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Forest Resources of the Bighorn National Forest

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The Interior West Forest Inventory and Analysis (IWFIA) Program of the USDA Forest Service, Rocky Mountain Research Station, as part of our National Forest System cooperative inventories, conducted a forest resource inventory on the Bighorn National Forest (Bighorn) using a nationally standardized mapped-plot design (for more details see section "Inventory methods" page 11). This report presents the highlights of this 2000 inventory using commonly requested variables and summaries. The data could be summarized in other ways for different purposes (see "For further information" on the inside back cover). The information presented in this report is based solely on the IWFIA inventory sample (USDA 1999). Supplementary documentation and inventory terminology can be located in USDA (2002). Additional data collected by the Bighorn National Forest and used separately or in combination with IWFIA data may produce varying results. Changes since the inventory, such as the impact of recent disturbances on the Forest have not been incorporated into this report. Annual inventories will soon replace periodic inventories to help monitor these changes at shorter intervals.

Description of the Bighorn National Forest

The Bighorn National Forest covers 1,107,671 acres (USDA 2000), of which 66 percent is forest land, 33 percent is non-forest, and less than 1 percent is water (figure 1). Seventeen percent of the total area on the Bighorn National Forest is in reserved designation. This report describes the characteristics of the forest land sampled on the Bighorn. "Forest land" is defined as land that is at least 10 percent stocked (or formerly stocked) with live tally tree species. Furthermore, forest land must be greater than 1 acre in area and at least 120 feet wide. Forest land can be divided into "timberland" and "woodland", based on the tree species present. Timberland is forest land that consists of tree species used primarily in the wood products industry, such as lodgepole pine and Engelmann spruce. Woodland is made up of tree species that often exhibit multi-stemmed growth forms and as such are not typically used in the wood products industry. Examples of woodland species are Rocky Mountain juniper, and certain species of oak. Only 2 percent of the forest land on the Bighorn is classified as woodland, and these woodlands are made up entirely of juniper forest type. The first part of this report focuses on forest resources of all forest land administered by the Bighorn National Forest, including reserved lands. The subsequent section will address non-reserved timberland.

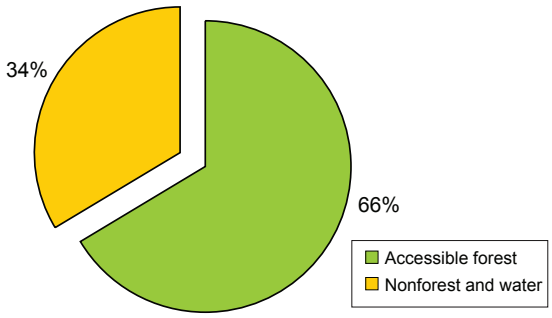

Figure 1—Percent area of accessible forest and non-forest land, Bighorn National Forest, 2000.

Forest land highlights of the Bighorn National Forest

Forest type—Forest resources are often described using a forest type classification. Forest type refers to the predominant tree species in a stand, based on plurality of tree stocking. Stocking is an expression of the extent to which growing space is effectively utilized by live trees.

Forest types are dynamic and can change slowly through forest succession, or rapidly due to disturbances such as logging, fire, or insect and disease epidemics. Figure 2 presents the distribution of forest land area on the Bighorn National Forest by forest type. The lodgepole pine forest type is the most common at 49 percent, followed by Engelmann spruce/subalpine fir mix (spruce-fir) at 20 percent. The Engelmann spruce forest type comprises almost 13 percent of the forest land area; Douglas-fir, 10 percent; ponderosa pine, 3 percent; juniper, 2 percent; limber pine, just under 2 percent; and aspen, 1 percent.

Tree and stand size—The size distribution of trees is an indicator of structural diversity. Figure 3 displays the tree size distribution by diameter class on the Bighorn National Forest. Overall, this shows a typical diameter distribution with a higher number of small trees than large trees. Trees often reproduce prolifically, but thin out naturally over time due to competition for resources.

Stand-size class is a measure of forest land based on the dominant diameter-size of live trees that contribute

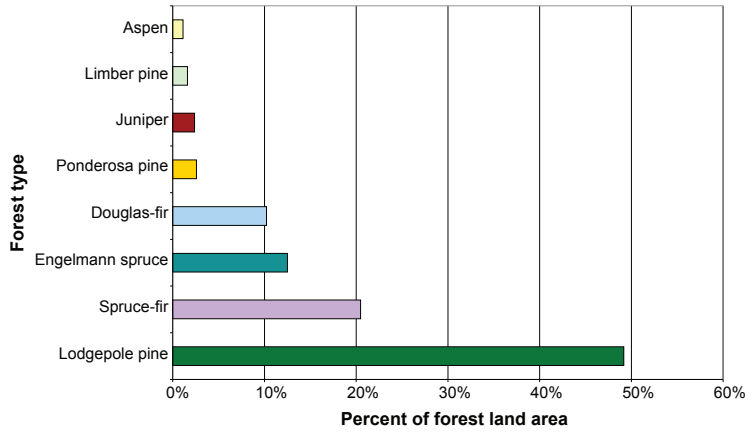

Figure 2—Percent of forest land area by forest type, Bighorn National Forest, 2000.

