068	191,797	154,038	159,965	2,098	2,371	799,455
Juniper	8,127	—	2,559	8,507	26,809	2,833	23,645	40,998	3,127	185	116,790
Other woodland	8,847	—	—	—	—	3,482	3,347	756	—	—	16,432
All types	95,732	7,532	34,507	67,387	138,877	198,112	181,030	201,719	5,225	2,556	932,677
Other public:											
Pinyon-juniper	159,751	43,706	177,431	200,168	424,625	561,186	353,711	557,934	3,840	1,664	2,484,016
Juniper	11,317	6,945	7,788	21,958	59,892	24,604	67,887	176,931	2,683	1,548	381,553
Other woodland	1,854	—	—	—	13,819	7,916	3,318	4,852	—	—	31,759
All types	172,922	50,651	185,219	222,126	498,336	593,706	424,916	739,717	6,523	3,212	2,897,328
Private:											
Pinyon-juniper	46,624	3,928	9,653	3,928	16,722	47,346	27,356	59,731	91	31	215,410
Juniper	1,209	891	2,276	2,493	10,931	4,489	8,497	29,677	1,206	293	61,962
Other woodland	6,142	—	—	—	302	1,402	2,330	587	—	—	10,763
All types	53,975	4,819	11,929	6,421	27,955	53,237	38,183	89,995	1,297	324	288,135
Total:											
Pinyon-juniper	285,133	55,166	219,032	262,976	553,415	800,329	535,105	777,630	6,029	4,066	3,498,881
Juniper	20,653	7,836	12,623	32,958	97,632	31,926	100,029	247,606	7,016	2,026	560,305
Other woodland	16,843	—	—	—	14,121	12,800	8,995	6,195	—	—	58,954
All types	322,629	63,002	231,655	295,934	665,168	845,055	644,129	1,031,431	13,045	6,092	4,118,140

Table 16—Net dead volume of woodland species on woodland by owner group, species, and diameter class, Nevada, 1989

Owner group and species	Diameter class (inches at root collar) 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+	Total
	Thousand cubic feet														
National Forest:															
Pinyon	452	1,309	1,869	1,953	4,286	4,015	3,438	2,059	3,089	634	2,231	—	5,746	823	31,904
Juniper	179	378	1,050	1,110	2,109	1,953	2,808	1,708	2,097	1,606	1,023	1,165	466	1,613	19,265
Oak	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cercocarpus	13	113	101	229	503	259	97	118	851	438	130	—	61	—	2,913
Other woodland	—	3	10	7	11	17	35	21	—	—	—	—	—	—	104
All species	644	1,803	3,030	3,299	6,909	6,244	6,378	3,906	6,037	2,678	3,384	1,165	6,273	2,436	54,186
Other public:															
Pinyon	1,000	3,570	6,820	10,854	11,819	11,373	11,328	8,700	8,064	3,527	1,850	631	5,101	647	85,284
Juniper	515	1,313	2,760	4,979	8,254	7,984	8,647	6,392	9,154	9,683	8,000	7,081	3,876	13,147	91,785
Oak	3	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Cercocarpus	101	217	498	641	349	389	507	17	57	102	476	55	52	—	3,461
Other woodland	—	4	17	12	18	28	58	35	—	—	—	—	—	—	172
All species	1,619	5,104	10,095	16,486	20,440	19,774	20,540	15,144	17,275	13,312	10,326	7,767	9,029	13,794	180,705
Private:															
Pinyon	130	368	786	798	2,369	2,088	1,865	794	1,735	348	1,075	9	4,030	572	16,967
Juniper	28	113	448	286	875	513	809	528	720	300	810	728	298	1,409	7,865
Oak	([1])	—	—	—	—	—	—	—	—	—	—	—	—	—	([1])
Cercocarpus	19	97	104	201	325	175	87	81	575	285	58	—	24	—	2,031
Other woodland	—	([1])	([1])	([1])	1	1	1	1	—	—	—	—	—	—	4
All species	177	578	1,338	1,285	3,570	2,777	2,762	1,404	3,030	933	1,943	737	4,352	1,981	26,867
Total:															
Pinyon	1,582	5,247	9,475	13,605	18,474	17,476	16,631	11,553	12,888	4,509	5,156	640	14,877	2,042	134,155
Juniper	722	1,804	4,258	6,375	11,238	10,450	12,264	8,628	11,971	11,589	9,833	8,974	4,640	16,169	118,915
Oak	3	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Cercocarpus	133	427	703	1,071	1,177	823	691	216	1,483	825	664	55	137	—	8,405
Other woodland	—	7	27	19	30	46	94	57	—	—	—	—	—	—	280
All species	2,440	7,485	14,463	21,070	30,919	28,795	29,680	20,454	26,342	16,923	15,653	9,669	19,654	18,211	261,758

