

U.S. Forest Resource Facts and Historical Trends



<http://fia.fs.fed.us>

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Introduction

The 2005 update of the 2000 RPA Assessment is being prepared in response to the mandate in the Forest and Rangeland Renewable Resources Planning Act of 1974, P.L. 93-378, 88 Stat. 475, as amended (RPA). The update consists of a summary report and supporting documents (available at <http://www.fs.fed.us/pl/rpa/list.htm>). Renewable resources in this assessment include outdoor recreation, wilderness, timber, fish and wildlife, water, range, and minerals. This brochure reports selected highlights of the findings of the update. Much of the data for this brochure is reported regionally as North, South, and West.

Major reporting regions of the United States for this brochure.



Need More Depth?

The *National Report on Sustainable Forests – 2003* provides the most comprehensive account of available data on the current condition of the Nation's forest resources. The report is based on 67 indicators for the conservation and sustainable management of forests. The indicators were endorsed by the United States and 11 other countries that house 90 percent of the world's temperate and boreal forests and 60 percent of all forests. This report may be found on the Web at <http://www.fs.fed.us/research/sustain/>.

Forest Inventory Data

Various attributes of the forest resource are inventoried by the U.S. Department of Agriculture (USDA) Forest Service Forest Inventory and Analysis (FIA) Program and reported in the RPA Assessment and various supporting documents. FIA has been conducting field inventories for more than 70 years using state-of-the-art technology to provide estimates of the status, condition, and trends of the Nation's forests. These estimates are critical to the development and implementation of policies and practices that support sustainable forestry in the United States. Eight national reports based on FIA data have been produced since 1953.

Extensive field measurement from FIA inventories includes over 4.5 million remote sensing plots interpreted for land use, over 125,000 permanent field plots systematically located across all forest lands in the United States, over 100 characteristics measured at each plot location, and over 1.5 million trees measured to evaluate volume, condition, and vigor.

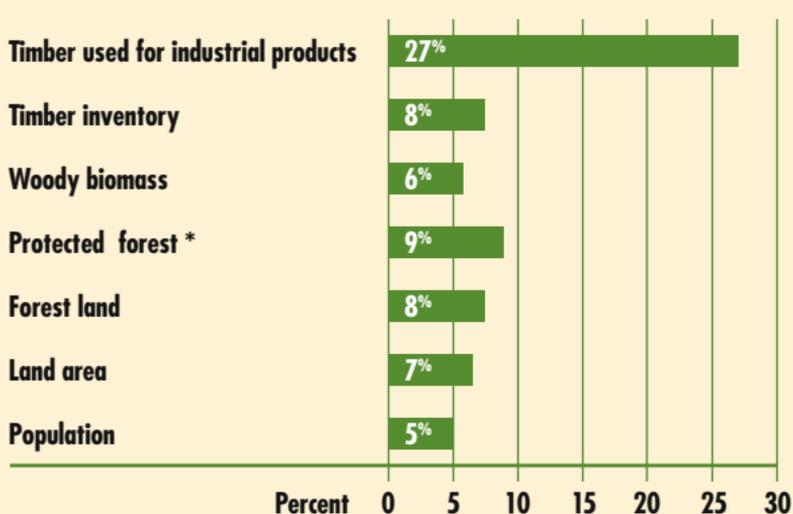
Other Data

Data for forest ownership and products is from periodic FIA forest ownership and forest products studies. Data for wildlife, recreation, health, timber trade, and non wood products was derived from USDA Forest Service scientists' contributions to the *National Report on Sustainable Forests – 2003*. Web sources for this and other related data are found at the end of this brochure.

The United States in a Global Context

Global forestry issues are of considerable significance to the United States, which has 5 percent of the world population and consumes 27 percent of the world's industrial wood products. Although domestic timber inventory is only 8 percent of the world total, 76 percent of U.S. consumption of industrial wood comes from domestic supplies. Other competing demands for forest uses are also of interest, such as areas protected for biodiversity and relative contributions of U.S. forests to carbon pools.

United States as a percent of world totals for selected measures

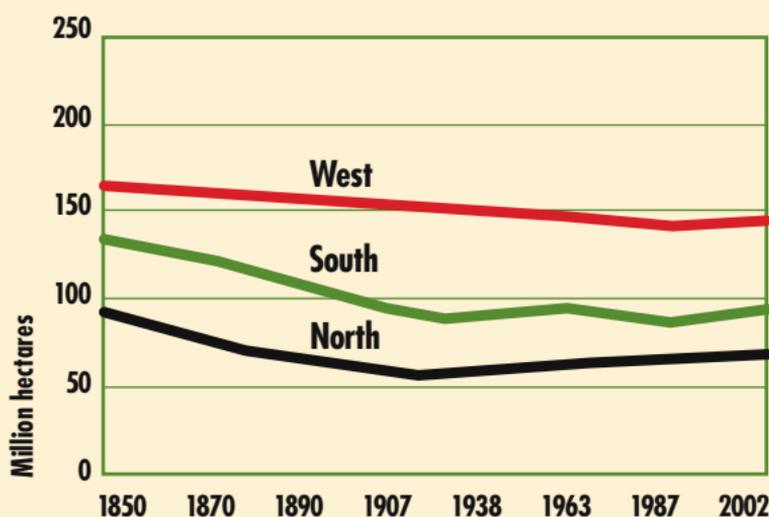


* Based on data from the Conservation Biology Institute.

Land and Forest Area

It is estimated that in 1630 the area of forest land in the United States was just over 425 million hectares or about 46 percent of the total land area. By 1907, the area of forest land had declined to an estimated 307 million hectares or 34 percent of the total land area. Forest area has been relatively stable since 1907. In 2002, forest land comprised 303 million hectares, or 33 percent of the total land area of the United States. Since 1630, there has been a net loss of 120 million hectares of forest land, predominantly due to agricultural conversions. Nearly two-thirds of the net conversion to other uses occurred in the last half of the 19th century when an average of 34 square kilometers of forest was cleared every day for 50 years.

Forest land trends in the United States, 1850-2002



Stable forest area, however, does not mean that there has been no change in the character of the forest. There have been shifts from agriculture to forests and vice versa. Some forest land has been converted to more intensive uses, such as urban. Even where land has remained in forest use, there have been changes as forests respond to human manipulation, aging, and other natural processes. The effects of these changes are reflected in the information presented in this brochure.

Land and forest area trends in the United States¹

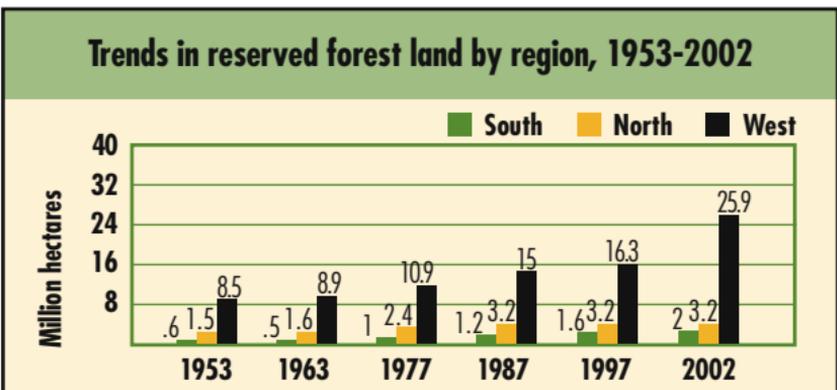
Category	Year	U.S.	Region		
			North	South	West
Million hectares					
Land	2002	916	167	216	532
<i>Of which:</i>					
Forest	2002	303	69	87	147
	1997	302	69	87	147
	1987	299	67	85	147
	1977	301	66	88	147
	1963	308	67	92	149
	1953	306	65	91	149
	1938	307	64	90	154
	1907	307	56	95	156
	1630	423	120	143	159
<i>Of which:</i>					
Timber land	2002	204	64	82	57
	1997	204	65	81	58
	1987	197	62	80	54
	1977	199	62	81	56
	1963	208	63	84	61
	1953	206	62	83	61
Reserved forest²	2002	31	3	2	26
	1997	21	3	2	16
	1987	19	3	1	15
	1977	14	2	1	11
	1963	11	2	1	9
	1953	11	1	1	8
Other forest	2002	68	1	3	64
	1997	77	1	4	72
	1987	83	1	4	77
	1977	87	2	6	79
	1963	89	2	7	79
	1953	90	1	8	80

¹ In addition to land area of the United States at that time, estimates for 1938 include forest area in the regions that would become the States of Alaska and Hawaii. Estimates for 1907 represent forest area for regions that would become the States of Alaska, Arizona, Hawaii, and New Mexico. Estimates for 1630 represent the forest area in North America for regions that would become the 50 States within the current United States. Source for 1938: U.S. Congress (1941). Source for 1907 and 1630: R.S. Kellogg (1909).

² Does not include some protected areas. Wildlife management areas in IUCN Category IV and VI are most frequently not identified as "reserved" in FIA statistics and total approximately 12 million hectares. Currently these lands are reported in timber land and other forest land in FIA reports. New inventories will provide more accurate data to place these lands in their proper IUCN classification.

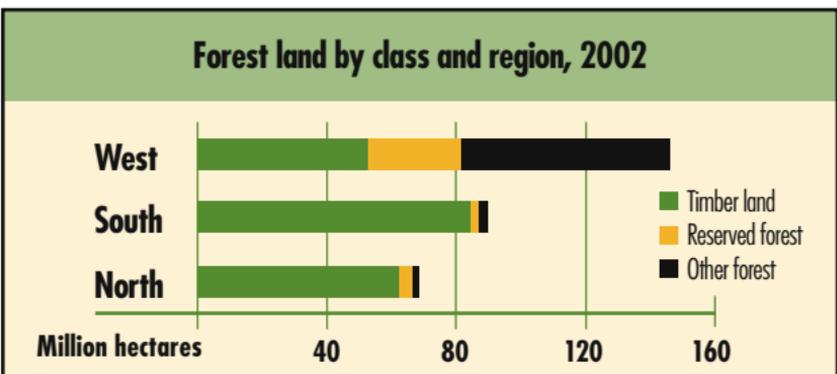
Reserved Forest (FIA classification)

Reserved forest land has tripled since 1953 and now stands at 10 percent of all forest land in the United States. This reserved forest area includes State and Federal parks and wilderness areas but does not include conservation easements, areas protected by nongovernmental organizations, many wildlife management areas, and most urban and community parks and reserves. Significant additions to Federal forest reserves occurred after the passage of the Wilderness Act in 1964. See the discussion of protected forest by IUCN [The World Conservation Union (formerly International Union for Conservation of Nature and Natural Resources)] categories in this brochure for more information.