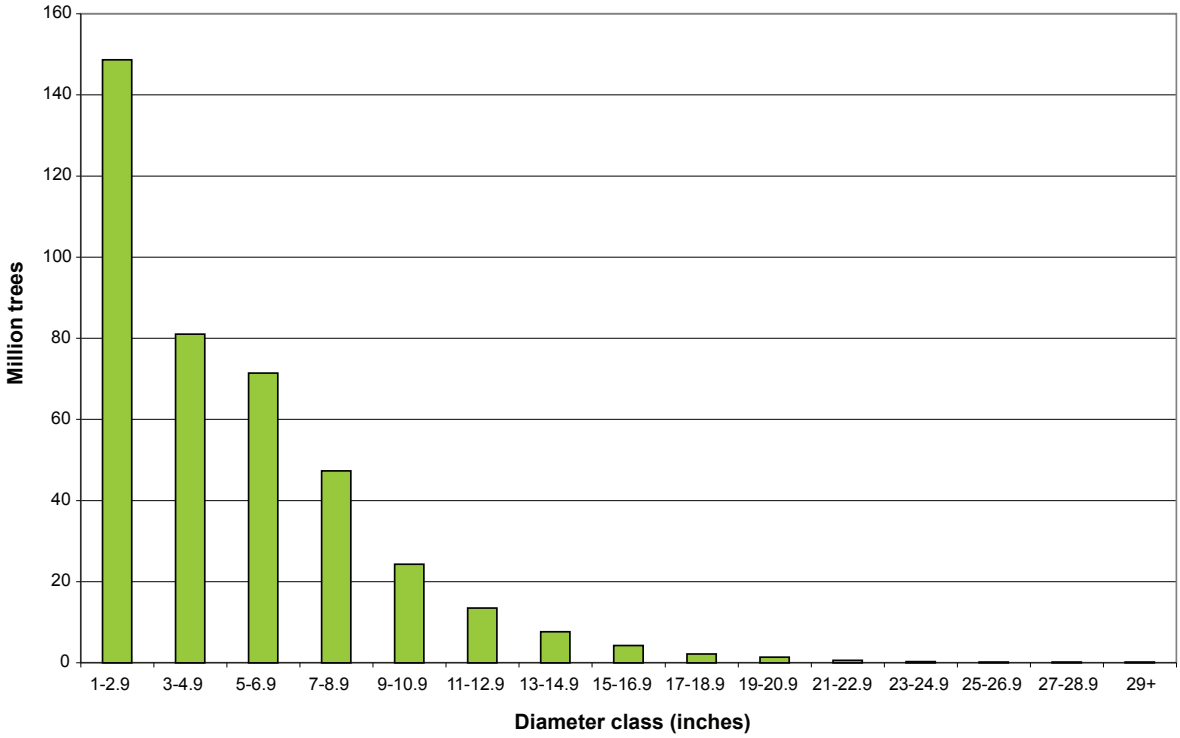

Figure 3—Number of live trees on forest land by diameter class, Bighorn National Forest, 2000.

to stand stocking. Large trees are timber softwoods and all woodland tree species 9.0 inches diameter and greater, and timber hardwoods 11.0 inches diameter and greater; medium trees include timber softwoods and all woodland tree species 5.0 to 8.9 inches diameter, and timber hardwoods 5.0 to 10.9 inches diameter; and saplings/seedlings comprise all trees under 5.0 inches diameter. Most nonstocked stands are those that have been recently disturbed by tree cutting, forest fire, or other large-scale change. For tree stocking, fewer large-diameter trees compared to small-diameter trees are required to fully stock a site.

Figure 4 shows a breakdown of forest land on the Bighorn National Forest by area and stand-size class. Fifty-one percent of the stands have a majority of stocking from large trees, while 2 percent are nonstocked.

Figure 5 shows the area of forest land by forest type and stand-size class on the Bighorn National Forest. The most common forest type in the large tree class is lodgepole pine, accounting for 41 percent of the large tree stands. The spruce-fir type makes up 22 percent of the large tree class and is the second most common type in this class. Lodgepole pine type dominates the medium tree class as well, accounting for 64 percent of this size class.

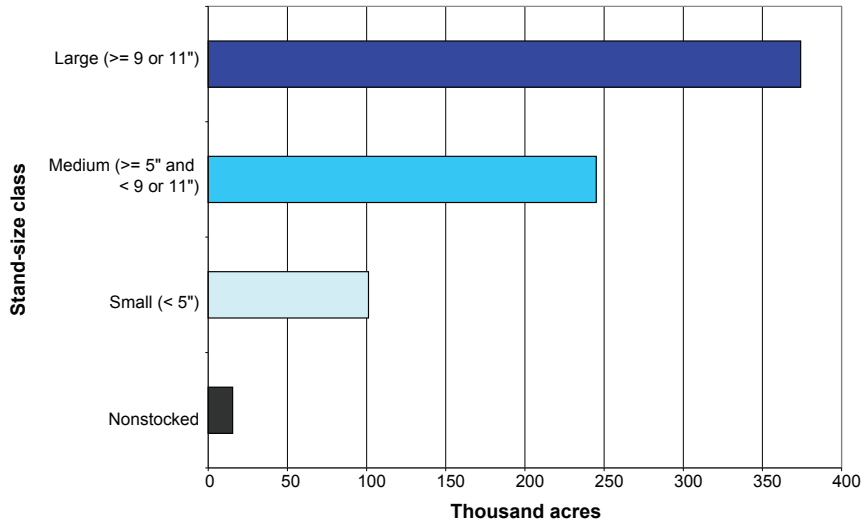

Figure 4—Forest land area by stand-size class, Bighorn National Forest, 2000.

Number of live trees—Another way to assess forest diversity is by examining the composition of forest land by tree diameter and species. Figure 6 shows total number of live trees by species in three diameter-size classes. Fifty-seven percent of all live trees on the Bighorn National Forest are from 1.0 to 4.9 inches diameter, 29 percent are from 5.0 to 8.9 inches diameter, and 14 percent are 9.0 inches diameter and greater. Lodgepole pine makes up 40 percent of the total number of trees; subalpine fir, 30 percent; Engelmann spruce, 14 percent; Douglas-fir, 10 percent; limber pine, 3 percent; and Rocky Mountain juniper, 2 percent. Ponderosa pine and aspen comprise the remaining 1 percent of live trees on the forest.

Elevation is closely correlated with variations in local climate. Precipitation generally increases with rising elevation, while temperature decreases. Aspect complicates this general rule; allowing relatively warmer- and dryer-site species to grow at higher elevations on south- and west-facing slopes. These factors have a profound effect on competition between tree species. The Bighorn National Forest displays some distinct elevation patterns in tree distribution: Subalpine fir and Engelmann spruce do well at the highest elevations, while

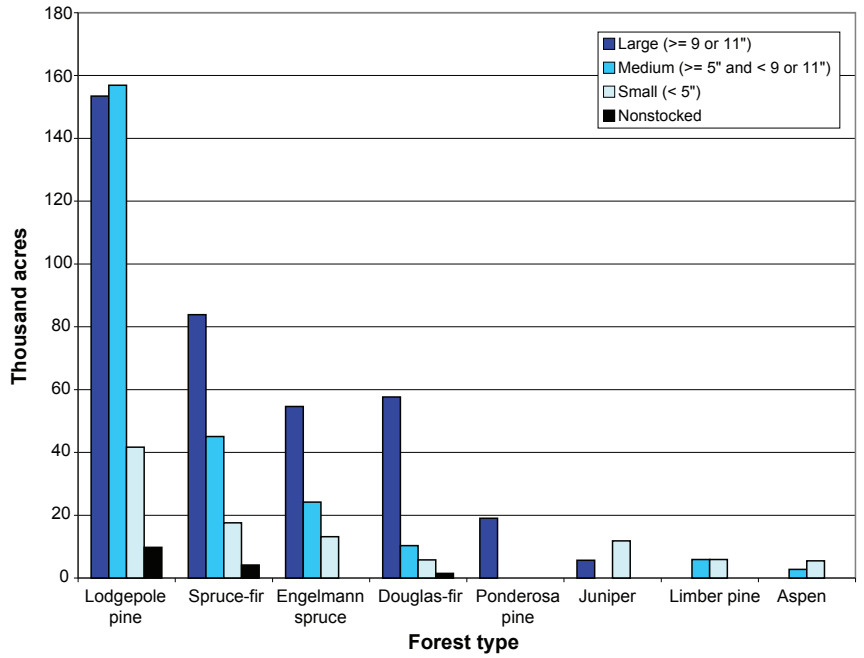

Figure 5—Area of forest land by forest type and stand-size class, Bighorn National Forest, 2000.

