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Federal Timber Harvests: Implications for U.S. Timber Supply

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Summary

The importance of federal timber has been debated at length over many years. The federal government owns about 20% of U.S. timberlands, concentrated in the west, and about 30% of U.S. timber inventory (and 44% of the softwood inventory). Declines in federal harvests in recent years, and legislation to end federal harvests, have led to concerns about the impacts on forest health and on the economy. The national impacts appear to be relatively modest, but local and regional effects could be substantial.

The importance of national forest timber has debated at length for many years. The Forest Service defines "timberland" as land capable of producing 20 cubic feet of industrial wood per acre annually. In 1992, there were nearly 490 million acres of timberland in the United States, nearly 22% of the total land area. Another 247 million acres (11%) were identified as other forest land — lands either less productive than the standard (such as interior Alaska) or reserved (withdrawn from potential timber harvesting by administrative or legislative action, such as wilderness designation).

Timberland and timber supply data have traditionally been reported by four landowner classes, as displayed in table 1. The national forests are administered by the Forest Service for sustained yields of the multiple uses — water yields, wildlife habitat, livestock grazing, and recreation and wilderness, as well as timber production; in 1992, the national forests contained 85 million acres of timberland, 17% of all U.S. timberland. The "Other Public" class of government-owned timberland contains all other government owners — other federal agencies (*e.g.*, Bureau of Land Management and Department of Defense), states, and local governments. In 1992, other public timberlands totaled 47 million acres, nearly 10% of all U.S. timberlands; about a quarter of these timberlands are administered by federal agencies. Another landowner class is the wood products industry — timberlands owned by companies that produce lumber, plywood, and other wood products; in 1992, these lands amounted to more than 70 million acres, 14% of all U.S. timberlands. The last class of timberland owners is "non-industrial private landowners" (NIPL). This class includes all individual and organizational timberland owners who do *not* own wood

product processing facilities; thus, the class includes not only farmers and other people, but also hunting clubs and major corporations that are not part of the wood products industry (*e.g.*, companies that own timberlands because of the minerals — coal, *etc.* — located beneath). This landowner class is also the largest, with nearly 288 million acres of timberland, 59% of all U.S. timberlands.

The timberlands of these various landowners are not distributed uniformly around the country. For example, 55% of industrial timberlands are in the south (Virginia to Texas and Oklahoma), and another 23% are in the north (Maine to Maryland to Missouri to Minnesota). Non-industrial private timberlands are even more heavily concentrated in the east — more than 87% of NIPL timberlands are in the eastern half of the country. In contrast, 75% of national forest timberlands are west of the 100th Meridian. Looking at this situation regionally, more than 70% of all eastern timberlands are NIPL timberlands, with the industry owning another 10% of timberlands in the north and 20% of timberlands in the south. In the west, government timberlands are relatively dominant, accounting for 68% of Rocky Mountain timberlands and 55% of Pacific Coast timberlands. Because of these substantial regional variations, the national consequences of changes in the timber supplies can mask important regional and local effects.

Table 1. U.S. Timberlands by Landowner and Region, 1992
(in millions of acres)

	National Forests	Other Public	Wood Industry	Non-ind. Private	Total
North	9.545	20.761	16.198	111.294	157.799
South	11.544	8.948	39.025	139.782	199.309
Rocky Mtns.	36.402	5.987	2.918	17.322	62.628
Pacific Coast	27.160	11.137	12.314	19.209	69.819
Total	**84.661**	**46.833**	**70.455**	**287.606**	**489.555**

Source: Douglas S. Powell, Joanne L. Faulkner, David R. Darr, Zhiliang Zhu, and Douglas W. MacCleery. *Forest Resources of the United States, 1992*. Gen. Tech. Rept. RM-234 (revised). Fort Collins, CO: U.S.D.A. Forest Service, June 1994. p. 43. (Hereafter referred to by title.)