[1]Less than 500 cubic feet.

Table 17—Net dead volume of woodland species on woodland by owner group, forest type, and productivity class, Nevada, 1989

Owner group	Forest type	Productivity class: High	Productivity class: Low	Total
		Thousand cubic feet		
National Forest:	Pinyon-juniper	35,544	8,384	43,928
	Juniper	5,294	2,281	7,575
	Other woodland	2,627	56	2,683
	All types	43,465	10,721	54,186
Other public:	Pinyon-juniper	112,927	42,004	154,931
	Juniper	10,555	12,189	22,744
	Other woodland	2,140	890	3,030
	All types	125,622	55,083	180,705
Private:	Pinyon-juniper	14,409	6,797	21,206
	Juniper	1,898	1,863	3,761
	Other woodland	1,781	119	1,900
	All types	18,088	8,779	26,867
Total:	Pinyon-juniper	162,880	57,185	220,065
	Juniper	17,747	16,333	34,080
	Other woodland	6,548	1,065	7,613
	All types	187,175	74,583	261,758

Table 18—Net dead volume of woodland species on woodland by owner group, forest type, and volume class, Nevada, 1989

Owner group	Forest type	Volume class: 0-199 cu ft/acre	200-399 cu ft/acre	400-599 cu ft/acre	600-799 cu ft/acre	800-999 cu ft/acre	1,000+ cu ft/acre	Total
		Thousand cubic feet						
National Forest:	Pinyon-juniper	828	5,134	5,600	5,607	8,702	18,056	43,927
	Juniper	2,186	1,334	1,249	669	1,440	698	7,576
	Other woodland	29	430	—	294	1,930	—	2,683
	All types	3,043	6,898	6,849	6,570	12,072	18,754	54,186
Other public:	Pinyon-juniper	4,953	22,604	37,050	28,116	22,055	40,154	154,932
	Juniper	2,398	6,603	4,217	4,249	2,436	2,841	22,744
	Other woodland	170	556	528	728	1,047	—	3,029
	All types	7,521	29,763	41,795	33,093	25,538	42,995	180,705
Private:	Pinyon-juniper	334	1,676	1,712	3,237	4,467	9,780	21,206
	Juniper	1,028	929	399	399	647	359	3,761
	Other woodland	17	333	68	158	1,324	—	1,900
	All types	1,379	2,938	2,179	3,794	6,438	10,139	26,867
Total:	Pinyon-juniper	6,115	29,414	44,362	36,960	35,224	67,990	220,065
	Juniper	5,612	8,866	5,865	5,317	4,523	3,898	34,081
	Other woodland	216	1,319	596	1,180	4,301	—	7,612
	All types	11,943	39,599	50,823	43,457	44,048	71,888	261,758

Table 19—Net dead volume on woodland by owner group, forest type, and woodland profile, Nevada, 1989