Timber Land and Other Forest Land

Timber land is fairly evenly distributed among the three major regions of the United States. Other forest land — such as slow-growing forests of spruce in interior Alaska and pinyon-juniper in the interior West — dominates many western landscapes and comprises more than one-fourth of all U.S. forest land. Reserved forest is most common in the West, comprising 11 percent of all forests in that region, while only 3 percent of eastern forests are in legally set-aside reserves such as parks and wilderness.



Protected Land and Forest (IUCN Classification)

The World Conservation Union (<http://www.iucn.org>), founded in 1948, brings together 78 States, 112 government agencies, 735 nongovernmental organizations, 35 affiliates, and some 10,000 scientists and experts from 181 countries and is the world's oldest and largest global conservation body. Its mission is to influence, encourage, and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The Conservation Biology Institute (<http://www.cbi.org>) has compiled a spatial database of protected areas in the United States, placing total protected land at 62 million hectares and protected forest at 43 million hectares. This compares with the 31 million hectares of forest that FIA data lists as “reserved.” Wildlife management areas in IUCN Category IV and VI are most frequently not identified as “reserved” in FIA statistics and total approximately 12 million hectares. Currently, these lands are reported in timber land or other forest land in FIA reports. New inventories will provide more accurate data to place these lands in their proper IUCN classification.

While the IUCN system is more robust than the FIA “reserved” classification, one additional difficulty with IUCN is that each block of land is listed within one category. Thus, an area of land that contains a scenic river within a wilderness area in a national park could fall into categories I, II, and V. Future accounting will likely establish a clear hierarchy based on the most dominant management regime for the land (i.e., wilderness management objectives would likely have both legal and practical precedence over general park land management).

Forest Ownership

Forest ownership patterns in the United States are quite diverse, with public forests dominant in the West and private forests dominant in the East. Private industrial forest ownership is concentrated in the South, Pacific Northwest, upper Lake States, and northern New England.

Pattern of Forest Ownership in the United States



■ Public
■ Private

Alaska (not pictured) has 51 million hectares of forest that is 72 percent public ownership and Hawaii (not pictured) has 0.7 million hectares of forest that is 34 percent public ownership.

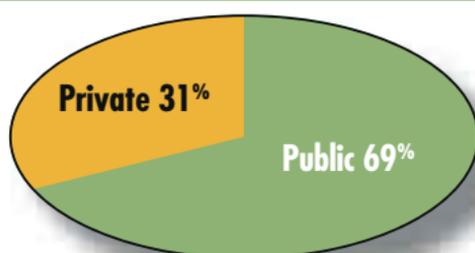
Forest land by owner class in the United States, 2002

Owner class/ land class	U.S.	Region		
		North	South	West
		<i>Million hectares</i>		
National forest	60	5	5	50
Timber land	39	4	5	31
Reserved forest	12	1	0	11
Other forest	9	0	0	9
Other public	69	12	5	52
Timber land	20	9	4	7
Reserved forest	19	3	1	15
Other forest	29	0	0	29
Forest industry	27	6	15	6
Timber land	27	6	15	6
Reserved forest	-	-	-	-
Other forest	0	0	-	0
Other private	147	46	61	39
Timber land	118	45	59	14
Reserved forest	0	0	0	0
Other forest	29	1	3	25
All owners	303	69	87	147
Timber land	204	64	82	58
Reserved forest	31	3	2	26
Other forest	68	1	3	64

Public Forests

Public forests are predominantly owned by the Federal Government in the West and State and county governments in the East. Seventy-six percent of all public forest hectares are in the West. Most protected forests are in public ownership, while most production forests are in private ownership.

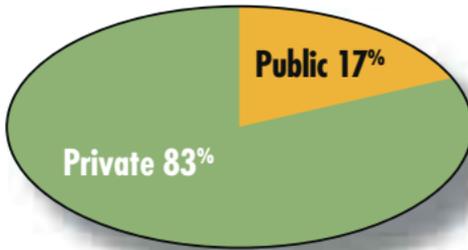
Forest ownership in the Western United States



Private Forests

Fifty-seven percent of forest land is in private ownership. Forty-four percent is owned by 9.6 million private forest land-owners (excluding private corporations), representing a diverse group of people with many reasons for owning their forest land. Most of this forest is owned as part of a family legacy, for the aesthetics that forests provide, and/or for the income that can be generated from the sale of the land or forest products. The remaining 13 percent of U.S. forests in private ownership are held predominantly by partnerships and corporations.

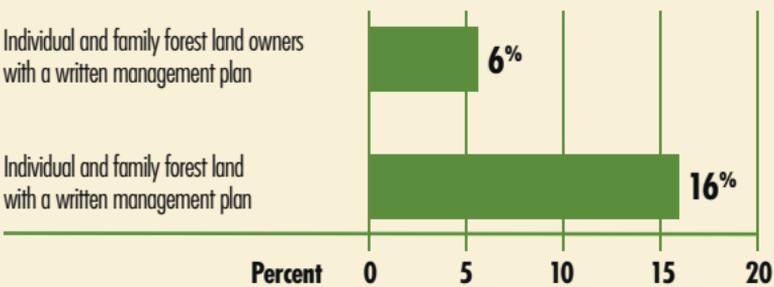
Forest ownership in the Eastern United States



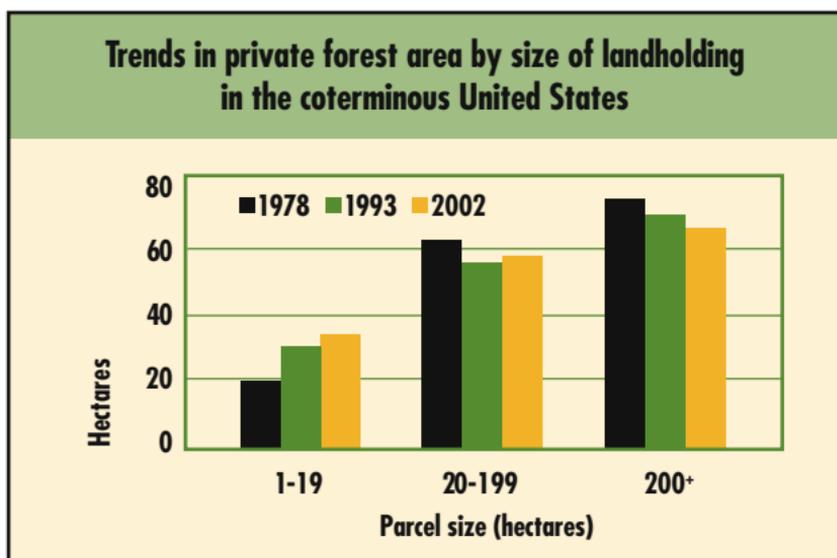
Management and Harvest

There has been a decided shift in timber removals in recent years from public lands in the West to private lands in the East. As the emphasis on timber production shifts from public to private lands, there is an increasing need to have information on the management objectives and behaviors of the private forest land owners. This information is critical to policies promoting sustainable forestry in the United States. Recent studies show that only 6 percent of families and individuals that own forest land in the United States have a written management plan. However, these plans cover 16 percent of the forest owned by this group of owners.

Management of private forest land in the United States



Nonindustrial private forests, those held by individuals and families, provided 60 percent of the Nation's timber harvest in 2001. A recent survey indicated that two out of three private owners have harvested trees from their land. Many of these harvests, however, are haphazard and are the consequence of a family's financial needs or trees perceived as being "mature." Fifty percent of landowners hold fewer than 4 hectares of forest land and collectively control 7 percent of the family forest land base. The majority of private forest land is held by owners with 40 hectares or more of forest land.



Parcelization

The area of forest land in smaller landholdings is increasing, resulting in forest parcelization. Changes in the characteristics of family forests, including forest parcelization, often occur when land is either sold or inherited.

Currently, 19 percent of the family forest land is owned by people who are 75 years or older, and an additional 26 percent is owned by people between the ages of 65 and 75. This relatively advanced age portends the transfer of a substantial amount of forest land in the near future.

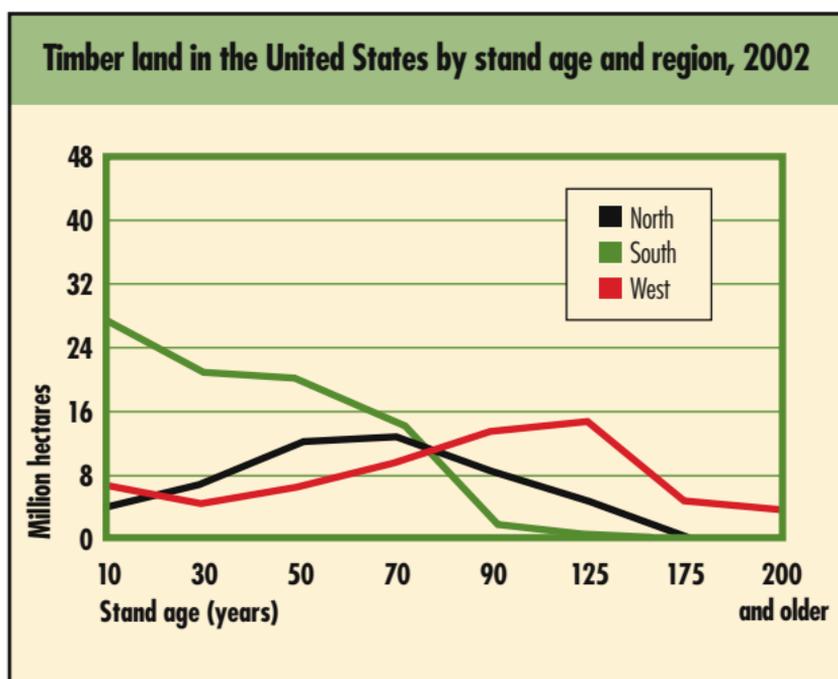
Industrial Forests

Forest land owned by corporations with wood processing facilities has traditionally been a major source of timber production in the United States. In 2002, the forest industry owned 27 million hectares or 13 percent of the Nation's 204 million hectares of timber land but supplied 29 percent of wood production.

In recent years, however, changes in corporate strategies have clouded the traditional way of viewing industrial forests. Many forest industry companies have divested some or all of their forest land holdings in the last 20 years. Some of these lands have been acquired by timber investment organizations and others have been purchased by family and individual ownerships.