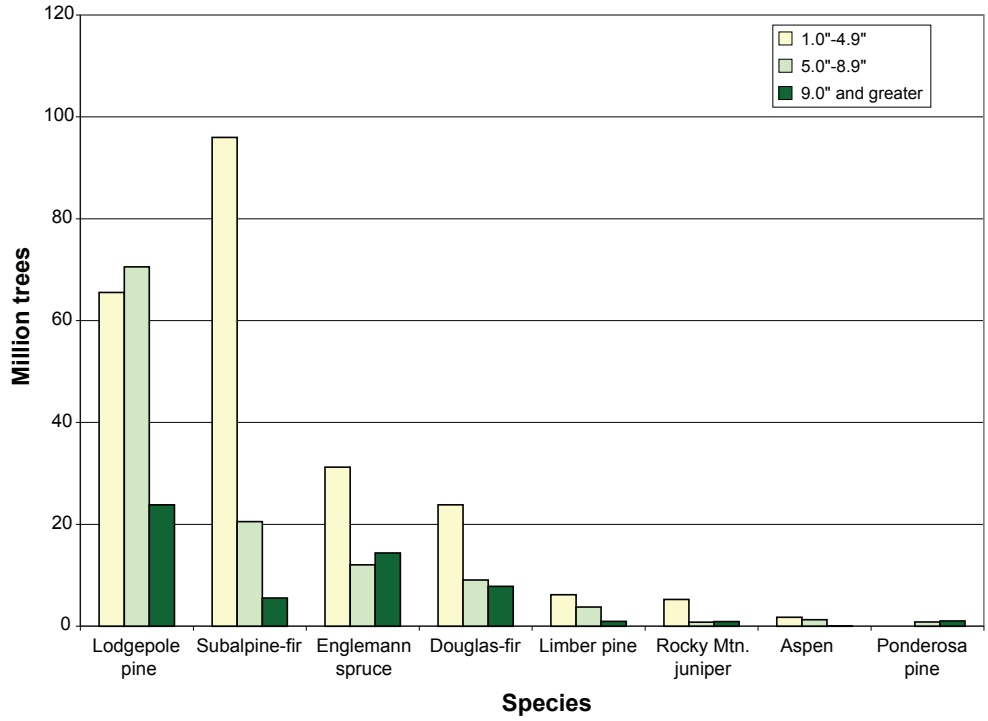

Figure 6—Number of live trees 1.0" diameter and greater on forest land by species and diameter-size class, Bighorn National Forest, 2000.

lodgepole pine co-dominates the mid to high elevation classes with subalpine fir and Engelmann spruce. Douglas-fir dominates the lower elevation stands (Figure 7).

Number and weight of dead trees—Standing and down dead trees are important for wildlife and in fire ecology, as well as acting as nutrient sinks and erosion controls. Approximately 81 million standing dead trees and 61 million down dead trees 1.0 inch diameter and greater occur on forest land on the Bighorn.

Many organisms rely on standing dead trees for some part of their life cycle, but the species, size, and densities required for quality habitat vary depending on the species utilizing them. Large diameter dead trees are generally scarce relative to smaller trees. Considering standing dead trees 11.0 inches diameter or larger, an estimated 6.0 per acre occur on forest

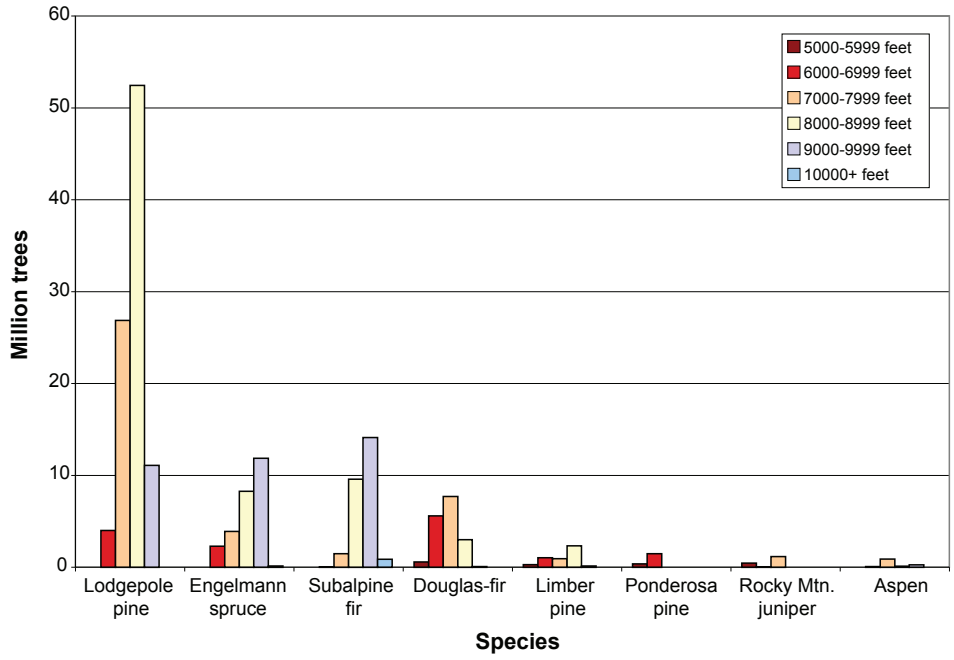

Figure 7—Number of live trees 5.0" diameter and greater on forest land by species and elevation class, Bighorn National Forest, 2000.

land. Of the very large dead trees (19.0 inches diameter or larger) there is an estimated 1.2 per acre. Four timber species (lodgepole pine, subalpine fir, Douglas-fir, and Engelmann spruce) occur in the 19-inch and larger standing dead tree group, with Engelmann spruce being the most common.

Dead material is a component of forest fuel loads. On this Forest, about 3.1 million tons of standing dead trees and 3.3 million tons of down dead trees occur on forest land. This estimate includes the merchantable bole and bark of trees 5.0 inches diameter and greater. Figure 8 shows the weight per acre of down dead trees by stand-size class for each forest type. For all forest types combined, the small tree stand-size class contributes the most dead and down material at roughly 5.9 tons per acre, with the sawtimber and poletimber classes accounting for 5.6 and 2.2 tons per acre respectively. Overall, lodgepole pine and spruce-fir forest type account for roughly 78 percent of the dead and down material on the Forest. Aspen forest types in the seedling/sapling stand-size class have the largest tonnage of down dead trees per acre at 11.16 tons/acre, but this forest type/size class is relatively scarce on the Bighorn (roughly 5,500 acres).