Owner group and forest type	Woodland profile 1	2	3	4	5	6	7	8	9	10	Total
	Thousand cubic feet										
National Forest:											
Pinyon-juniper	4,100	675	1,314	3,093	5,524	16,278	4,366	8,384	194	([1])	43,928
Juniper	446	—	260	698	1,826	([1])	2,063	2,244	—	38	7,575
Other woodland	1,930	—	—	—	—	295	402	56	—	—	2,683
All types	6,476	675	1,574	3,791	7,350	16,573	6,831	10,684	194	38	54,186
Other public:											
Pinyon-juniper	7,849	3,505	13,068	12,093	22,539	33,438	20,005	42,004	430	1	154,932
Juniper	725	698	263	1,945	3,558	568	2,794	11,878	4	311	22,744
Other woodland	658	—	—	—	917	383	181	890	—	—	3,029
All types	9,232	4,203	13,331	14,038	27,014	34,389	22,980	54,772	434	312	180,705
Private:											
Pinyon-juniper	2,287	209	610	194	1,166	8,692	1,241	6,797	10	([1])	21,206
Juniper	21	90	106	244	592	24	822	1,800	([1])	63	3,762
Other woodland	1,372	—	—	—	20	113	275	119	—	—	1,899
All types	3,680	299	716	438	1,778	8,829	2,338	8,716	10	63	26,867
Total:											
Pinyon-juniper	14,236	4,389	14,992	15,380	29,229	58,408	25,612	57,185	634	1	220,066
Juniper	1,192	788	629	2,887	5,976	592	5,679	15,922	4	412	34,081
Other woodland	3,960	—	—	—	937	791	858	1,065	—	—	7,611
All types	19,388	5,177	15,621	18,267	36,142	59,791	32,149	74,172	638	413	261,758

[1]Less than 500 cubic feet.

Growth and Mortality

Table 20—Net annual growth on woodland by species and owner group, Nevada, 1988

Species	Owner group: National Forest	Owner group: Other public	Owner group: Private	Total
	Thousand cubic feet			
Ponderosa pine	13	26	9	48
White fir	9	—	—	9
Aspen	—	62	8	70
Pinyon	7,481	20,847	1,757	30,085
Juniper	2,421	9,321	925	12,667
Oak	—	48	([1])	48
Cercocarpus	159	312	103	574
Other woodland	16	34	1	51
All species	10,099	30,650	2,803	43,552

[1]Less than 500 cubic feet.

Table 21—Net annual growth on woodland by owner group, forest type, and productivity class, Nevada, 1988

Owner group	Forest type	Productivity class: High	Productivity class: Low	Total
		Thousand cubic feet		
National Forest:	Pinyon-juniper	7,202	1,752	8,954
	Juniper	769	250	1,019
	Other woodland	118	8	126
	All types	8,089	2,010	10,099
Other public:	Pinyon-juniper	22,293	5,075	27,368
	Juniper	1,760	1,279	3,039
	Other woodland	180	63	243
	All types	24,233	6,417	30,650
Private:	Pinyon-juniper	1,517	655	2,172
	Juniper	329	214	543
	Other woodland	81	7	88
	All types	1,927	876	2,803
Total:	Pinyon-juniper	31,012	7,482	38,494
	Juniper	2,858	1,743	4,601
	Other woodland	379	78	457
	All types	34,249	9,303	43,552

Table 22—Annual mortality on woodland by species and owner group, Nevada, 1988

Species	Owner group: National Forest	Other public	Private	Total
	Thousand cubic feet			
Ponderosa pine	—	—	—	—
White fir	—	—	—	—
Aspen	—	—	—	—
Pinyon	801	728	527	2,056
Juniper	—	274	3	277
Oak	—	—	—	—
Cercocarpus	2	10	2	14
Other woodland	—	—	—	—
All species	803	1,012	532	2,347

Christmas Trees

Table 23—Number of pinyon Christmas trees on woodland by owner group, grade, and height class, Nevada, 1989

Owner group	Christmas-tree grade	Height class: 0'-5'	6'-10'	11'-12'	Total
		Thousand trees			
National Forest:	Premium	1,430	4,042	436	5,908
	Standard	10,786	9,107	839	20,732
	Utility	39,314	15,648	1,198	56,160
	Total	51,530	28,797	2,473	82,800
Other public:	Premium	11,039	7,257	684	18,980
	Standard	30,703	27,683	2,662	61,048
	Utility	90,439	40,578	5,142	136,159
	Total	132,181	75,518	8,488	216,187
Private:	Premium	1,326	627	32	1,985
	Standard	910	1,849	169	2,928
	Utility	1,818	2,025	335	4,178
	Total	4,054	4,501	536	9,091
Total:	Premium	13,795	11,926	1,152	26,873
	Standard	42,399	38,639	3,670	84,708
	Utility	131,571	58,251	6,675	196,497
	Total	187,765	108,816	11,497	308,078