Timber inventory data, in table 2, show a somewhat different story. The national forests have only 17% of the timberland, but they contain 27% of total timber inventory and 41% of the softwood timber inventory used for building materials.[1] In addition, these timberlands also have higher average inventories, at 2,495 cubic feet of timber per acre.

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[1]The terms "softwoods" and "hardwoods" are commonly used misnomers. Softwoods are actually conifer trees (pines, firs, spruces, *etc.*), while the hardwoods are angiosperms (flowering plants). Softwoods are generally medium-density woods that can readily be used for construction materials; they dry straight and are strong, but easy to work with. The dominant temperate hard-woods — oaks and maples — are substantially harder (more dense) than the conifers, although some "hardwoods," such as aspen and cottonwood, are relatively soft (less dense than conifers). As a group, hardwoods are more variable than softwoods in density and workability, and less valuable for construction, but many are more valuable for flooring, furniture, and cabinetry.

(See table 3.) Private timberlands, both industrial and NIPL, have substantially lower inventories. Some of this difference is due to the substantial cost to private landowners of holding lands and inventory, but differing regional landownership patterns also contribute significantly. Pacific Coast timberlands have much higher average inventories than other timberlands, for all landowners, as shown in table 3. Because 75% of national forest timberlands are in the west, one would expect greater relative inventories in the national forests than on private timberlands, 80% of which are in the east.

Table 2. Total Timber Inventories by Landowner and Region, 1992
(in billions of cubic feet of timber)

	National Forests	Other Public	Wood Industry	Non-ind. Private	Total
Softwood	185.575	50.003	70.956	143.361	449.895
Hardwood	25.641	32.977	34.806	242.298	335.722
Total	**211.216**	**82.980**	**105.762**	**385.659**	**785.617**

Table 3. Average Timber Inventories by Landowner and Region, 1992
(in cubic feet of timber per timberland acre)

	National Forests	Other Public	Wood Industry	Non-ind. Private	Average
North	1,349	1,290	1,481	1,289	1,313
South	1,676	1,515	1,051	1,264	1,257
Rocky Mtns.	2,072	1,510	1,661	1,207	1,760
Pacific Coast	3,775	3,018	2,917	2,322	3,118
Average	**2,495**	**1,772**	**1,501**	**1,341**	**1,605**

Source: *Forest Resources of the United States, 1992*, pp. 43, 48-55.

Timber harvest data, in tables 4 and 5, show a story related to the landownership and inventory patterns. The national forests have 17% of the timberland and 27% of the inventory, but provided only 12% of the harvest (16% of the softwood harvest) in 1991. Other public lands show a similar pattern, with nearly 10% of the timberland, more than 10% of the inventory, but only 6% of the harvest. In contrast, industrial landowners have only 14% of the timberland and 13% of the inventory, but provided 33% of the 1991 harvest. The relatively low harvests from government lands is due to two factors. First, for the national forests, low average harvests result partly from the regional differences; 43% of national forest timberlands are in the Rocky Mountains, which have lower average harvests than southern or Pacific Coast timberlands. Second, most government lands must be managed for sustained yield of multiple uses, including water and recreation as well as timber. Industrial timberlands are also commonly managed for sustained yield, but emphasize producing timber (and revenues) over other, non-paying uses.

Table 4. Total Timber Harvests by Landowner and Region, 1991
(in billions of cubic feet of timber)

	National Forests	Other Public	Wood Industry	Non-ind. Private	Total
Softwood	1.781	0.659	4.112	4.403	10.956
Hardwood	0.220	0.326	1.213	3.594	5.352
Total	**2.001**	**0.985**	**5.325**	**7.997**	**16.308**

Table 5. Average Timber Harvests by Landowner and Region, 1992
(in cubic feet of timber per timberland acre)

	National Forests	Other Public	Wood Industry	Non-ind. Private	Average
North	15.08	14.21	44.66	14.60	17.66
South	32.23	22.86	74.50	39.12	44.92
Rocky Mtns.	11.12	9.53	59.16	11.10	13.20
Pacific Coast	39.75	38.50	123.55	37.08	53.60
Average	**23.64**	**21.03**	**75.58**	**27.81**	**33.31**

Source: *Forest Resources of the United States, 1992*, pp. 43, 106-107.