Stand age—Stand age for this report is estimated from core samples of live trees. The estimate is limited to trees with diameters that fall in a stand's designated stand-size class. Many other factors affect the number of sample trees available for determining stand age. In general, stand age for dense stands that contain more core sample trees is more representative than stand age for sparse stands that contain less.

Figure 9 displays the percent of forest land area by forest type and stand-age class on the Bighorn National Forest. Stand age can indicate the duration since the last extensive disturbance of the forest overstory. This figure shows the 81- to 100-year class as the most common on the Forest, followed by the 141- to 160-year and 101- to 120-year age classes respectively.

Wood volume, biomass, and basal area of live trees—Estimates of cubic-foot volume and basal area include all live trees 5.0 inches diameter and greater. Basal area is the cross-sectional area of a tree stem/bole (including bark) at the point of diameter measurement. Biomass estimates include boles, bark, and branches of all live trees 1.0 inches diameter and greater. The net volume of wood on the Bighorn National Forest is estimated to be in excess of 1.6 billion cubic feet. Total biomass of wood is estimated at just over 30 million tons, and the total basal area is

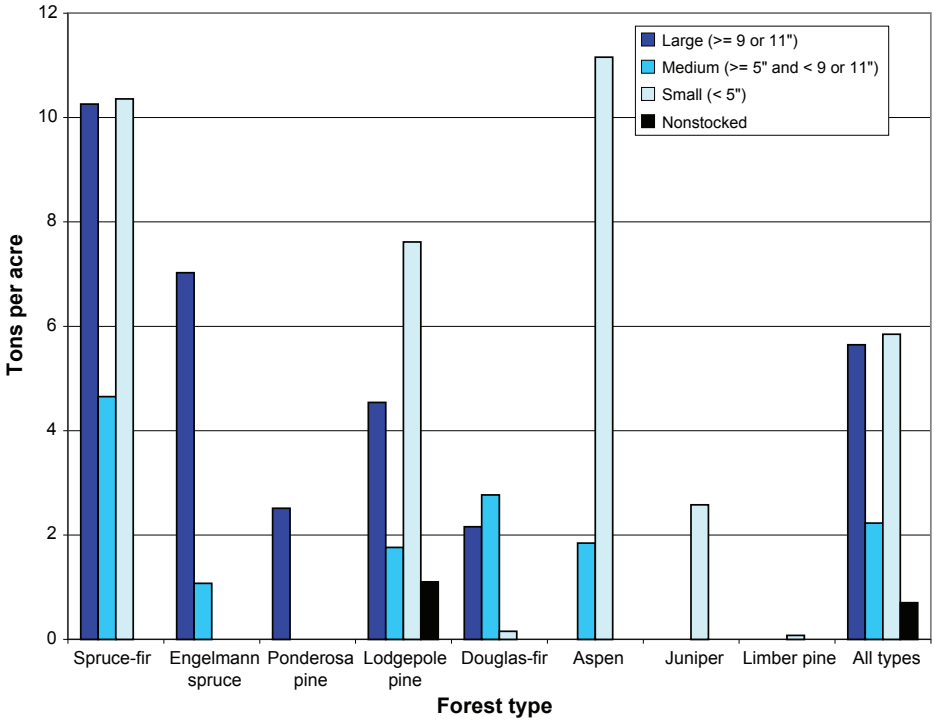

Figure 8—Weight of down dead trees 5.0" diameter and greater on forest land by forest type and stand-size class, Bighorn National Forest, 1999.

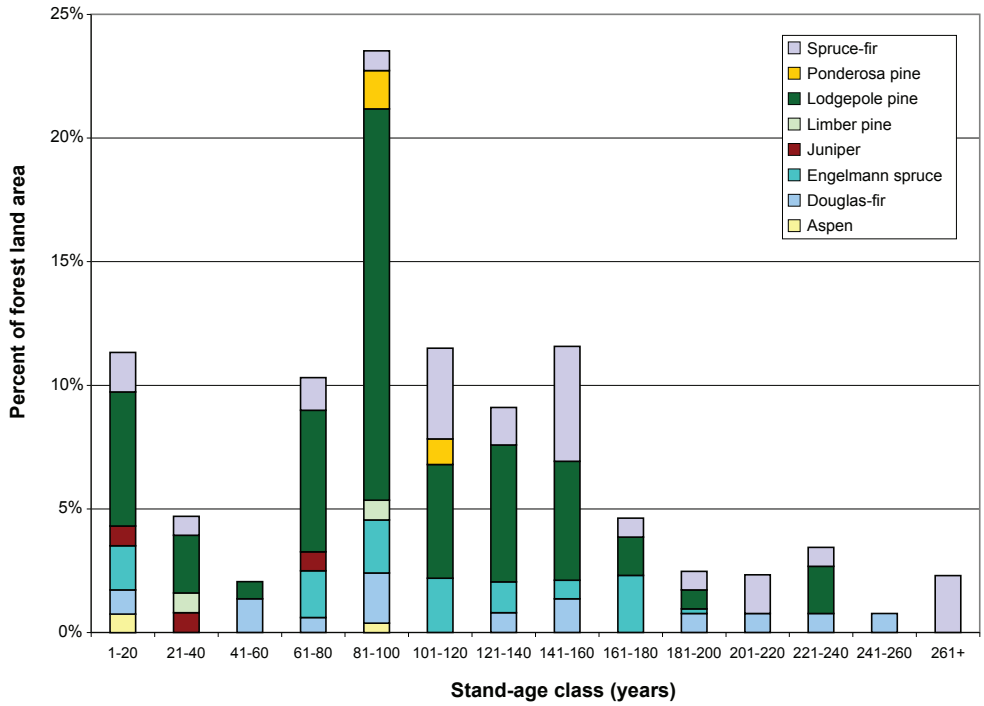

Figure 9—Percent of forest land area by forest type and stand-age class, Bighorn National Forest, 2000.

Table 1—Net volume, biomass, and basal area on forest land by species, Bighorn National Forest, 2000.

Species	Volume (≥5.0" dia.) (Million cubic-feet)	Biomass (≥1.0" dia.) (Million tons)	Basal area (≥5.0" dia.) (Million square-feet)
Lodgepole pine	764.0	13.7	35.4
Engelmann spruce	445.1	7.0	18.9
Douglas–fir	232.9	4.9	10.0
Subalpine fir	163.6	3.6	9.5
Ponderosa pine	18.9	0.4	1.2
Limber pine	17.5	0.4	1.6
Rocky Mountain juniper	4.3	†	0.9
Aspen	3.2	†	0.3
Total (not exact due to rounding)	**1,649.5**	**30.1**	**77.7**

† – Less than 100,000

estimated to be about 77.7 million square feet. Table 1 is a breakdown of volume, biomass, and basal area by species.

