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## Clearcutting in the South: Issues, Status, and Trends

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**Abstract.**—Clearcutting has been the most controversial and enduring forest management issue since its widespread adoption on public land in the 1960s. Public opinion generally opposes clearcutting, but foresters and forestry firms have adopted it widely. Despite the controversy, we have little data about the extent of clearcutting by region in the South. Forest Inventory and Analysis (FIA) data indicate 5.2 million acres are harvested annually in the South, with 39 percent being clearcut. This includes 1.67 million acres in the Southeast (85 percent clearcut), and 3.52 million acres in the South Central (17 percent clearcut). Measurement discrepancies among these regions may account for some of these differences. Including seed tree and salvage cuts, about half the timber harvests in the South are made by clearcutting. The large clearcut area, especially in the more populous Southeastern States, will continue to evoke concern about harvest practices and forest management. This issue must be addressed by careful logging and attention to public concerns, safety, and esthetic considerations in forest harvesting.

The South currently provides about 63 percent of annual timber removals in the United States (Smith *et al.* 2001) and about 18 percent of the industrial roundwood harvests in the world (FAO 2002). In addition, the South is projected to provide nearly all the increases in national timber removals over the next 50 years (Haynes, in press). Increasing removals and rising investment in timber growing will encourage more intensive management practices. Few of them are as controversial as timber harvesting, particularly clearcutting. Clearcutting removes most trees in a stand at one time, and the sight of barren forestland often evokes perceptions of widespread environmental damage, fueling opposition to its use in forest management.

The division between proponents and opponents of clearcutting is marked. Our knowledge of the extent of clearcutting and its ecological and economic impacts is modest, however. Previous studies have dealt with the environmental and economic impacts of logging practices, including clearcutting, but our basic knowledge of the extent of clearcutting in the South is almost totally lacking. Accordingly, this paper briefly reviews the current issues about clearcutting and then provides up-to-date analyses of the extent of clearcutting in the U.S. South.

### The Clearcutting Issue

In the late 19th to mid-20th century, exploitative and destructive timber harvesting prompted calls for, first, Federal regulation of private forestry, and later, State forest practice laws. Currently, regulatory or non-regulatory Best Management Practices (BMPs) have been developed and implemented to protect water quality during timber harvesting, and are at least partly a response to broad concerns about clearcutting. Bliss (2000) suggests that we cannot ignore public opposition to clearcutting, no matter how compelling our scientific bases or professional beliefs. Clearcutting has been a lightning rod for public opposition to forestry practices from the cut-out-and-get-out practices of the mid-1800s to the Bitterroot and Monongahela issues in the 1960s and 1970s (Gorte 1998) to virulent opposition today. A casual search of the Internet on the subject of clearcutting is illustrative. Using *Google*, a search for the word clearcutting generated 31,200 sites; adding the word South reduced this to only 10,900 sites. A nonrandom sample of those sites indicated that most were either critiques or attacks on clearcutting, scientific articles about the subject, or professional discussions of the merits of the practice.

Critics of clearcutting state that it causes ecological degradation and soil erosion, reduces water storage capacity,

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destroys wildlife habitat, loads streams and rivers with sediment, kills fish, and results in economic ruin. The Natural Resources Defense Council states that clearcutting can jeopardize an area's ecological integrity by destroying water buffer zones and habitat for insects and bacteria, removing forest carbon sinks, eliminating fish and wildlife species via erosion, removing important underground worms and fungi, causing loss of small-scale economic opportunities, and destroying esthetic values and recreational opportunities. Other environmental groups have programs and Web sites that focus on forest practices in general, and opposition to clearcutting specifically, including the Southern Environmental Law Center (2002), The Dogwood Alliance (2002), and Heartwood (2002). A wealth of other literature exists on the potential adverse effects of clearcutting on water quality, wildlife, and scenic beauty, which is too extensive to review here.

The clearcutting issue has expanded significantly in the South since the mid-1990s. The increase of timber harvesting and wood chip mills in the Southeast has increased public discontent with forestry practices. From 1997 to 1999, the governors of Tennessee, North Carolina, and Missouri formed advisory committees to study the impact of proliferating chip mills and clearcutting. In 1999, the governor of South Carolina replied to the outcries of a coalition of 30 organizations to press for a moratorium on licensing chip mills there and to initiate a study. All those studies produced balanced reviews of forest practices and their impacts; none led to major forest policy changes to date. But widespread opposition to clearcutting and wood chip mills has not abated. More recently, the North American Coalition for Christianity and Ecology (2000) and the Progressive Presbyterians (Witherspoon Society 2001) have advocated moratoriums on clearcutting, and environmental groups throughout the South and the world continue to oppose the practice.