Relative Importance of Federal Timber

This lengthy background is important for understanding the relative importance of federal timber in U.S. timber supply and lumber production. In 1991, U.S. manufacturers produced 33.2 billion board feet (BBF) of softwood lumber.[2] As shown in table 4, the national forests provided 16% of the softwood timber cut in 1991, and other federal lands (about a quarter of other public timberlands) probably provided about 1-2%. Adjusting for the higher conversion factors for federal lands,[3] federal timber accounted for about 21% of the timber used in softwood lumber production in 1991. In addition, U.S. wood users imported 11.7 BBF of softwood lumber, primarily from Canada, while U.S. lumber producers exported 2.9 BBF of softwood lumber; thus, U.S. softwood lumber consumption in 1991 was 42.2 BBF, and federal timberlands provided about 16% of the softwood used in 1991. (21% of 33.2 BBF = 7.0 BBF; 7.0 BBF/42.2 BBF = 16%.)

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[2]American Forest & Paper Association. *Statistical Roundup: Quarterly Statistical Supple-ment*. Washington, DC: Aug. 1997. This is the source for all production, import and export data for 1991 and 1996. This CRS report focuses on softwood products, because of the relatively greater importance of federal lands in softwood supply, as shown in table 2.

[3]The cubic-foot and board-foot inventory data in *Forest Resources of the United States, 1992* (pp. 48-51 and 56-59, respectively) imply about 4 board feet per cubic foot of softwood timber on private lands and about 5 board feet per cubic foot on government lands in 1992.

By 1996, the situation had changed. U.S. softwood lumber production was 33.3 BBF, slightly higher than in 1991. However, national forest timber harvests in 1996 were only 44% of 1991 levels. Assuming that other federal harvests were similarly reduced, federal timber accounted for about 9% of the timber used in domestic softwood lumber production in 1996. Softwood lumber consumption rose to 49.9 BBF in 1996, because imports rose to 18.2 BBF, while exports fell to 1.9 BBF. Thus, federal timberlands provided only about 6% of the softwood timber used in 1996. (9% of 33.3 BBF = 3.0 BBF; 3.0 BBF/49.9 BBF = 6%.)

Possible Impacts of Ending Federal Timber Harvests

A bill to prohibit timber harvesting from federal lands (the National Forest Protec-tion and Restoration Act of 1997, H.R. 2789) has been introduced in the 105th Congress. Questions about such legislation have focused on its possible impacts on forest health and on its possible economic consequences.

Possible Forest Health Impacts. Environmentalists have generally asserted that timber harvests are unnatural disturbances that displace wildlife, fragment wildlife habitat, and degrade water quality while adding fuel to increase the risk of catastrophic wildfires and to further degrade forest health. The wood products industry argues that timber harvesting can be used to reduce accumulated fuels and thus to reduce the risk of catastrophic wildfires while improving forest health by mimicking natural disturbances.

What is the reality? It is difficult to draw conclusions. Currently, forest health, at least in the interior west (the Cascade Crest to the Black Hills), is widely acknowledged to be relatively poor, but there is a lack of agreement on the nature of the problem, the possible remedies, and the urgency of action. The wood products industry has argued that timber mortality on federal lands in the interior west is at unprecedented levels, and that immediate action is needed to remove dead and dying trees to prevent catastrophic fires. The environmental groups that accept the existence of a problem assert that the problem is too many small-diameter, non-commercial trees, often of the wrong species, and too few big, old trees, and that the problem has been developing over decades, and will take years or decades to correct. Anecdotal evidence supports both views; the existing data (in *Forest Resources of the United States, 1992*) do not unambiguously demonstrate any forest health problem, but the geographic scale used and the time required to gather and publish the data could obscure the situation.