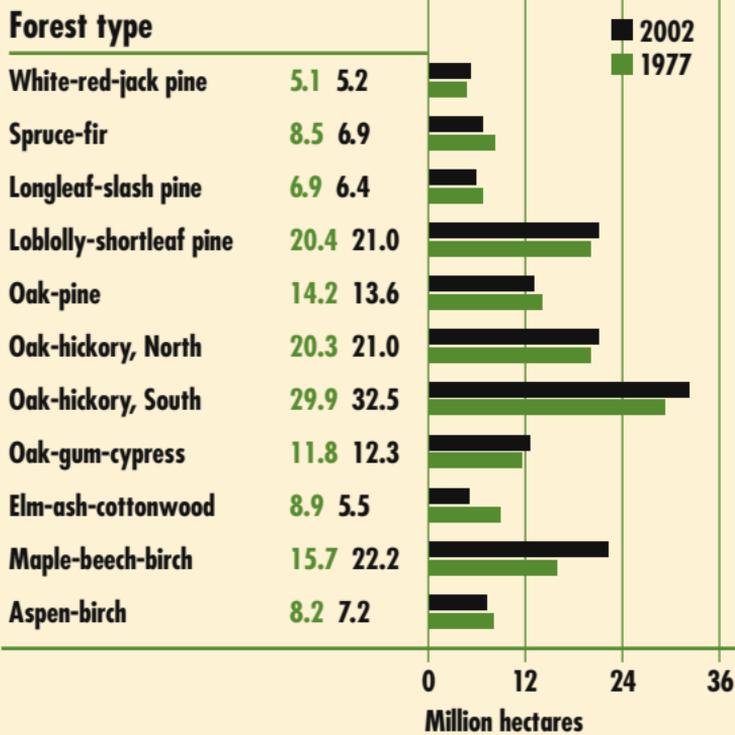
Forest Age and Composition

Following intensive logging and regeneration in the late 19th century and again in the mid 20th century, 55 percent of the Nation's timber land is less than 50 years old. Six percent is more than 175 years old.

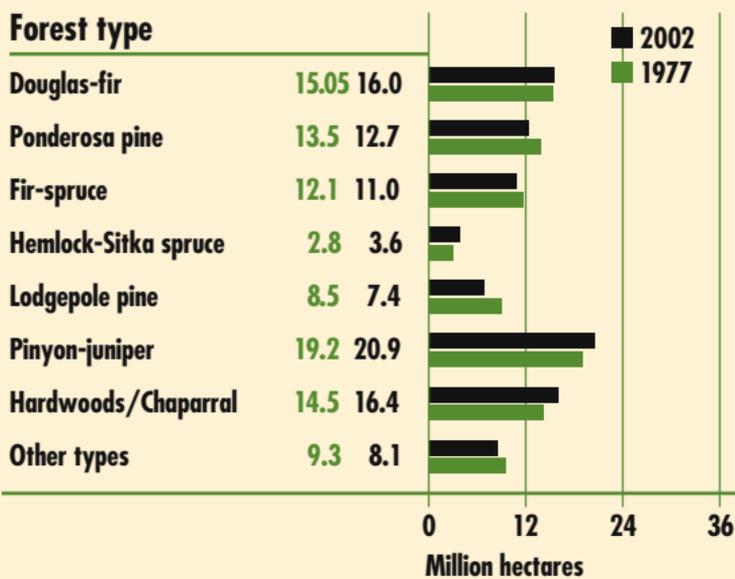


The forests of the United States are very diverse in their composition and distribution—from the oak-hickory and maple-beech-birch forests that dominate the northern portions of the East to the expansive pine forests of the southern regions of the East to the majestic Douglas-fir and ponderosa pine forests of the West. In the last 25 years, as the Nation's forests age, there has been a shift away from early seral types like aspen and spruce-fir to mid and late seral types like oak-hickory and maple-beech-birch in the East. In the West, decades of fire suppression are reducing areas of ponderosa and lodgepole pine.

Forest type trends in the East, 1977 and 2002

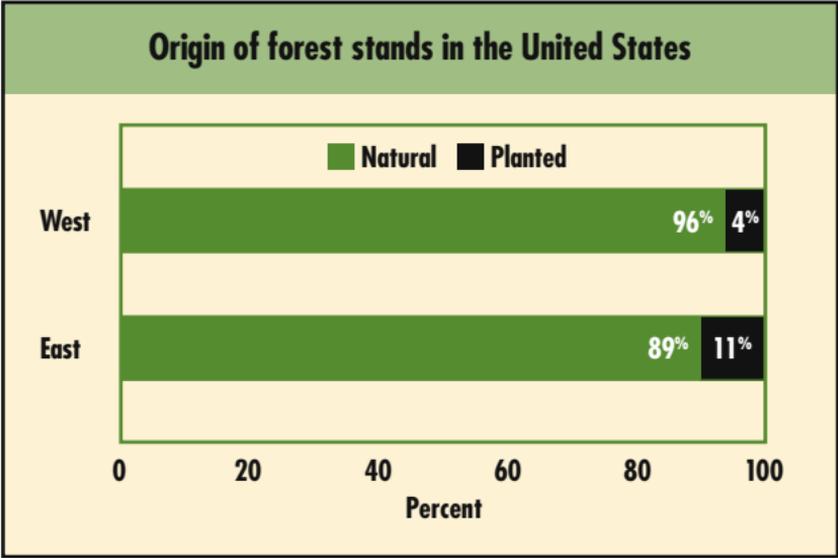


Forest type trends in the West, 1977 and 2002



Forest Origin

Forests in the United States are predominantly natural stands of native species. Planted forest land is most common in the East and heavily comprised of planted stands of native pine in the South. In the West, planting is generally used to augment natural regeneration.



Tree Planting

Forest planting in the United States currently averages about 1 million hectares per year. The most dominant planting is pine species in the South. Spikes in planting occurred in the South in the 1950s as result of the Soil Bank Program and in the 1980s as a result of the Conservation Reserve Program, which saw planting of nearly 1.2 million hectares of nonforest land in the South. Western planting has subsided in recent years mirroring reduced harvesting in that region.



Growing stock inventory, growth, removals, and mortality on timber land by region and species group in the United States, 1952-2002

Volume category	Year	U.S.	North	Region South	West
All species		<i>Million cubic meters</i>			
Inventory	2002	24,226	6,159	7,583	10,484
	1997	23,650	6,063	7,255	10,331
	1987	22,121	5,378	6,923	9,819
	1977	20,745	4,613	6,321	9,811
	1963	18,836	3,631	4,926	10,280
	1953	17,430	2,936	4,202	10,292
	Growth	2001	670	153	326
1996		666	153	303	210
1986		641	156	283	202
1976		621	151	320	149
1962		473	125	229	119
1952		394	105	189	99
Removals		2001	453	81	287
	1996	453	78	288	87
	1986	452	77	232	143
	1976	402	71	189	142
	1962	338	59	156	123
	1952	336	60	161	115
	Mortality	2001	178	48	59
1996		179	46	63	70
1986		131	35	47	49
1976		116	33	36	47
1962		123	27	33	63
1952		111	20	28	63
Softwoods					
Inventory	2002	13,918	1,412	3,057	9,449
	1997	13,693	1,397	2,967	9,329
	1987	13,232	1,348	2,989	8,896
	1977	13,215	1,241	2,864	9,110
	1963	12,728	953	2,125	9,651
	1953	12,220	766	1,711	9,743
	Growth	2001	387	33	183
1996		379	33	167	170
1986		368	36	156	179
1976		354	44	179	176
1962		272	34	133	131
1952		219	28	103	105
Removals		2001	285	19	184
	1996	285	19	183	83
	1986	310	21	150	139
	1976	283	20	126	138
	1962	216	15	80	121
	1952	220	18	88	114
	Mortality	2001	102	13	26
1996		103	13	29	60
1986		79	10	24	45
1976		70	9	18	43
1962		78	8	11	59
1952		75	6	9	60

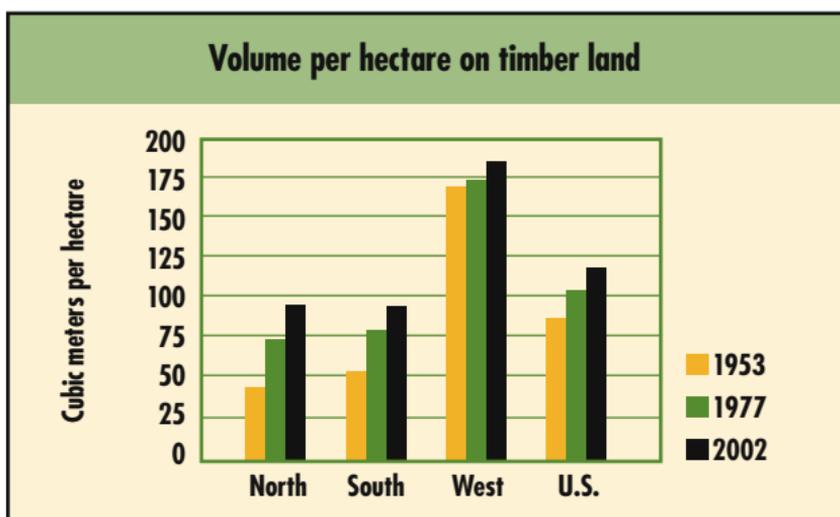
Growing stock inventory, growth, removals, and mortality on timber land by region and species group in the United States, 1952-2002

(continued)

Volume category	Year	U.S.	Region		
			North	South	West
<i>Hardwoods</i>					
<i>Million cubic meters</i>					
Inventory	2002	10,308	4,747	4,526	1,035
	1997	9,956	4,666	4,288	1,003
	1987	8,888	4,030	3,934	924
	1977	7,531	3,372	3,457	701
	1963	6,108	2,678	2,801	629
	1953	5,210	2,170	2,491	549
Growth	2001	284	120	143	21
	1996	287	120	136	31
	1986	272	120	127	26
	1976	267	107	142	18
	1962	201	91	96	14
	1952	175	78	86	11
Removals	2001	168	62	102	4
	1996	169	60	105	4
	1986	142	56	82	4
	1976	119	51	63	4
	1962	123	44	77	2
	1952	116	42	73	1
Mortality	2001	77	35	33	9
	1996	76	33	34	9
	1986	53	25	24	4
	1976	46	23	18	4
	1962	44	18	22	4
	1952	35	13	18	4

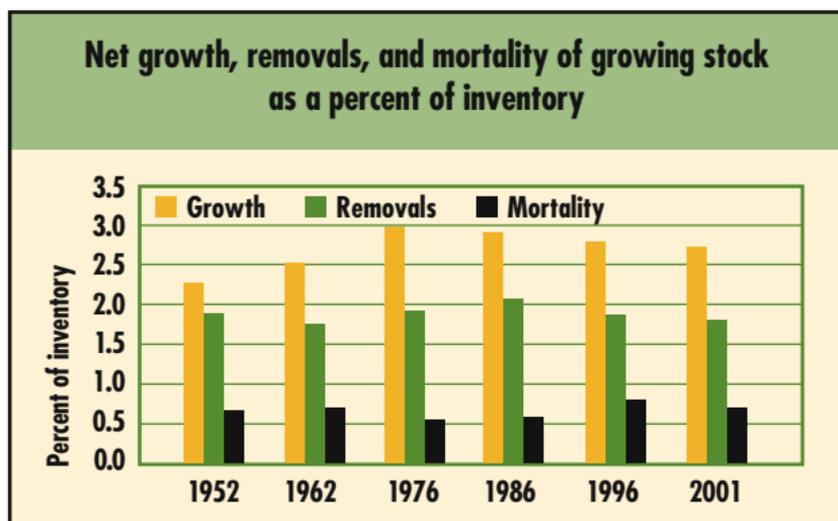
Growing Stock Volume

Average growing stock volume per hectare continues to rise across the United States, with the largest gains in the North and South where volumes per hectare are nearly double what they were in 1953.