Scientific forestry and professional organizations have extolled the merits of clearcutting, including the Society of American Foresters (2002) and most southern State forestry associations. West Virginia University (2002) publishes a good Web-based summary on clearcutting, dispelling most myths except the obvious problem that clearcuts are (temporarily) ugly. Of course, opposition to clearcuts in Maine was so strong

that the State had a ballot referendum in 1997 that unsuccessfully tried to limit clearcut sizes in the State. To combat the public protest of their recent purchase of 905,000 acres in Maine, the Plum Creek Timber Company allowed access for groups to inspect the land through guided tours. An official spokesman for Plum Creek Timber offered 100 percent public access of its land, and sponsored a media event for local newspapers in an attempt to gain public support, having been previously criticized for poor forest practices based on its reputation for clearcutting. The continued importance of clearcutting is reflected in both SFI and FSC forest certification schemes, which have clearcut size limits of 120 acres on average and 40 acres in total in the South, respectively.

## Southern Clearcutting Data

From analyses performed by Siry (2002) we summarized recent FIA harvesting statistics from data sets prepared for use in SOFRA assessment to estimate the annual clearcut and partially cut areas in the 12 Southern states from Texas to Tennessee to Virginia. The latest FIA survey for each State occurred in the 1990s. In the South Central region, partial cutting, seed-tree cutting, and salvage cutting were merged into one partial cutting category that corresponds to the Southeast partial cutting category. Annual averages were obtained by dividing harvested area by the number of years between FIA surveys.

### Average Annual Harvest Acreage Estimates Based on FIA Data

Table 1 summarizes the annual harvest area by type of cutting in the South by State. FIA results indicate that clearcutting occurs on about 2 million acres annually in the 12 Southern States. Upland hardwood accounts for 39 percent of clearcut land and is followed by planted pine with 22 percent (table 2). The area of clearcut planted pine is probably larger, since planted pine stands with a large hardwood component are classified as oak-pine. If so, planted pine clearcut area would be similar to upland hardwood. Clearcutting is most common on nonindustrial private land, which accounts for 57 percent of harvested area (table 3). This result is as expected because nonindustrial private owners hold most of the forestland in the region.

Table 1.—Annual timber harvest in the South by State and type of harvest

Region/State	Forest area (acres)	Total harvest area (acres)	Type of harvest			
			Clearcut		Partial cut	
			(acres)	(%)	(acres)	(%)
<b>Southeast</b>	<b>85,060,000</b>	<b>1,666,000</b>	<b>1,415,000</b>	<b>85</b>	<b>251,000</b>	<b>15</b>
FL	14,651,000	268,000	247,000	92	21,000	8
GA	23,796,000	543,000	446,000	82	97,000	18
NC	18,710,000	316,000	265,000	84	51,000	16
SC	12,45,000	313,000	276,000	88	37,000	12
VA	15,448,000	226,000	181,000	80	45,000	20
<b>South Central</b>	<b>103,329,000</b>	<b>3,518,000</b>	<b>600,000</b>	<b>17</b>	<b>2,918,000</b>	<b>83</b>
AL	21,932,000	765,000	168,000	22	597,000	78
AR	18,392,000	531,000	0	0	531,000	100
LA	13,783,000	593,000	109,000	18	485,000	82
MS	18,587,000	804,000	171,000	21	633,000	79
OK	4,895,000	94,000	7,000	7	87,000	93
TN	13,965,000	229,000	60,000	26	169,000	74
TX	11,774,000	501,000	85,000	17	416,000	83
<b>South</b>	<b>188,389,000</b>	<b>5,184,000</b>	<b>2,014,000</b>	<b>39</b>	<b>3,169,000</b>	<b>61</b>

Table 2.—Annual timber harvest in the South by timber type and type of harvest

Timber Type	Region								
	Southeast			South Central			South		
	Harvest area	Clearcut	Partial cut	Harvest area	Clearcut	Partial cut	Harvest area	Clearcut	Partial cut
	acres	%	%	acres	%	%	acres	%	%
Planted pine	396,000	98	2	383,000	12	88	779,000	56	44
Natural pine	210,000	76	24	552,000	5	95	761,000	25	75
Oak pine	300,000	84	16	701,000	13	87	1,000,000	35	65
Upland									
Hardwood	520,000	79	21	1,455,000	25	75	1,975,000	39	61
Bottomland									
Hardwood	241,000	83	17	415,000	16	84	656,000	41	59
Nonstocked	0	0	0	13,000	51	49	13,000	51	49
Total harvest area	1,666,000	85	15	3,518,000	17	83	5,184,000	39	61