Both descriptions of the problem are probably true in some localities, while neither is universally true. Timber harvesting can be useful for sites with "excess" mortality of trees with commercial value. Research has demonstrated that timber harvesting can occur while adequately protecting water quality and fish and wildlife habitat, but there is little evidence to assess performance. Timber harvesting does increase small-diameter biomass (limbs and tops) at or near ground level, and thus increases the fuel accumulations that exacerbate the risk of catastrophic wildfire, at least until treatments to prepare the site for reforestation dispose of much of this biomass (assuming the funds are available). However, timber harvesting is not sufficient to address the apparent forest health problem, with other treatments — *e.g.*, precommercial thinning and prescribed burning — also needed. It is unclear whether such treatments could be sufficient to address the forest health problem without timber harvesting; at a minimum, such an approach would require substantial annual appropriations.

It should also be recognized that the risk of catastrophic wildfire has risen over the past few decades, and that neither timber harvesting nor eliminating harvesting will substantially alter that risk in the near future. In severe fire seasons, burned acreage is still less than 1% of all forested area. Similarly, at the peak of timber harvesting, less than 1% of federal forestlands were logged in any year. Furthermore, past timber harvest sites do burn, and the severity depends at least partly on whether the remaining biomass has been treated. Thus, even with a return to peak harvesting levels (which seems unlikely) and the best possible results following timber harvesting, it would be years before the risk of catastrophic wildfire was significantly altered.

Possible Economic Consequences. As with environmental impacts, estimating the economic impacts is fraught with uncertainty. From a national perspective, economic impacts of supply changes can be estimated using the price elasticity of demand. No studies of the price elasticity of timber demand exist, but indirect evidence — the price elasticity of lumber demand — can be used to infer timber demand elasticity. Lumber markets are relatively price inelastic; the range of long-run price elasticities for lumber markets is generally -0.4 to -0.3 regionally, with an average of about -0.35 nationally.[4] (This means that a 1% drop in supply would result in a 3.5% rise in prices.) Elasticities for factors of production (*e.g.*, timber) are usually lower than the price elasticities of the final product; according to economic theory, they are the product of the demand elasticity for the final product times the percentage of total costs attributable to that input. In 1981, timber costs were 66% of the total cost of lumber production.[5] Subsequent developments (*e.g.*, technological innovation) might have altered this estimate; it is used with the understanding that significant changes (*i.e.*, timber costs being a higher or lower percentage of lumber production costs) would alter the results. At 66% of total costs, the price elasticity of timber demand would be -0.23 (-0.35 for lumber demand multiplied by 66% = -0.23). If applicable over the long run (typically decades for wood products), lumber prices would thus be expected rise by about 4 times as much as wood supplies decline. Therefore, if eliminating timber harvesting from federal lands reduced total timber supplies by about 6%, then long-run lumber prices would be expected to rise by about 24%.

Projections of this nature are necessarily speculative, and caution should be used in applying such estimates to any situation. Many of the data used in these calculations are long-run, national totals or estimates, and may well be poor indicators of near-term or of local or regional consequences. Thus, at the national level over the long term, eliminating federal timber harvests may have relatively modest economic impacts. However, because of the regional concentrations of timberland ownership and timber inventory, the local and regional consequences could be substantial. Because federal timberlands are more than 60% of Rocky Mountain timberlands and more than 40% of Pacific Coast timberlands (see table 1), the impacts are likely to be concentrated in those regions.

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[4]Darius M. Adams and Richard W. Haynes. *The 1980 Softwood Timber Assessment Market Model: Structure, Projections, and Policy Simulations*. Forest Science Monograph 22. (Supplement to *Forest Science*, vol. 26, no. 3.) Bethesda, MD: Society of American Foresters, 1980. pp. 15-16.

[5]Thomas P. Clephane and Jeanne Carroll. *Timber Survey: Timber Ownership, Valuation, and Consumption Analysis for 97 Forest Products, Paper, and Diversified Companies*. New York, NY: Morgan Stanley & Co., Aug. 25, 1982. p. 6.