Table 24—Number of pinyon Christmas trees on woodland by owner group, grade, and woodland profile, Nevada, 1989

Owner group and grade	Woodland profile 1	2	3	4	5	6	7	8	9	10	Total
	Thousand trees										
National Forest:											
Premium	1,220	—	39	—	437	913	2,019	1,280	—	—	5,908
Standard	39	—	660	233	1,022	4,306	9,096	5,000	39	337	20,732
Utility	4,154	—	1,904	2,759	5,188	7,973	28,599	5,224	39	320	56,160
Total	5,413	—	2,603	2,992	6,647	13,192	39,714	11,504	78	657	82,800
Other public:											
Premium	189	—	394	80	2,830	1,780	8,976	4,481	—	250	18,980
Standard	2,129	992	7,740	689	9,591	7,600	18,621	12,258	64	1,364	61,048
Utility	7,537	1,408	8,699	5,576	22,868	23,172	49,230	17,444	64	161	136,159
Total	9,855	2,400	16,833	6,345	35,289	32,552	76,827	34,183	128	1,775	216,187
Private:											
Premium	845	—	47	2	73	44	910	63	—	1	1,985
Standard	327	10	469	14	246	203	999	628	1	31	2,928
Utility	593	9	168	123	450	530	1,787	515	1	2	4,178
Total	1,765	19	684	139	769	777	3,696	1,206	2	34	9,091
Total:											
Premium	2,254	—	480	82	3,340	2,737	11,905	5,824	—	251	26,873
Standard	2,495	1,002	8,869	936	10,859	12,109	28,716	17,886	104	1,732	84,708
Utility	12,284	1,417	10,771	8,458	28,506	31,675	79,616	23,183	104	483	196,497
Total	17,033	2,419	20,120	9,476	42,705	46,521	120,237	46,893	208	2,466	308,078

Table 25—Number of juniper fenceposts on woodland by owner group and type of post, Nevada, 1989

Owner group	Type of post		Total
	Line	Corner	
	Thousand fenceposts		
National Forest	30,882	18,434	49,316
Other public	141,815	82,304	224,119
Private	11,373	7,213	18,586
Total	184,070	107,951	292,021

Table 26—Number of juniper fenceposts on woodland by owner group, post grade, and woodland profile, Nevada, 1989

Owner group and post grade	Woodland profile 1	2	3	4	5	6	7	8	9	10	Total
	Thousand fenceposts										
National Forest:											
Juniper line	2,774	—	347	2,487	5,823	3,589	7,430	8,330	96	6	30,882
Juniper corner	1,419	—	324	1,321	3,524	2,872	3,475	5,499	—	—	18,434
Total	4,193	—	671	3,808	9,347	6,461	10,905	13,829	96	6	49,316
Other public:											
Juniper line	9,772	1,543	9,644	7,521	27,078	14,424	32,384	39,200	82	167	141,815
Juniper corner	4,014	1,471	6,524	5,184	16,756	9,774	13,897	24,646	—	38	82,304
Total	13,786	3,014	16,168	12,705	43,834	24,198	46,281	63,846	82	205	224,119
Private:											
Juniper line	1,299	163	558	333	1,110	1,150	2,636	4,066	37	21	11,373
Juniper corner	684	106	374	301	627	702	1,310	3,105	—	4	7,213
Total	1,983	269	932	634	1,737	1,852	3,946	7,171	37	25	18,586
Total:											
Juniper line	13,845	1,706	10,549	10,341	34,011	19,163	42,450	51,596	215	194	184,070
Juniper corner	6,117	1,577	7,222	6,806	20,907	13,348	18,682	33,250	—	42	107,951
Total	19,962	3,283	17,771	17,147	54,918	32,511	61,132	84,846	215	236	292,021

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Presents highlights of Nevada forest resources as of 1989. Describes the extent, condition, and location of the State's timberland and woodland. Includes statistical tables: area by land classes, ownership, wood volumes, growth, mortality, and products. Maps show location by timberland, woodland, and owner group.

KEYWORDS: forest inventory, timberland, woodland, woodland products

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