Table 3.—Annual timber harvest in the South by ownership and type of harvest

Owner	Region								
	Southeast			South Central			South		
	Harvest area	Clearcut	Partial cut	Harvest area	Clearcut	Partial cut	Harvest area	Clearcut	Partial cut
	acres	%	%	acres	%	%	acres	%	%
Public Forest	78,000	84	16	160,000	14	86	238,000	37	63
industry	434,000	94	6	990,000	17	83	1,424,000	41	59
Miscellaneous corporate	186,000	85	15	303,000	16	84	489,000	425	58
Nonindustrial private	968,000	81	19	2,065,000	17	83	3,033,000	38	62
Total harvest area	1,666,000	85	15	3,518,000	17	83	5,184,000	39	61

The area clearcut in the South grew by nearly 10 percent over the period covered by the FIA surveys. This represents a 1.4 percent annual increase from 1986 to 1993. While clearcutting increased on public, nonindustrial private, and miscellaneous corporate land, it actually decreased on forest industry land by 5 percent. The total annual clearcut area is only about 1 percent of timberland area in the region.

FIA data indicate that partial cutting is more widespread in the South than clearcutting, occurring on about 3.2 million acres annually. Partial cutting acreage has increased by 12 percent over the period covered by the FIA surveys. The total area on which harvest cuts (clearcutting and partial cutting) are carried out is about 5.2 million acres. Clearcutting was done on about 40 percent of the harvested area. Partial cutting accounted for the remaining 60 percent of the harvested land.

#### Data Issues

During the SOFRA review process, the clearcutting estimates based on FIA data were called too conservative and suggestions were made that clearcutting estimates should correspond to the total area harvested, including the area that was clearcut and partially cut. Although we found no support for this proposition, we examined the FIA results in greater detail and used other sources of information to develop average annual clearcutting estimates for the South.

Examination of the FIA results revealed large differences between the Southeast and the South Central. For example, in the Southeast clearcutting accounted for 85 percent of the harvested area while in the South Central partial cutting accounted for 83 percent of the harvested area (table 1). Although some of these differences may be explained by different ownership, management objectives and approaches, and local forest conditions, these factors alone do not explain such big differences in the harvest area estimates.

Another factor that could have contributed to these discrepancies is differences in harvest definitions and their interpretation by the individual FIA units in both regions as well as our assumptions concerning the development of South-wide cutting categories. We assumed that the extent of clearcutting in the Southeast is described by the harvest variable defined as the liquidation of a merchantable-size stand of timber, leaving insufficient residual stocking for a manageable stand. In the South Central, we used the clearcut variable defined as a removal of all merchantable trees. Although these two definitions appear to be similar, there were larger differences between partial cutting definitions.

In the South Central, partial cut, seed-tree and shelterwood cut, and salvage cut variables were combined into one partial cutting category. Partial cut includes all selection cuts, high-grading, diameter-limit cutting, and any other sawtimber

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cutting practice that leaves a residual stand of crop trees or potential crop trees and cull trees. It does not include poletimber thinning. Seed-tree and shelterwood cuts leave a small number of crop trees to provide seed or shade to establish a new stand. Salvage cuts remove damaged or salvable dead trees.

In the Southeast, there is only one partial cut category and that includes selective cutting and high grading—the removal of selected trees of highest value from a merchantable stand of timber, leaving sufficient stocking of residual trees for a manageable stand. This category excludes commercial thinning and other stand improvements used to enhance the growth and quality of the stand).

These definitions and assumptions indicate that while the total area on which harvest (clearcut and partial cut) took place can be reliably estimated from FIA data, there could be problems in determining the precise extent of clearcutting and partial cutting. One possible solution may be developing our own clearcutting and partial cutting definitions based on initial and residual stocking as well as volume removed. Without more detailed information about relevant FIA procedures, however, it is difficult to make additional assumptions so other information sources, such as timber sales and logging surveys, would need to be used.

Greene *et al.* (1997) provide another means to check our summary of the FIA data. They surveyed nearly 6,000 private timber sales between 1988 and 1994 in Georgia and the neighboring States of Alabama, Florida, South Carolina, and Tennessee, and recorded the type of harvest used, i.e., clearcut or partial cut. The median timber sale was 85 acres. They found that clearcutting was used on 67 percent of the sales and partial cutting on 33 percent. Furthermore, sales on forest industry land used clearcutting exclusively.