Figure 10 displays the percent net cubic-foot volume of live trees by diameter class. Seventy-one percent of this volume is in the 9.0 inches and greater diameter. By species, 91 percent of Engelmann spruce, 89 percent of ponderosa pine, 81 percent of Rocky Mountain juniper, and 86 percent of Douglas-fir volume is in trees 9.0 inches diameter and greater. Conversely, only 62 percent of subalpine fir, 57 percent of lodgepole pine, and 10 percent of aspen volume is in trees 9.0 inches diameter and larger.

Another way to look at wood volume is by forest type, for which estimates per acre can be computed along with basal area (table 2). These numbers include the many different species that can occur together in each forest type. The highest volume and basal area per acre on the Bighorn National Forest is in the spruce-fir forest type. Volume and basal area per acre for aspen, juniper, limber pine, and ponderosa pine may not be representative due to the small sample size. One characteristic of the mapped-plot design is that a plot may sample more than one condition as indicated in the last two columns of table 2. A forest condition is generally defined as an area of relatively homogeneous vegetative cover that meets the criteria for forest land. Forest type is one of several attributes that define and separate conditions identified on the plot.

Stand Density Index—Many factors influence the rate at which trees grow and thrive, or die. As tree size and density increase, competition for available resources increases. Stand density index (SDI), as developed by Reineke (1933), is a relative measure quantifying the relationship between number of trees per acre and average stand diameter. The concept was developed for even-aged stands, but can also be applied to uneven-aged stands composed of three or more size classes (Long and Daniel 1990, Shaw 2000). Stands may be categorized on the basis of tree size, often in terms of their predominant diameter or height class. Stands where just one or two size classes dominate are called single-storied, or even-aged, because they have a structure characterized by a single canopy layer or two closely related layers. Stands having a structure composed of three or more size classes are called multistoried or uneven-aged stands. Both types of structure are important in forest diversity.

SDI is usually presented as a percentage of the maximum SDI for each forest type (Van Dyck 2002). SDI was computed

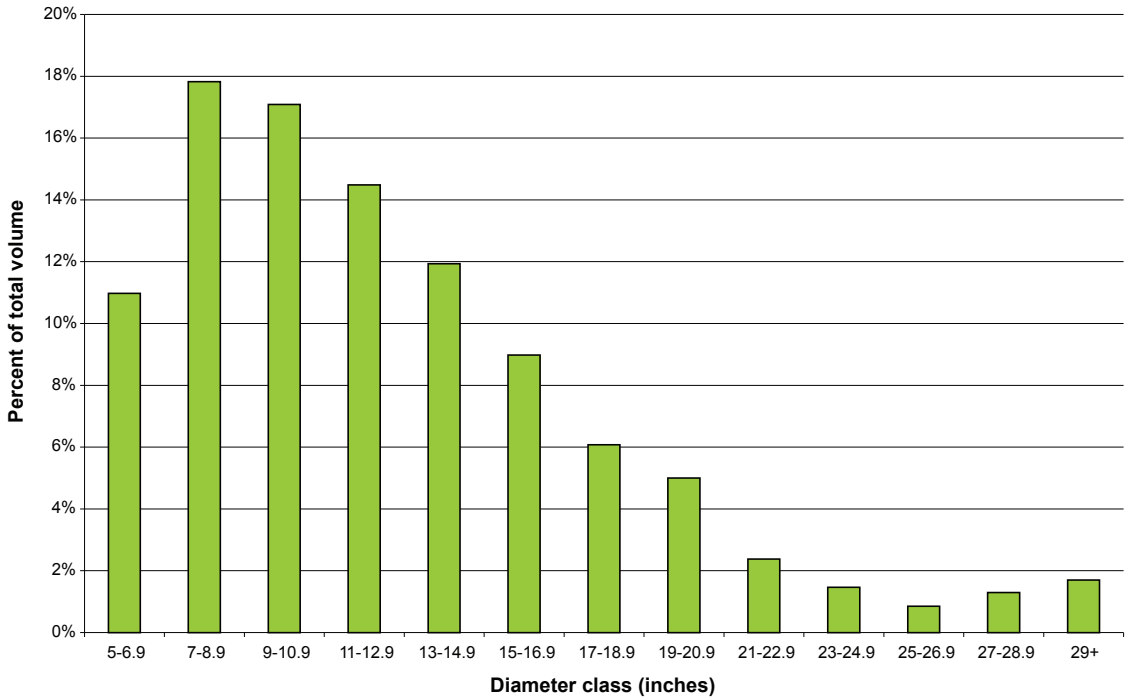

Figure 10—Percent of total net cubic-foot volume of live trees on forest land by diameter class, Bighorn National Forest, 1999.

Table 2—Net volume per acre, basal area per acre, number of conditions, and condition proportions on forest land by forest type, Bighorn National Forest, 2000.

Forest type	Net cubic-foot volume per acre	Basal area sq. ft. per acre	Number of conditions[a]	Condition proportions[b]
Spruce–fir	2,679	123	29	25.0
Douglas–fir	2,610	119	16	12.7
Engelmann spruce	2,463	115	19	15.8
Lodgepole pine	2,201	103	68	60.6
Ponderosa pine	959	65	3	3.0
Limber pine	450	59	2	2.0
Juniper	160	26	3	3.0
Aspen	127	12	2	1.5
Total			**142**	**123.6**

[a]Number of conditions by forest type that were sampled. These numbers are often greater than the total number of forested plots by forest type because a plot may sample more than one forest condition.

[b]Sum of the condition proportions of plots by forest type that were sampled. These numbers are often less than the total number of plots by forest type because of nonforest condition proportions (from plots containing both forest and nonforest conditions) that are not included here.

for each location using those maximums, and the results were grouped into four classes (Figure 11). A site is considered to be fully occupied at or above 35 percent of SDI maximum, which marks the onset of competition-related stresses and slowed growth rates (Long 1985). Based on FIA sample data, 68.4 percent of all forest stands in the Bighorn National Forest are considered to be fully occupied.