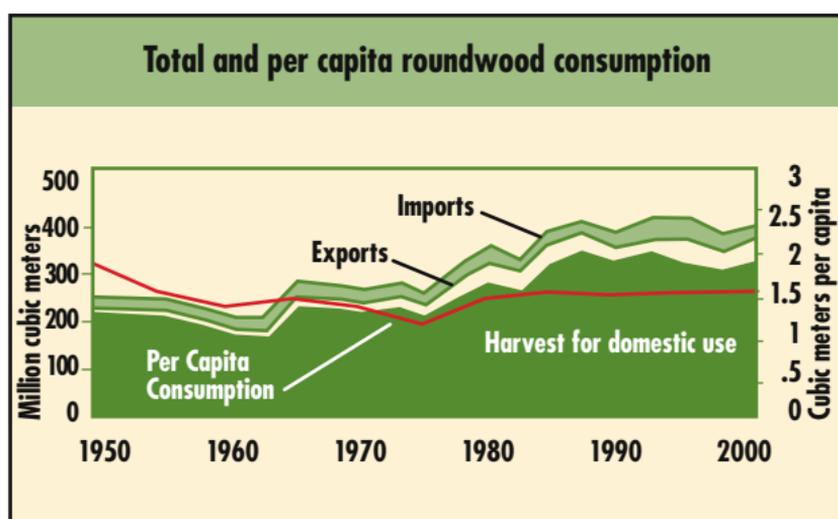
Net Growth, Removals, and Mortality Rates for Growing Stock

Over the past 50 years, net growth has consistently exceeded removals in the United States. Removals remain at about 2 percent of inventory, while net growth is near 3 percent. Currently, the volume of annual net growth is 32 percent higher than the volume of annual removals. Mortality rates have remained well below 1 percent of inventory for at least 50 years.

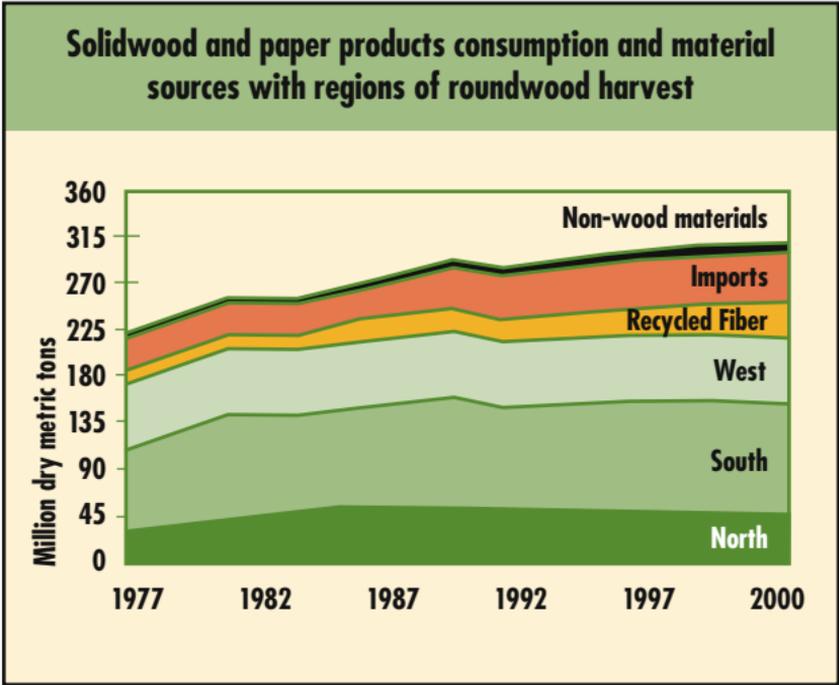


Timber Product Consumption and Sources

Solidwood and paper products consumed in the United States require roundwood harvest in the United States and other countries plus recycled paper and solidwood products. Domestic roundwood harvest increased from 1950 through the mid 1980s and has remained steady to declining since then.

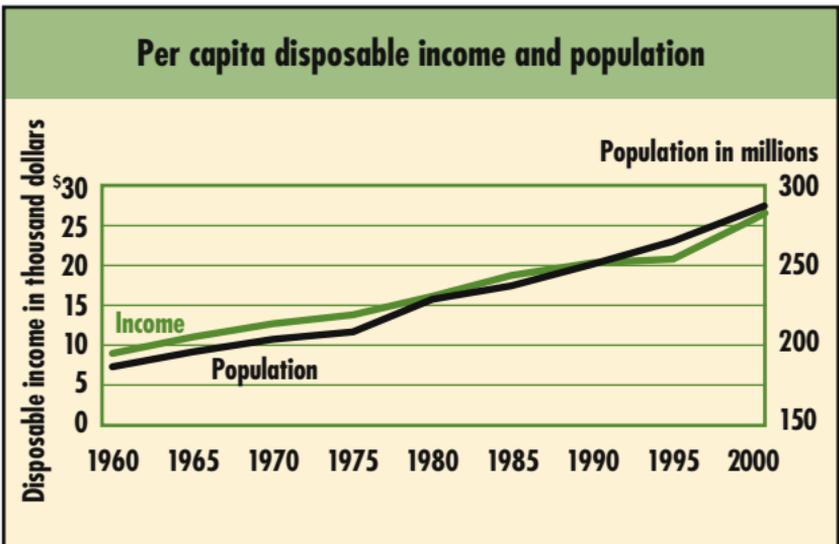


Total domestic roundwood harvest has been stable to declining due to increasing imports and an increase in use of recycled paper. With these increases, total consumption of solidwood and paper products has also increased steadily since 1950.



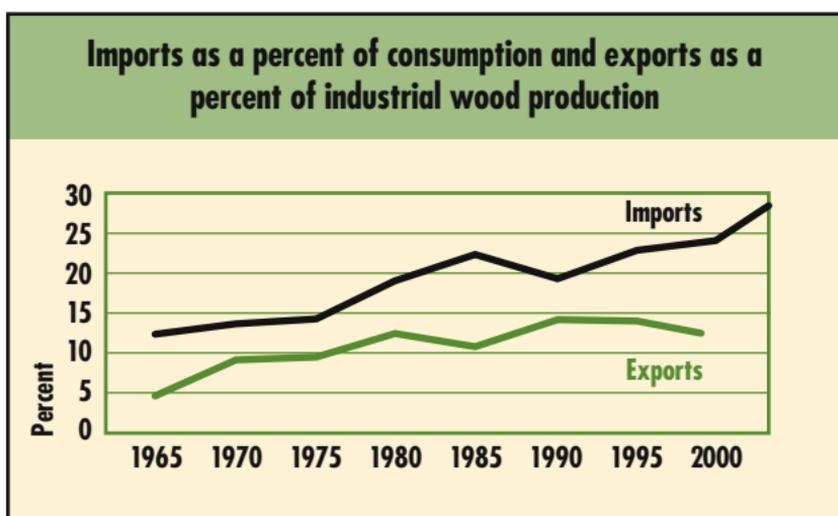
Drivers of Timber Demand

Demands for the products and services of forests are driven largely by population and disposable income. Per capita disposable income (constant \$1996) more than doubled between 1960 and 2000. Total U.S. population increased by 56 percent during this time.



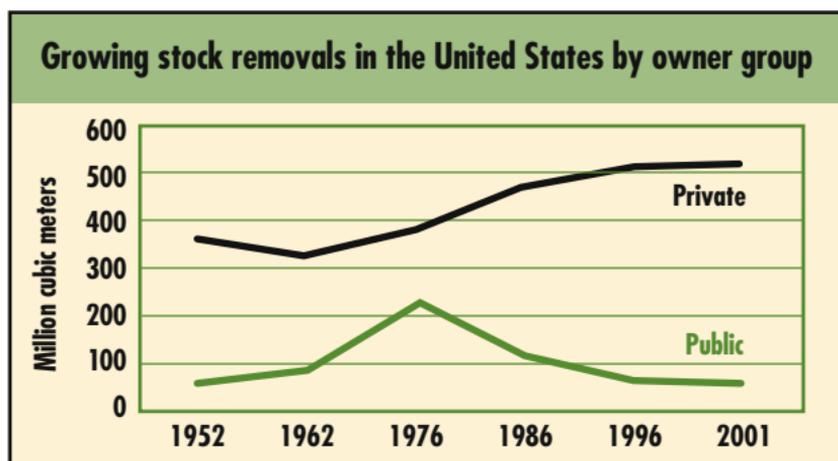
Imports and Exports

Especially in the 1990s, imports accounted for an increasing share of the Nation's timber supply—reaching 27 percent in 2002. While most of the imports originated in Canada, there were increased shipments from Chile, New Zealand, Finland, and other countries during this time. Exports as a percent of production peaked at 16 percent in 1991 and generally declined after that point, reflecting a strong dollar and decreased demands in key markets such as Japan. Because of their effects on U.S. harvest, both imports and exports affect the condition of the domestic forest resource.