The analysis of FIA data and other sources of information indicates that annual clearcut area may be higher than that based purely on FIA data and our assumptions about combining various categories of harvest cuts. Further, seed-tree cutting and salvage cuts in the South Central could be considered clearcuts. Then, South-wide, clearcutting and partial cutting would each have a 50-percent share in harvest cuts, both being used on about 2.6 million acres annually. If Greene *et al.* (1997) estimates hold for the whole South, clearcutting would

be occurring on nearly 3.5 million acres and partial cutting on the remaining 1.7 million acres. This would imply that in our estimates based on FIA data too many harvested acres were classified as clearcuts in the Southeast and too many acres were classified as partial cuts in the South Central.

While clearcutting area apparently is greater than that based on our analysis of the reported FIA data, it is not likely that all harvested land was clearcut. First, partial cutting is frequently practiced in hardwood stands, and even if these stands were high-graded, sufficient trees, albeit many of poor quality, may have been left. That may be the case if the objective was to harvest sawtimber of high-value species, leaving lower grade logs and less desirable species. Second, the growing success of Best Management Practices (BMPs) also indicates that only partial cutting is practiced in these areas. These voluntary programs require that up to 50 percent of trees will be left following harvest in Streamside Management Zones (SMZs), areas adjacent to streams and lakes. Cabbage and Woodman (1993) estimated, for example, that, in Georgia, SMZs cover about 1.5 million acres or 7 percent of the State's forestland. Growing compliance and stricter requirements indicate that partial cutting is the only harvesting practice permitted and practiced on southern forestland covered by SMZs.

## Conclusions

Given the best available evidence presented here, we conclude that the annual clearcut area in the South averages about 3 million acres and can vary between 2.5 and 3.5 million acres annually. The total annual average harvest area is nearly 5.2 million acres. This area increased by 14 percent during the 7-year FIA survey cycle, or about 2 percent annually.

The average area harvested annually is likely to increase in the future to meet growing demand. As total harvest volumes increase, so will the harvested area. Results of the current RPA and SOFRA assessments indicate that the South will continue to be a major timber supplier in the United States and that harvests will increase considerably (Adams 2002, Prestemon and Abt 2002). While increasing harvests will increase harvest areas, this trend will be mitigated by the growing productivity of forest plantations.

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Past experience indicates that harvest volume increases are accompanied by increases in harvest areas. But the growth in harvested areas was less than proportional. Over the period covered by FIA surveys, average annual removals of growing stock increased by 26 percent while the area harvested increased only by 12 percent (Conner and Hartsell 2002). In other words, the area of harvest cuts increased only half as fast as volume harvested.

One reason for increased timber removals from less land area is the increasing productivity of southern forests, primarily of intensively managed pine plantations. Growing more timber per acre allows meeting wood demand by harvesting less timberland area. This could be important on forest industry land, which is intensively managed. Indeed, FIA data indicate that harvesting intensity as measured by the percent of area harvested has decreased on forest industry land. Greene *et al.* (1997) also found that forest industry sales averaged 59 tons per acre versus 40 tons per acre from private sales. Technical innovations, such as wood chip mills, have allowed greater volume utilization per acre as well. These factors suggest that the area of clearcuts and partial cuts in the South will continue to increase more slowly than harvest volumes.

While intensive forestry and better utilization will foster more efficiency, the use of clearcutting must be sensitive to the context of the specific intended forestry operation. The practice will remain contentious. At the very least, it is esthetically undesirable, and at least some of the environmental concerns over its use may have merit. Most of the general public dislikes clearcuts, as evidenced by the extensive Web sites, as well as by the limits on clearcut size in the industry-initiated SFI program. The practice of clearcutting must be done in an ecologically sensitive manner, adhering to Federal, State, and local environmental guidelines, as well as forest certification standards. Strict enforcement of these guidelines is also required to protect forest areas and to ensure that forest operations will continue to have reasonable freedom in the future. Continued research into the ecological, economic, and social effects of clearcutting versus other timber harvesting methods also can help clarify tradeoffs and values. As this paper suggests, perhaps half of our timber harvests in the South are made by clearcuts, with a greater share occurring in the Southeast than the South Central. Our ability to continue practicing such even-

age management in the future will depend on our skill in doing it well, with minimum adverse impacts today.

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