Components of change: growth—Another measure of forest vigor is net annual growth. Net annual growth is the difference between gross annual growth and losses due to mortality. Gross annual growth of live trees (5.0 inches diameter and greater) of all forest land on the Bighorn National Forest is estimated to be just over 27 million cubic feet, and net annual growth is just over

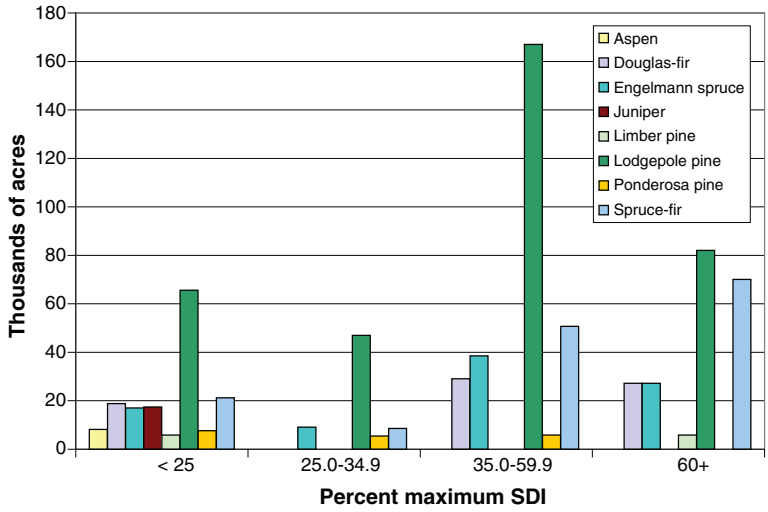

Figure 11—Area of forest land by Stand Density Index and forest type, Bighorn National Forest, 2000. SDI is presented as a percentage of the theoretical maximum for each forest type.

22 million cubic feet. Gross annual growth is compared to mortality for four high volume species in Figure 12.

Components of change: mortality—Field crews assess which trees have died in the past 5 years; these trees are used to estimate an average annual mortality. Based on this estimate, in 1999, 4.8 million cubic feet of wood from live trees (5.0 inches diameter and greater) died on the Bighorn National Forest, roughly 50 percent of this death is attributed to disease. Twenty percent of tree mortality was caused by unknown agents, 17 percent by insects, and 13 percent from weather related events. Mortality on all forest land on the Bighorn National Forest is about 18 percent of gross annual growth. No species has a larger mortality rate than growth rate on the Bighorn National Forest. Aspen has the highest mortality to growth ratio at 73 percent, followed by Douglas-fir at 34 percent. The leading specific causes of mortality in these two species were disease for aspen (58 percent conks, 42 percent cankers) and insect damage from bark beetles in Douglas-fir (63 percent). No mortality was fire related. Lodgepole pine (47 percent), subalpine fir (24 percent), and Douglas-fir (20 percent) are the top three mortality species, accounting for 91 percent of overall mortality.

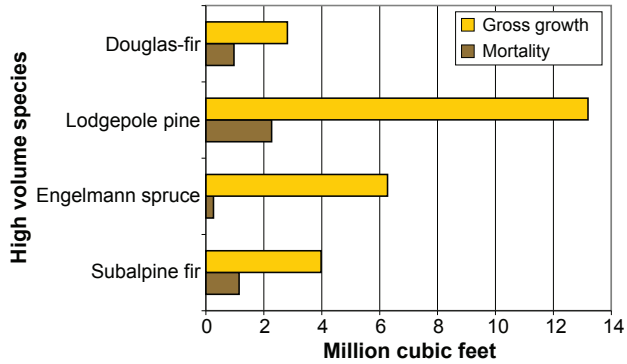

Figure 12—Gross annual growth of all live trees 5.0"diameter and greater compared to mortality for four high-volume species on forest land, Bighorn National Forest, 1999.

Understory vegetation—Understory vegetation provides forage and cover for wildlife, contributes to forest fuel load, and can be an indication of the successional stage of the forest community. Understory vegetation works in concert with the dominant vegetation to provide complexity and diversity to forest structure and composition. Generally, the more complex and diverse the vegetation component of a forest is, the more diverse the wildlife community using it will be. On each plot, field crews visually estimated crown canopy coverage for four plant groups – tree seedlings/saplings, shrubs, forbs, and graminoids (See USDA 1999 for details). Figure 13 shows the average cover (as a percentage of total ground cover) of plant groups on forest land by forest type. Ponderosa and limber pine forest types contain the lowest cover of grasses and forbs while Engelmann spruce has the lowest average of understory seedling/sapling cover and the spruce-fir forest type has the lowest average shrub cover. Conversely, the spruce-fir type had the highest average seedling/sapling and forb cover at roughly 15 percent and 9 percent, respectively. The juniper forest type has the highest average grass cover and the second highest average forb cover, despite the well documented allelopathic effects junipers have on associated plant communities. The juniper forest type also has the highest average combined understory cover at 51 percent, followed by Douglas-fir and lodgepole pine at 43 percent and 42 percent, respectively. Limber pine type has the lowest overall average understory cover at 23 percent. Interpretation of data associated with the limber pine and juniper forest types should be done with caution due to low sample size.

Nonreserved timberland highlights of the Bighorn National Forest

Reserved lands are those that have been withdrawn from management for production of wood products through federal statute or administrative designation, such as wilderness areas and National Parks. Roughly eleven percent (81,361 acres) of the timberland on the Bighorn National Forest is reserved, while the remaining 89 percent (636,945 acres) is nonreserved and available for the management of timber and wood products. Lodgepole pine and s pruce-fir are the only two forest types found on reserved lands on the Bighorn National Forest.

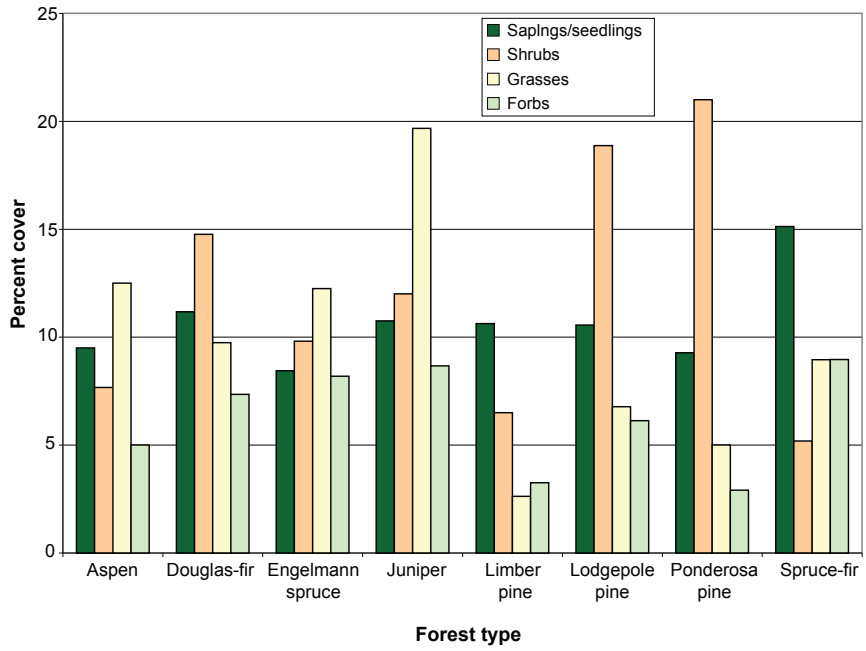

Figure 13—Percent cover of four major understory plant groups on forest land by forest type, Bighorn National Forest, 1999.