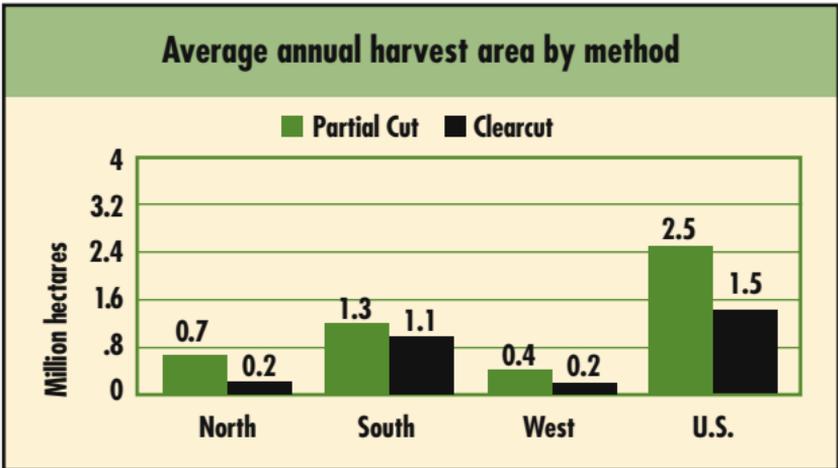
Shifting Timber Sources

Recent changes in public land policy have had significant impacts on private forests. As harvesting declined on public lands in the West, harvesting increased on private lands in the East, particularly in the South. Overall, domestic harvesting has remained steady to declining for the past decade and increased demand has been supported by increased imports and paper recycling.



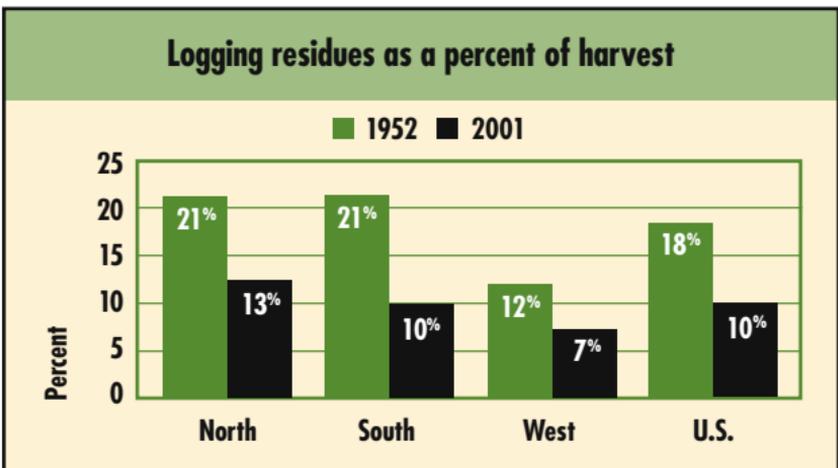
Harvest Methods and Efficiency

Selective harvesting is prevalent on 62 percent of harvested hectares in the United States annually. Clearcutting, used on the remaining 38 percent of harvested forest, is most prevalent in areas of managed plantations in the South and areas in the North where pioneer species such as aspen, jack pine, and spruce-fir—which need open sunlight to regenerate—are being managed for timber production. In the West, clear cutting is generally followed by planting to augment natural regeneration.



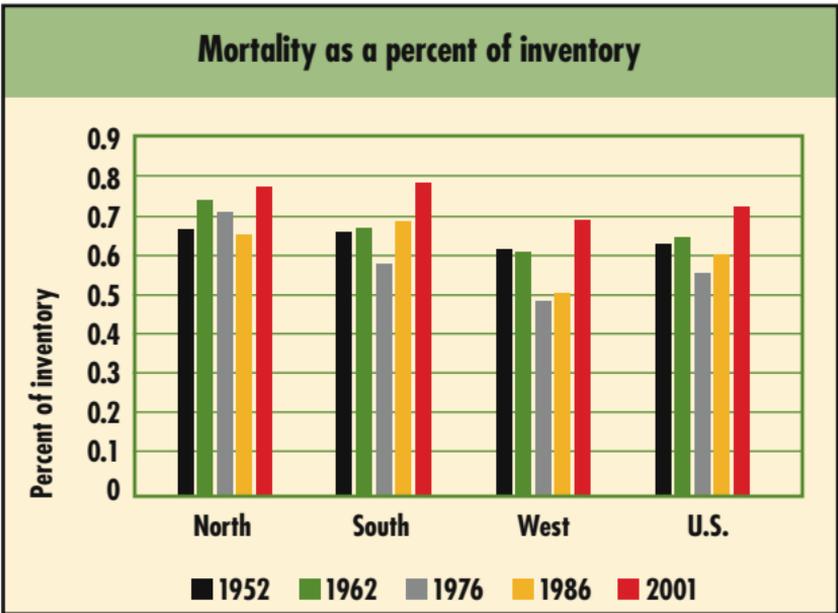
Logging residues are the portions of harvested trees that are not utilized and left in the woods after harvest operations. The proportion of this material left in the woods declined from 18 percent of harvested material in 1952 to 10 percent in 2001.

During this same period, the volume of lower quality, non-growing stock trees, previously left behind, being harvested and utilized for products increased. These two improvements in utilization together increased the average volume removed from logging sites for products by more than 30 percent, thus reducing the total harvest hectares needed to produce the same amount of products.



Forest Health

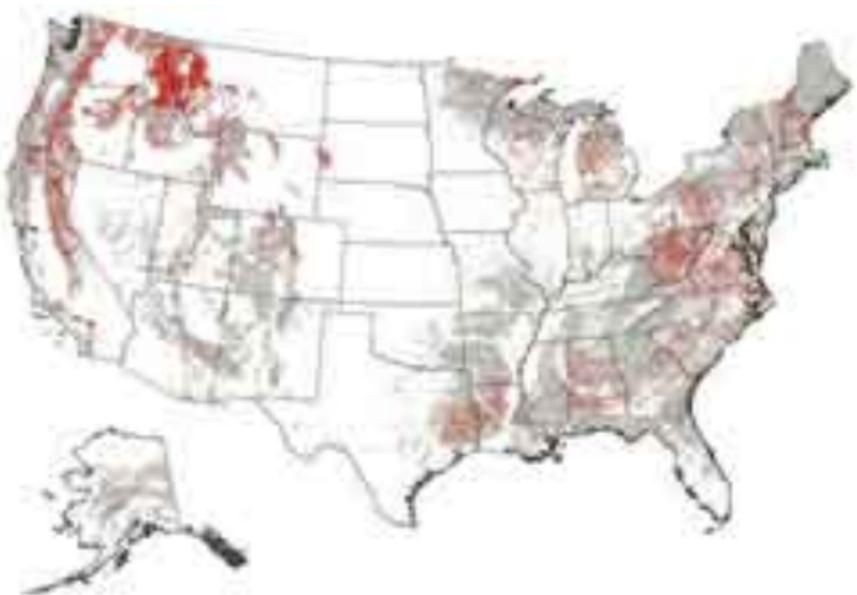
Mortality rates relative to inventory, although currently at the highest level in 50 years, remain less than 1 percent of inventory. However, much of the recent increase may be attributed to a confluence of local cyclic effects of forest stressors. It is difficult to discern if current rates are beyond the range of normal variability from a regional or national perspective.



General Health Risk

Areas potentially at risk of 25 percent or higher mortality due to insects and disease over the next 15 years are depicted in the following graphic.

- Significant risk to insects and disease mortality
- Low risk to insects and disease mortality



Major Forest Insects

Aerial detection surveys provide information on the extent of damage caused by major forest pests. Some of these pests include—

Southern pine beetle. Activity was at historically high levels throughout the last 20 years, reflecting the widespread availability of its preferred host, loblolly pine.

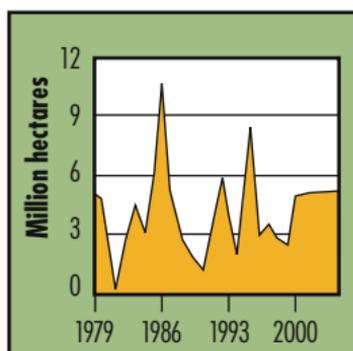
Mountain pine beetle. Activity gradually declined throughout the period. Massive killing of host trees, especially lodgepole pine, greatly depleted the availability of suitable host trees.

Spruce budworm. Activity has been declining the past 20 years, with outbreaks restricted to the Lake States. Spruce budworm outbreaks are cyclic, with epidemics occurring at 30- to 50-year intervals as a new forest grows up from the old one killed by the budworm.

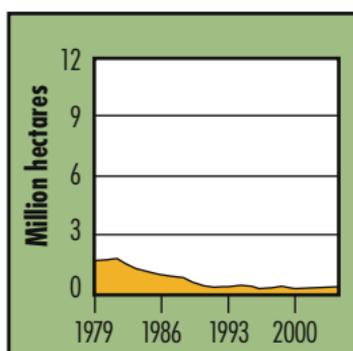
Western spruce budworm. Defoliation peaked from 1983 to 1992. Many trees weakened by budworm defoliation were subsequently killed by bark beetle attacks.

Gypsy moth. Gypsy moths defoliated almost 5 million hectares of hardwoods in 1980. Defoliation has averaged 1.1 million hectares annually the past 20 years. Activity reached unprecedented levels as it spread south and west into better habitat; the great reduction in recent years appears to reflect the effect of *Entomophaga maimaiga* (a fungal pathogen of the Gypsy moth).

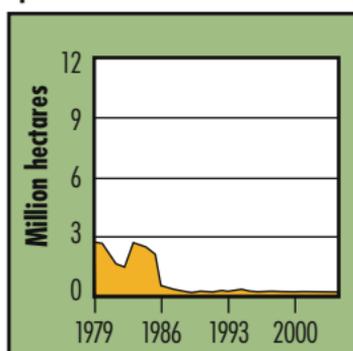
Southern Pine Beetle



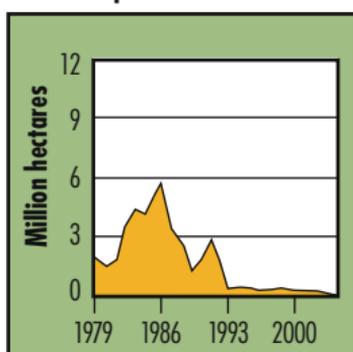
Mountain Pine Beetle



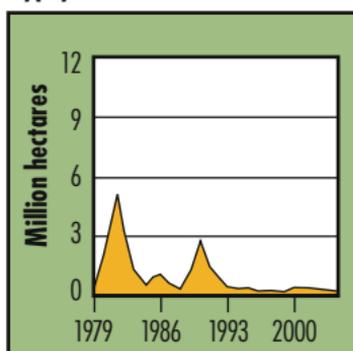
Spruce Budworm



Western Spruce Budworm



Gypsy Moth



Major Forest Diseases

Dozens of diseases affect U.S. forests each year. The following is a list of the 10 most commonly found tree diseases in the United States:

Disease	Primary species affected
Beech bark disease	beech
Dutch elm disease	American elm
Dogwood anthracnose	dogwood
Dwarf mistletoes	conifers
Fusiform rust	southern pines
Oak wilt	eastern oaks
Port-Orford cedar root dis.	Port-Orford cedar
Root rots	many conifers and hardwoods
Sudden oak death	California oaks, tanoak
White pine blister rust	5-needle pines

Air Pollution

Ozone has been shown to alter forest ecosystems in areas of high deposition. At high ozone levels, sensitive trees show ozone-related injury; while lower ozone levels have been shown to reduce photosynthesis of trees — affecting tree health. The ozone bioindicator uses a biosite index based on the number of species evaluated, the number of plants of each species evaluated, the proportion of injured leaves on each plant, and the average severity of injury of each plant. Ozone-induced foliar injury to bioindicator plants occurred more frequently in the Eastern United States from 1997 through 2001.

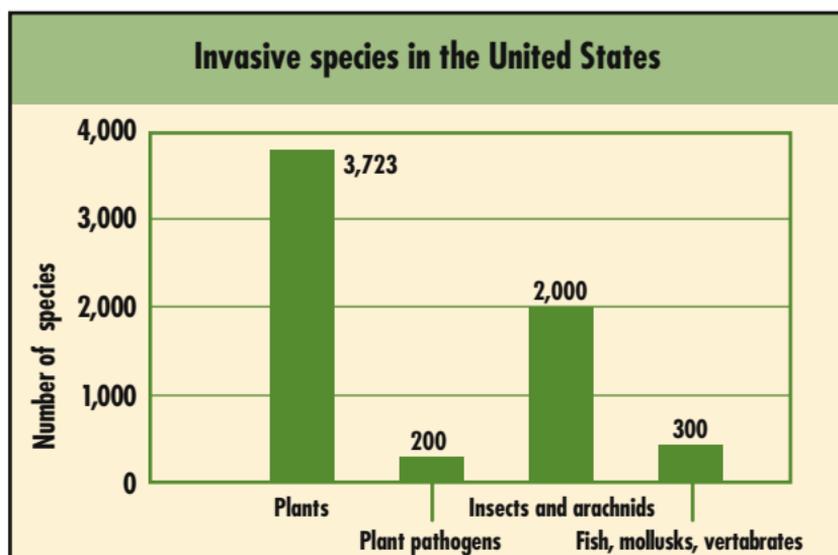


Oak-hickory forests in the southern Midwest showed the highest risk (ozone biosite index of 25 or greater), indicating visible injury leading to changes in structure and function of the ecosystem. Forests of the mid-Atlantic coastal plain and northern Allegheny plateau showed moderate risk (biosite index of 15.0 to < 25.0), indicating visible injury to moderately sensitive species. These forests are in areas determined

to have sensitive tree species and relatively high incidence of ozone-induced foliar injury. Forests of the southern California mountains and valleys and Sierra Nevada foothills showed low risk (biosite index of 5-15), indicating visible injury to highly sensitive species. Most forests in the North Central and Western United States had an average biosite index of less than 5, indicating visible injury to isolated genotypes of sensitive species such as common milkweed and black cherry.

Invasive Species

Expanding global trade and travel have increased the risk of introducing new, exotic organisms. When brought into new ecosystems, exotic (invasive) species have no natural enemies and, therefore, can cause extensive damage. The biological invasion of the continental United States by invasive species began with European settlement almost 500 years ago and is one of the most important issues in natural resource management. Invasive plant species are defined as species being moved beyond their natural range or natural zone of potential dispersal, including all domesticated species and hybrids. The consequences of the introduction of invasive species have major ecological and economic implications and may directly affect human health. One of the major effects of invasive species on biodiversity may be the outright loss of native species. There are an estimated 3,723 plants with species of origin outside the United States. Areas with the highest rates of introduction tend to be along the coasts or major inland waterways. In general, human disruptions of natural communities, such as by soil alterations, removal of vegetative cover, or suppression of natural disturbance regimes, seem to promote opportunities for invasive species.



Invasive insects and pathogens threaten many forests throughout the United States

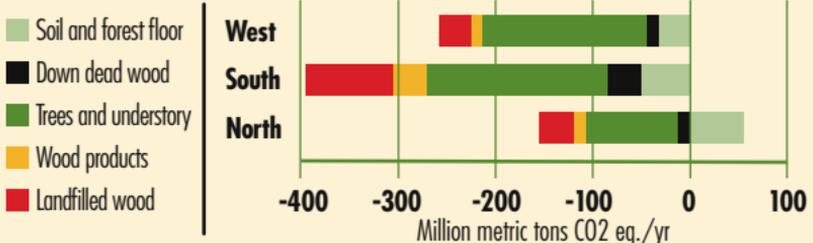


Forest Carbon

Concern over consequences of increasing greenhouse gas concentrations in the atmosphere has led the United States to develop an annual inventory of greenhouse gas sources and sinks since 1990. The U.S. Environmental Protection Agency prepares the official inventory for all sources to comply with commitments under the United Nations Framework Convention on Climate Change. USDA agencies, including the Forest Service, provide the inventory for the agriculture and forestry sectors. In 2001, gross greenhouse gas emissions in the United States were equivalent to 6,936 million metric tons (15.3 trillion pounds) of carbon dioxide equivalents (CO₂ eq.).

Forests take in CO₂ and water, store carbon in wood, and release oxygen. The carbon stored in forests is released back into the atmosphere when trees are burned such as in forest fires or when dead trees and leaves decay. Forest management can affect greatly the amount of carbon stored; vigorously growing forests store more carbon than slow-growing ones. When trees are made into lumber or paper, some CO₂ is released, but much continues to be stored in the products or eventually in landfills. Substituting wood for nonrenewable materials can also reduce CO₂ in the atmosphere by reducing fossil fuel energy use.

Net forest carbon stock change during 2001



Note: negative value corresponds to storage by forests.

In 2001, a net 759 million metric tons (1.7 trillion pounds) of CO² eq. were removed from the atmosphere and stored in forests and forest products in the 48 conterminous States. This offsets about 11 percent of gross U.S. CO² emissions from all sources. An additional 185 million metric tons (407 million pounds) of CO² eq. were stored by forests and then harvested from forests and burned for energy as a substitute for burning fossil fuels, resulting in a net change of zero to the atmosphere.

Wildland Fire

Fire Condition Classes

Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. Some of the activities that may cause this departure: fire exclusion, timber harvesting, grazing, introduction, and establishment of exotic plant species, insects, and disease (introduced or native), or other past management activities. Three general condition classes are identified based on fire regimes relative to historic range, ecosystem stability relative to intact functioning components, fire frequency relative to historic range, and vegetation attributes (species composition and structure) relative to historic range.

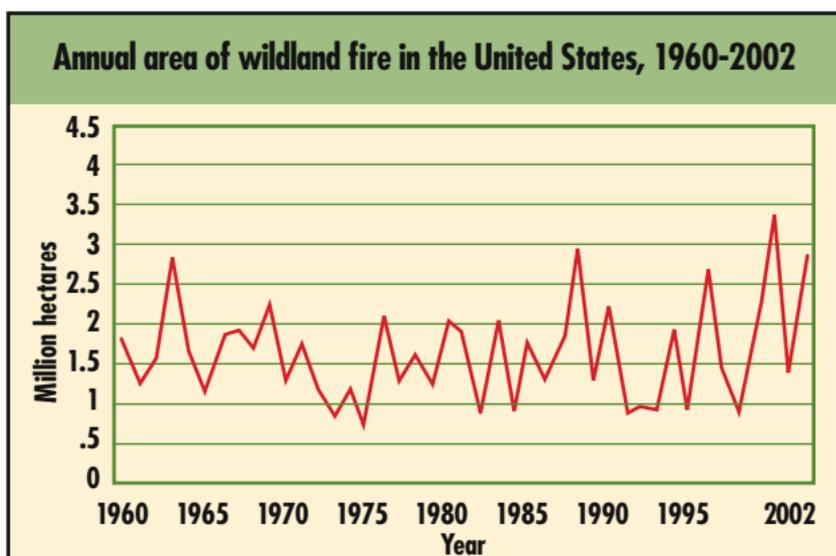
Current fire regime condition classes

Condition class	Fire regime	Ecosystem stability	Historic fire frequency	Vegetation attributes
1	Near normal	High	Within one interval	Within historic range
2	Moderately altered	Moderate	Departure of more than one interval	Moderately altered from historic range
3	Significantly altered	Low	Departure of multiple intervals	Significantly altered from historic range



Fuel Reduction

Years of fire suppression and other management practices have resulted in increased undergrowth and tree density (both live and dead), creating high fuel levels that have in turn brought high-intensity fires that threatened property, natural resources, and the public. In response to the risks posed by heavy fuel loads, the National Fire Plan (NFP) was established to provide a long-term program of hazardous fuels reduction on Federal and adjacent lands. The NFP emphasizes cooperation and collaboration among Federal agencies; State, local, and tribal governments; and other stakeholders to achieve the fuels reduction goals and objectives. These objectives are outlined in a 10-Year Comprehensive Strategy (<http://www.fireplan.gov/content/overview>). Reducing hazardous fuels lessens the risk to humans, important landscapes, and municipal watersheds, as well as improving forest and rangeland health.

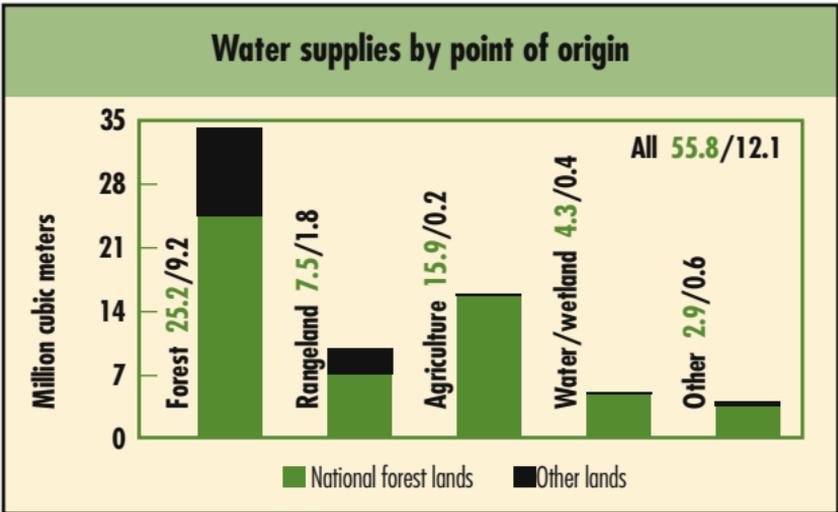


Fire at the Wildland-Urban Interface

Wildland urban-interface communities exist wherever homes and businesses are built among trees, brush, and other flammable vegetation. Historically, aggressive and effective wildfire suppression has resulted in increased undergrowth and density of trees, creating high levels of fuels. In these conditions, fires can move rapidly into the interface areas. A key element in reducing threats to these wildland-urban interface areas and restoring fire to its natural role in the environment is community education and involvement. The USDA Forest Service and the Department of the Interior agencies, in partnership with the State foresters, administer a variety of programs that address living with fire in the wildland-urban interface.