Forest type—Lodgepole pine accounts for nearly 48 percent of all nonreserved timberland on the Bighorn, making it the most common. Spruce-fir (20 percent), Engelmann spruce (14 percent), and Douglas-fir (12 percent) make up the majority of what remains, while ponderosa pine, limber pine and aspen each account for less than 3 percent of the nonreserved timberland found on the Bighorn National Forest.

Dead trees and fuels—The Bighorn has approximately 23 million standing dead trees and 24 million down dead trees 5 inches diameter or greater on nonreserved timberland. The merchantable bole and bark of these trees is approximately 2.9 tons for the standing dead trees and 2.9 tons for the down dead trees. Lodgepole pine accounts for the largest portion of total weight of dead standing (33 percent) and dead down (47 percent) trees in nonreserved timberland. This is similar to the forest as a whole, where Lodgepole pine makes up 37 percent of the dead standing trees and 49 percent of the down dead trees on Bighorn timberland.

Stand age—In general, stand age on nonreserved timberland is similar to stand age on all forest land. The 81-100 year age-class is the most common, followed by 141-160 and 101-120 year age-classes respectively. This is similar to forest land on the Bighorn as a whole.

Wood volume, biomass, and basal area of growing-stock trees—Growing-stock trees include live timber species 5 inches and greater diameter at breast height and meeting specific standards of quality and vigor. Of all growing-stock trees on nonreserved timberland on the Bighorn, 14 percent are 9 inches diameter or greater. Table 3 displays a breakdown of net cubic-foot volume, tons of wood biomass, and square foot basal area for growing-stock trees 5 inches diameter and greater by species on nonreserved timberland for the Bighorn. The total net cubic-foot volume of growing stock on nonreserved timberland is about 1.5 billion cubic feet. Lodgepole pine and Engelmann spruce together account for roughly 73 percent of this volume. The total wood biomass is estimated at 25.0 million tons, with lodgepole pine making up over 45 percent of this amount. Total basal area for growing-stock trees on nonreserved timberland is

Table 3—Net volume, biomass, and basal area of growing-stock trees greater than 5 inches diameter on nonreserved timberland, Bighorn National Forest, 2000.

Species	Volume (Million cubic-feet)	Biomass (Million tons)	Basal area (Million square-feet)
Lodgepole pine	672.8	11.3	31.2
Engelmann spruce	412.0	6.2	17.4
Douglas-fir	229.8	4.5	9.7
Subalpine fir	141.1	2.3	7.9
Ponderosa pine	18.6	0.4	1.2
Limber pine	14.5	0.3	1.2
Aspen	2.9	†	0.2
Total (not exact due to rounding)	**1,491.8**	**25.0**	**68.7**

† less than 100,000 tons
* numbers may not add to total due to rounding

estimated at 68.7 million square feet, with lodgepole pine comprising 45 percent of this total as well.

The net volume of sawtimber trees on nonreserved timberland is estimated to be 5.1 billion board feet (or 1.1 billion cubic feet). This includes all growing stock trees 9 inches diameter and greater for softwoods and 11 inches diameter and greater for hardwoods. Figure 14 illustrates the sawtimber volume on nonreserved timberland by diameter class and forest type. The 9-10.9 inch diameter class contributes the most volume with 24 percent of the total, followed by the 11-12.9 inch class (20 percent) and the 13-14.9 inch class (17 percent). The lodgepole pine forest type holds the majority of each of these diameter classes.

Stand Density Index—Over 73 percent of nonreserved timberland on the Bighorn National Forest is at or above the 35 percent SDI maximum threshold, which classifies them as fully occupied. The spruce-fir forest type has the highest percentage of its nonreserved area fully occupied at 86.3 percent, followed by the Douglas-fir type at 74.9 percent.

Components of change: growth and mortality—Gross annual growth of growing-stock trees on nonreserved timberland on the Bighorn is estimated to be 25.1 million cubic feet, while mortality is estimated at 3.7 million cubic feet. This calculates to a net annual growth of 21.4 million cubic feet. Lodgepole pine accounts for 51 percent of this total. Figure 15 compares gross growth and mortality of growing-stock trees by species on nonreserved timberlands on the Bighorn National Forest.

Other inventory highlights of the Bighorn National Forest—It is interesting to compare the attributes of reserved and nonreserved forests to see if there are differences in structure and composition between them. For instance, using the three high volume forest types found on both reserved and nonreserved forest lands (Engelmann spruce, lodgepole pine, and spruce-fir), nonreserved forests produce almost twice as much volume per acre of these species (1700 cubic feet per acre) than do reserved forest lands (890 cubic feet per acre). When biomass is compared, there is little difference between lodgepole pine and subalpine fir in terms of tons per acre produced on reserved and nonreserved lands. However, Engelmann spruce contributes nearly twice as much biomass per acre on nonreserved forest lands as they do on reserved forests (10.1 tons per acre and 5.6 tons per acre respectively).

Standing and down dead trees provide habitat to numerous organisms in forest lands. These include nest cavities for birds, incubation sites for invertebrates, hibernacula for an assortment of mammals, reptiles, and amphibians,

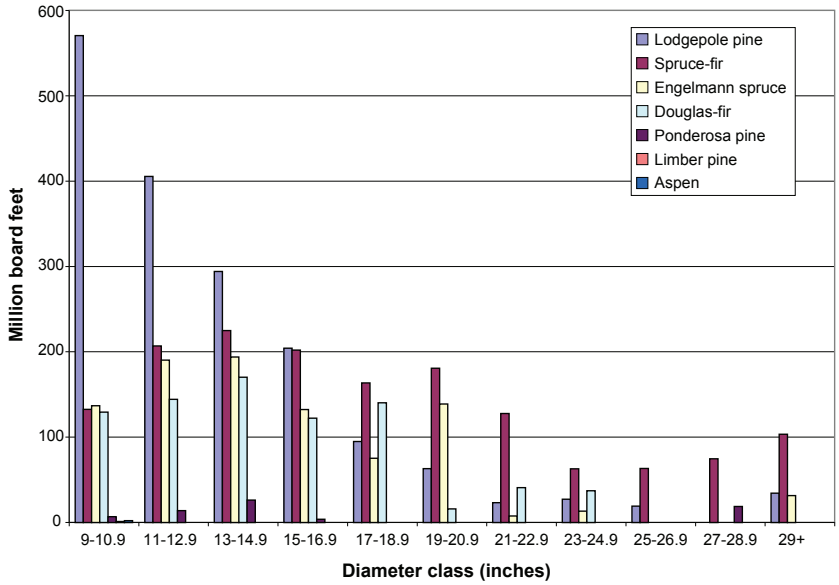

Figure 14—Board-foot volume (International 1/4 rule) on nonreserved timberland by diameter class and forest type, Bighorn National Forest, 2000.