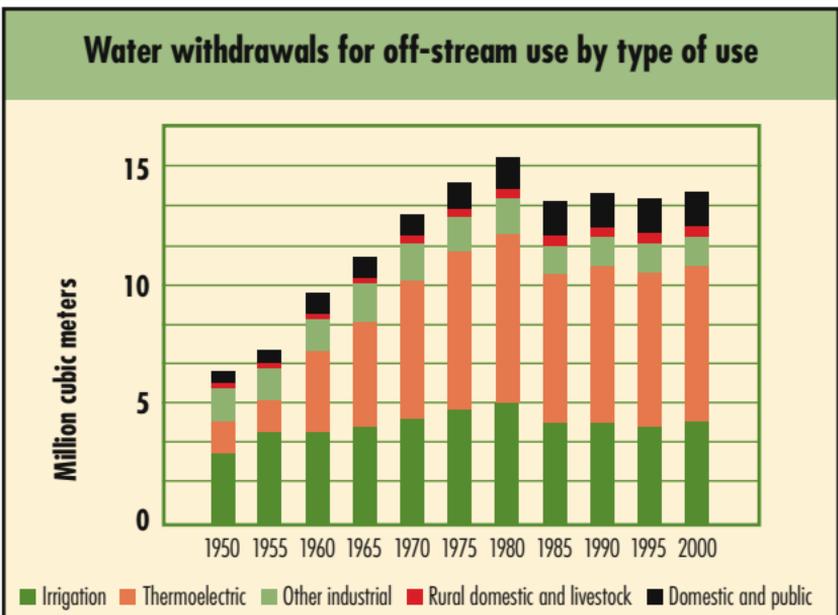
Water Supplies

In the conterminous 48 States, about 18 percent of the Nation's water supply originates on forests managed by the USDA Forest Service. About 51 percent of water supplies originates on forested land, 14 percent on range lands, and 24 percent on agricultural lands. The remaining 11 percent is split between water/wetland and other. Lands managed by the USDA Forest Service account for 27 percent of the water originating on forest land and 19 percent of the water originating on range land.



Water Uses

Estimates of water use in the United States indicate that about 1.5 billion cubic meters per day were withdrawn for all uses during 2000. This total has varied less than 3 percent since 1985 as withdrawals have stabilized for the two largest uses — thermoelectric power and irrigation. About 48 percent of all withdrawals in 2000 were used for thermoelectric power and 34 percent for irrigation.



Watershed Management

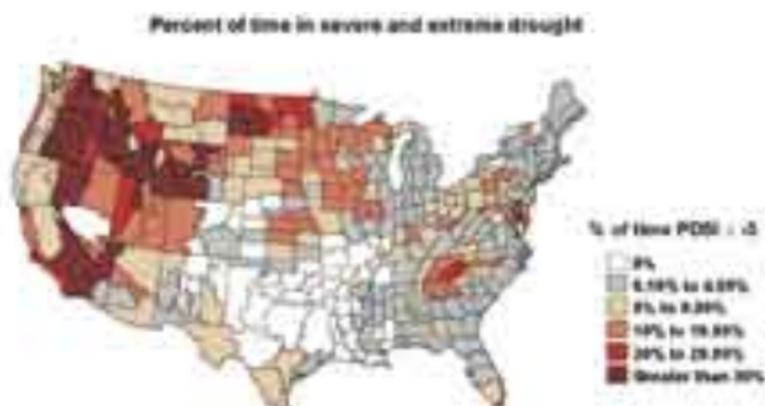
Water quality is becoming an increasingly serious concern in the United States, as well as globally. High-quality watersheds trap sediments; slow runoff; and provide cooling shade and excellent habitat for wildlife, fish, and plants. Potential watershed management issues include habitat loss and fragmentation, hydrologic alterations, nutrient enrichment of surface waters, and pathogens and toxins. Forests offer significant mitigation opportunities for water management.

Effective watershed management must be based on a planning process that integrates both scientific analysis and public participation. To explore current efforts in watershed management, visit <http://www.partnershipresourcecenter.org/watersheds/index.php>.

Drought

Another aspect of water is the lack of it. Many forests have recently experienced fires of unprecedented intensity and extent, and this is partially the result of forest management practices that have allowed decades of dead wood (fuels) to accumulate. This has been exacerbated by climate variability in the form of prolonged periods of drought that have left forests in tinder dry conditions, and thus more susceptible to intense fires. Public resource agencies are shifting their fire policies from complete suppression to recognition that fire is an integral component of the landscape. Presuppression forests experienced fires more frequently, but these fires were less destructive. These less intense fires served as a means of keeping fuels from accumulating on the forest floor and maintaining low stand density. As shown in the composite Palmer Drought Index, much of the West is in a medium to high drought stage, and patchy areas of the East are also at heightened risk.

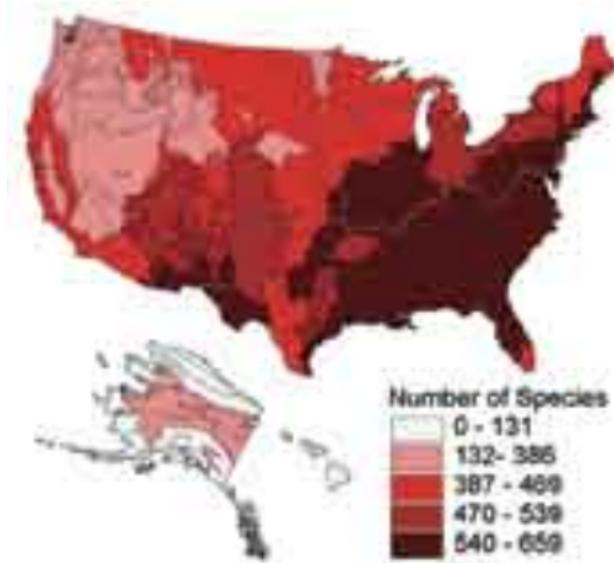
Palmer Drought Severity Index 1985-1995



SOURCE: McKee et al. (1993); NOAA (1993); High Plains Regional Climate Center (1999).
Albers Equal Area Projection. Map prepared at the National Drought Mitigation Center.

Forest Wildlife

Geographic variation in the number of forest-associated species occurring within ecoregions for all taxa



Species Richness

A count of species is a basic and easily understood measure of biological diversity. The species richness graphic above shows where diversity is relatively high or relatively low based on the geographic range of species and their intersection with ecoregional boundaries. In this regard, it should be considered a baseline condition or expectation of the number and composition of species within each ecoregion. Long-term monitoring data are required if trends in species richness are to be estimated. The South has the majority of high-richness areas. The only taxonomic groups with high-richness areas in all regions are mammals and birds.

Wildlife Trends

Favorable indicators of wildlife habitat include relatively stable forest land area and enrollment of land in the Conservation Reserve Program, increases in both population and harvests of many big game species, and increases in populations of 75 percent of all breeding birds monitored.

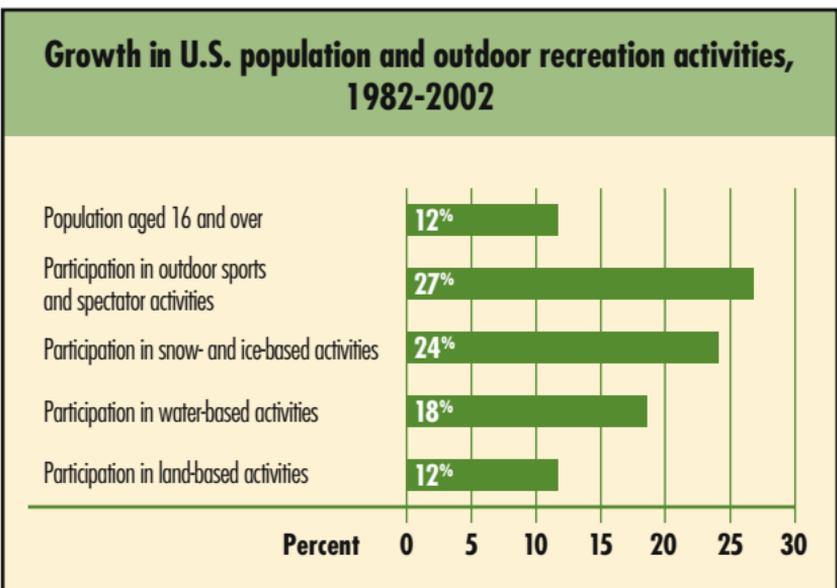
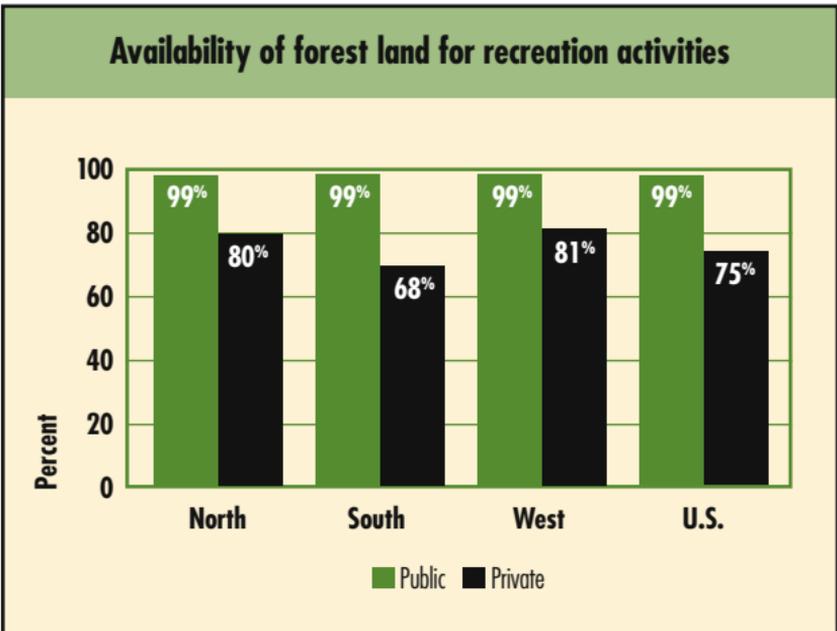
Unfavorable indicators of wildlife habitat include some forest type conversions, conversion of wetlands in the South, and declines in small game populations and harvests for species associated with grassland and early successional habitats.

Additionally, the rate of species listing (threatened and endangered) has declined nearly five-fold since the 2000 RPA Assessment was published.

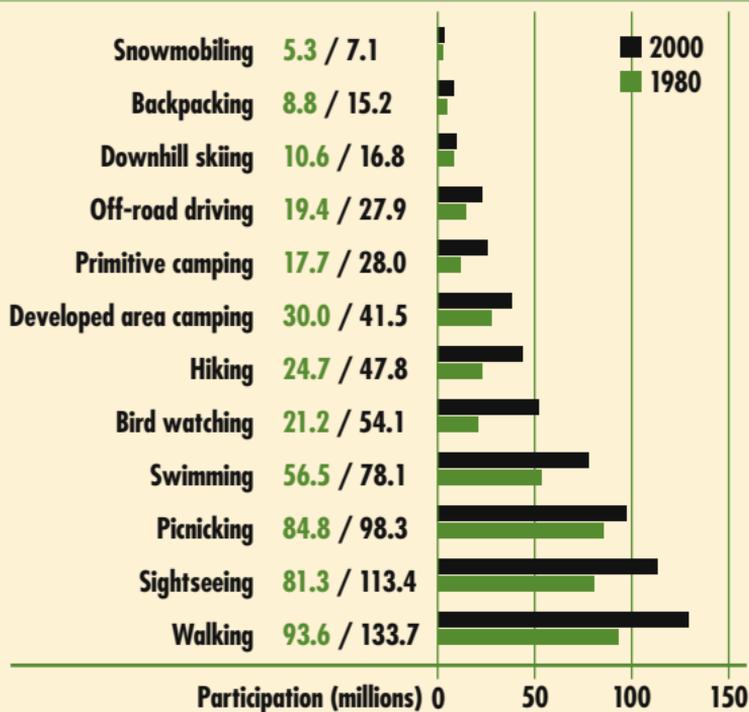
Forest Recreation

Nationally, of the total 303 million hectares of forest land, nearly 259 million hectares (85 percent) is available for outdoor recreation to the entire public or persons selected by private owners. However, free access to private lands has been declining in recent years. As the population and their demand for natural resources continues to grow, this trend may become a more serious concern.

Participation in many recreation activities increased faster than population, with many of the largest percentage changes being for land-resource-based activities. Ninety-four percent of individuals aged 16 or older participated in outdoor recreation activities between 1980 and 2002. During this same period, the population aged 16 and older increased by 12 percent.



Trends in popular outdoor recreation opportunities in the United States

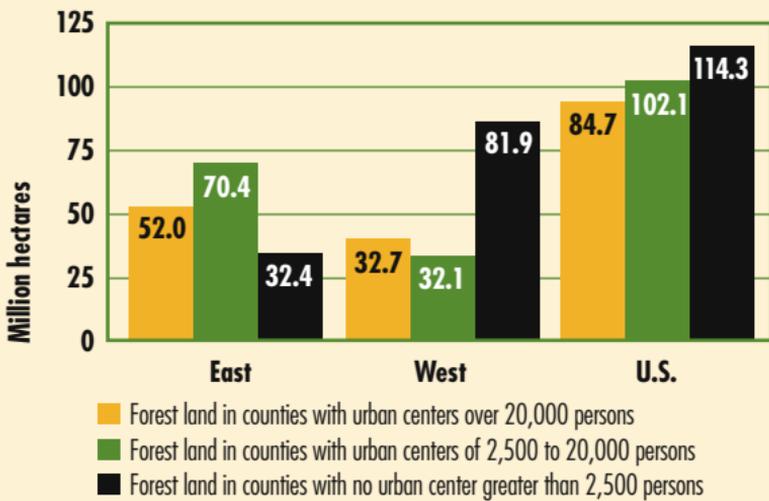


Outdoor recreation is a fast-growing use of forests in the United States, continuing a steady trend since the 1950s. Currently, over 90 percent of Americans participate in at least one outdoor recreation activity. Growth in many of these activities points to a rapid increase in trail, motorized, camping, and skiing forest uses. Rising demand and declining per capita area of forest available for recreation is expected to increase conflicts between different user interests.

Urban Influence on Forests

Today there are an estimated 3.8 billion trees in urban areas, which have an average tree cover of 27 percent. Urban forests are significant and diverse, and as landscapes become fragmented and more urbanized, more forests will be managed by urban residents and institutions. Urban areas (cities, towns, or villages with at least 2,500 people) currently occupy 3.5 percent of the total land area in the United States, double the area found in 1969. As people seek more opportunities for forest recreation closer to home, the pressures and use conflicts of forests near urban areas are expected to increase.

Forest land in the United States by urban population influence



Nontimber Forest Products

Gathering nontimber forest products is a significant use of the Nation's forests that affects forest ecosystems. These products include medicinals, food and forage species, floral and horticultural species, resins and oils, art and craft species, game animals, and fur bearers. Harvest of these products from forest ecosystems is a significant and very important activity for many Americans, for recreational, commercial, subsistence, and cultural uses.

Medicinals — The use of medicinal plants has experienced an expansion in the past 20 years, exceeding that of any other nontimber native flora. Medicinal herbal products and plants are a big business in the United States, with demand prompting protective measures for some species.

Food and forage species — Foods from native species provide a very small share of the food species consumed by Americans, but are often culturally significant. Forage grass species are particularly important to Federal and private land management.

Floral and horticultural species — Native plants used for decorating homes and workplaces are as diverse as the decorative forms invented, and harvests have a strongly regional character.

Resins and oils — Products derived from native plant species fall into several broad categories. Industrial chemists use aromatic plant compounds in air fresheners, bath products, diffusers, hair- and skin-care products, inhalants, massage oils, perfumes, and food flavoring. A few native species have a long tradition of commercial uses as fragrances and have international markets.

Arts and crafts — Arts and crafts are an integral part of innumerable traditions from Native American use of bark, willow, and branches in baskets, masks, and traditional and ceremonial dress; to doll-making and baskets in the Appalachians; to furniture, birdhouses, bowls, and other well-known and admired Shaker products.

Game animals and fur bearers — This category includes big game (primarily large mammal species), small game (rabbits, squirrels, etc.), migratory game birds (ducks, geese, etc.), and furbearers (fox, raccoon, beaver, etc.). Trends indicate a likely increase in species that tolerate intensive land use activities, such as those associated with agricultural habitats and decreases in species associated with grasslands and early successional stages of forest habitats; and general declines in species dependent on wetlands. Generally, big game hunting is increasing, small game hunting is declining, migratory bird hunting may be increasing after 20 years of decline, and fur harvests declined sharply from 1980 to 1990.

In general, harvest of nontimber forest products is largely undocumented, particularly on private forest lands. It is understood, however, that any harvesting of these products may impact forest ecosystems.

Web Resources

USDA Forest Service

<http://www.fs.fed.us>

Forest Inventory and Analysis

<http://fia.fs.fed.us>

Forest Health

<http://www.fs.fed.us/foresthealth/>

<http://www.na.fs.fed.us/spfo/fhm/index.htm>

Fire

<http://www.nfic.gov>

<http://www.fuelman.gov>

Forest Ownership

<http://www.fs.fed.us/ne/studies/NWOS/main.html>

Forest Products

<http://www.fpl.fs.fed.us>

Forest Wildlife

<http://www.fws.gov>

Global Forest Information

<http://www.fao.org/forestry>

National Assessments of Forests

<http://www.fs.fed.us/pl/rpa/list.htm>

National Report on Sustainable Forests

<http://www.fs.fed.us/research/sustain>

Nontimber Forest Products

<http://www.sfp.forprod.vt.edu>

<http://www.fao.org/forestry/site/6367/en>

<http://ifcae.org/ntfp>

Protected Areas

<http://www.IUCN.org>

<http://www.cbi.org>

Recreation/Wilderness

<http://www.srs.fs.usda.gov/trends>

<http://www.fs.fed.us/recreation>

Water Resources

<http://water.usgs.gov/watuse>

<http://www.partnershipresourcecenter.org/watersheds/index.php>

<http://drought.unl.edu>

Terms

Forest land — Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. The minimum area for classification of forest land is 0.4 hectare.

Growing stock volume — Live trees on timber land of commercial species meeting specified standards of quality and vigor. Cull trees are excluded. Includes only trees 12.7 centimeters in diameter or larger at 1.37 meters above ground.

Growth (Net Annual) — The net increase in the volume of growing stock trees during a specified year. Components include the increment in net volume of trees at the beginning of the specific year surviving to its end, plus the net volume of trees reaching the minimum size class during the year, minus the volume of trees that died during the year, and minus the net volume of trees that became cull trees during the year.

Hardwood — A dicotyledonous tree, usually broad-leaved and deciduous.

IUCN Protection Categories — The World Conservation Union protected area classifications are:

Category I is defined as (a) an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, or available primarily for scientific research and or environmental monitoring, or (b) a large area of unmodified or slightly modified land and/or sea, retaining its natural character and influence, without permanent or significant habitation, that is protected and managed so as to preserve its natural condition.

Category II land is a natural area of land and/or sea designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally comparable.

Category III land is an area containing one, or more, specific natural or natural/cultural feature that is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities, or cultural significance.

Category IV is an area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Category V is area of land with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological, and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance, and evolution of such an area.

Category VI is an area containing predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

Logging residues — The unused portions of growing-stock trees cut or killed by logging and left in the woods.

Mortality — The volume of sound wood in growing stock trees that died from natural causes during a specified year.

National forest — An ownership class of Federal lands, designated by Executive order or statute as national forests or purchase units, and other lands under the administration of the USDA Forest Service.

Other Federal — An ownership class of Federal lands other than those administered by the Forest Service. Primarily lands owned by the Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and the Departments of Energy and Defense.

Other forest land — Forest land other than timber land and reserved forest land. It includes available land that is incapable of producing annually at least 1.4 cubic meters per hectare of industrial wood under natural conditions because of adverse site conditions such as sterile soils, dry climate, poor drainage, high elevation, steepness, or rockiness.

Removals — The net volume of growing stock trees removed from the inventory during a specified year by harvesting, cultural operations such as timber stand improvement, or land clearing.

Reserved forest land — Forest land withdrawn from timber utilization through statute, administrative regulation, or designation. Does not include all land in IUCN protection categories.

Roundwood products — Logs, bolts, and other round timber generated from harvesting trees for industrial or consumer use.

Softwood — A coniferous tree, usually evergreen, having needles or scale-like leaves.

Timber land — Forest land that is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. (Note: Areas qualifying as timber land are capable of producing in excess of 1.4 cubic meters per hectare per year of industrial wood in natural stands.)

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