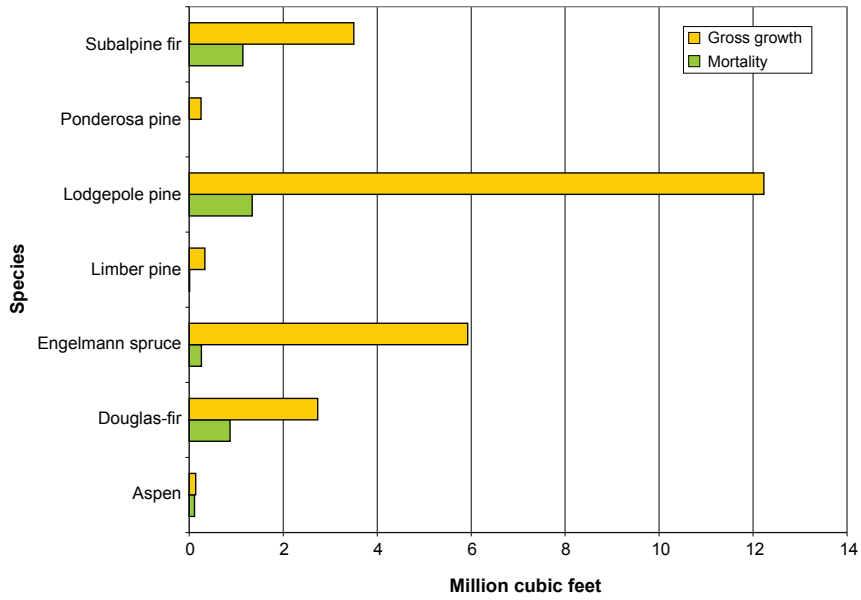

Figure 15—Gross annual growth of growing-stock trees 5.0" diameter and greater compared to mortality on nonreserved timberland by species, Bighorn National Forest, 1999.

roost sites for bats, microsites for germination and growth of some plants, as well as providing cover and forage opportunities for many other species. Figure 16 illustrates how dead tree biomass differs between the two major forest types found on both reserved and nonreserved forest lands. On the Bighorn National Forest, spruce-fir forest types on nonreserved lands provide the bulk of the dead tree habitat and structure.

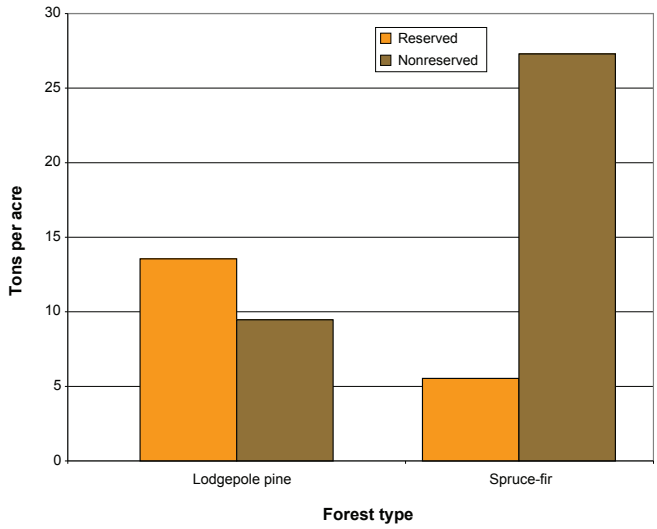

Figure 16—Biomass of dead trees 1.0" diameter and greater by forest type and reserve status, Bighorn National Forest, 2000.

Inventory methods

Forest Inventory and Analysis (FIA) provides a statistically-based sample of forest resources across all ownerships that can be used for planning and analyses at local, state, regional, and national levels. IWFIA uses a two-phase sampling procedure for all inventories. Phase one is based on a grid of sample points systematically located every 1,000 meters across all lands in a state. Phase one points are assigned ownership and vegetative cover attributes using maps and remotely sensed imagery. Field crews conduct phase two of the inventory on the sub-sample of phase one points that occur on forest land. The sampling intensity is one field plot every 5,000 meters, or about every 3 miles. Phase two plots are stratified based on phase one ownership and vegetation information, while weights are assigned to each stratum based on the proportion of phase one points in that stratum.

Phase two plots were sampled using the mapped-plot design (see next section). There were 183 field plots on the Bighorn National Forest. One hundred ten plots sampled only forest conditions, 51 plots sampled only non-forest conditions, 21 sampled both forest and non-forest conditions, and 1 sampled both forest and water conditions (rivers, reservoirs, lakes, etc. at least 30 feet wide or 1 acre in area). A total of 142 forest conditions were sampled on 132 plots that contain 123.6 forest, and 8.4 non-forest condition proportions.

About the mapped-plot design—The mapped-plot design was adopted by FIA nationwide by 1995. Its predetermined subplot layout uses boundary delineation, when necessary,

to classify differing conditions. Most plots sample one forest condition, therefore delineating conditions is often not required.

Conditions were separated, or mapped, based on differences in any of five attributes: forest/nonforest, forest type, stand-size class, stand origin, and stand density. The condition proportion is the fraction of plot area sampled in each condition. The sum of all condition proportions for any given plot equals 1.00. Therefore, the number and relative size of plot conditions determines the weighted area used for sample expansion.

Standard errors—The sample was designed to meet national standards for precision in state and regional estimates of forest attributes. Standard errors, which denote the precision of an estimate, are usually higher for smaller subsets of the data. Forest-level estimates and percent standard errors by land class or type of trees for various attributes are presented in table 4. Standard errors for other estimates are available upon request (see "For further information" section on the inside back cover).

Table 4—Percent standard errors for area, volume, growth, and mortality estimates on total forest land and nonreserved timberland, Bighorn National Forest, 1999 and 2000.

Land class or Type of trees	Attribute	Area or volume	Percent standard error
Total forest land (acres)	Area	735,714	±3.2
Total forest land (all trees cubic feet)	Volume	1,649,479,733	±6.5
	Growth	22,334,632	±7.6
	Mortality	4,822,697	±22.3
Total nonreserved timberland (acres)	Area	636,945	±3.7
Nonreserved timberland (growing-stock cubic feet)	Volume	1,491,758,338	±6.9
	Growth	21,379,268	±7.8
	Mortality	3,721,360	±25.5

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Selected data for this National Forest are part of a national data base that houses information for much of the forest land in the United States. This data base can be accessed on the Internet at the following web site:

http://fia.fs.fed.us/tools-data/

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