

**Biomass from Logging
Residue and Mill Residue
in East Texas, 2003**

By

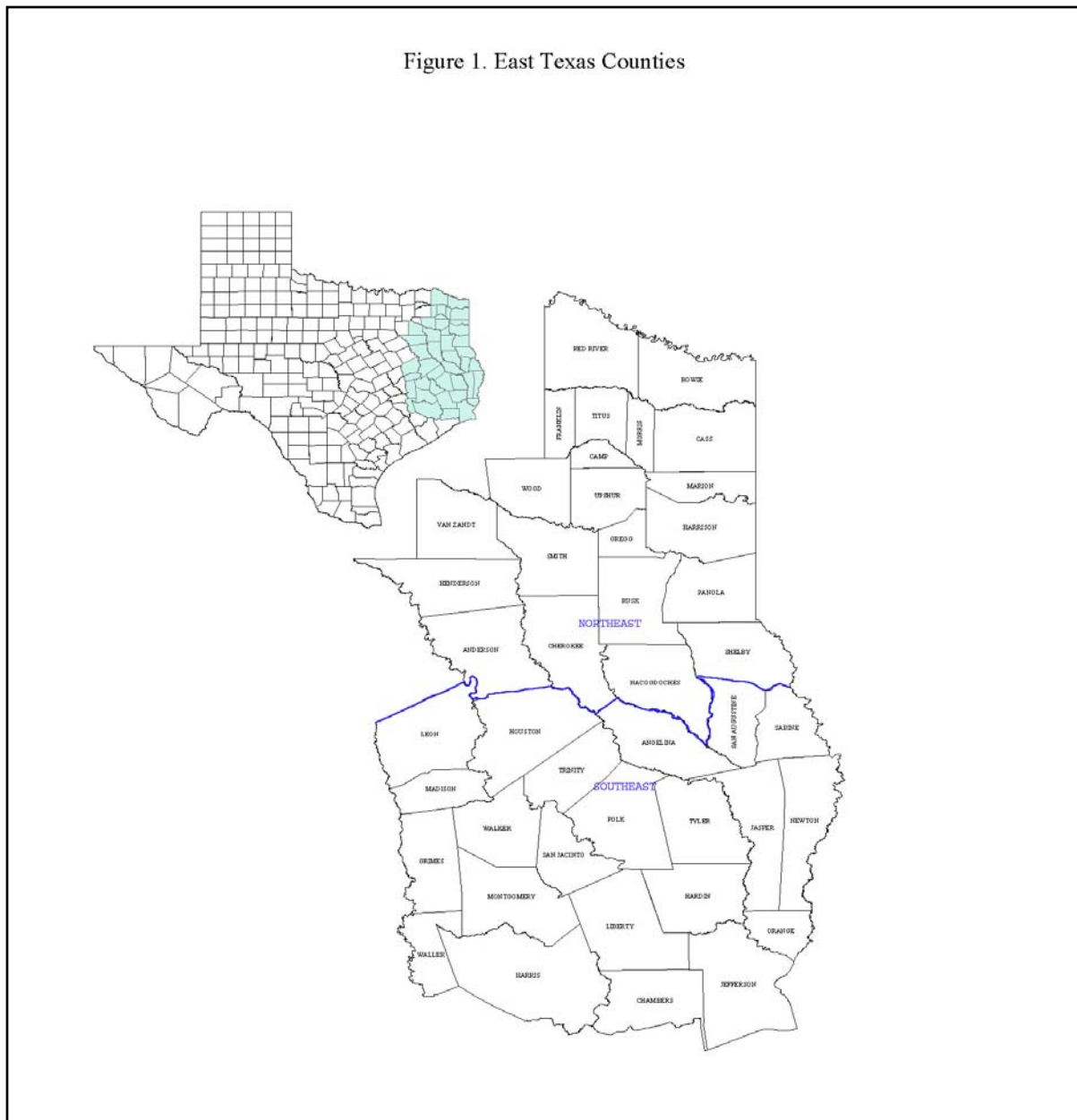
Weihuan Xu, Ph.D., Principal Economist
Burl Carraway, Assistant Department Head
Sustainable Forestry & Economic Development

June 2005



Introduction

The abundance of woody biomass from East Texas forests offers a valuable potential for use as a renewable energy resource or for chemical extraction. This report represents the most current data on the availability of woody biomass in the form of logging and mill residue in East Texas. Residue data estimates are based on a mill survey conducted by the Texas Forest Service (Xu, 2004) and a wood utilization study published by the U.S. Department of Agriculture Forest Service (Bentley and Johnson, 2004). The 43 East Texas counties, delineated by Northeast and Southeast regions, form the scope of this study, (Figure 1).



Logging Residue

Types of logging residue include *stumps*, *tops*, *limbs* and unutilized *cull trees*. *Stump* residue, the part of the tree that is lower than the cutting point and thus left after the harvesting operation, is generally not available commercially since the cost of obtaining the stump or root biomass is likely prohibitive. *Tops* refer to the tops of the trees that are either broken during harvesting or are cut off the central stem of the tree due to a merchantability standard. *Limbs* refer to the branches of the trees. *Cull trees* are the trees that cannot be used to produce saw logs due to defects, rot, or form. Some cull trees are used as pulpwood and others are left unutilized as a part of logging residue. *Tops*, *limbs*, and unutilized cull trees are the logging residue that is potentially available as biomass for energy production or chemical extraction.

Table 1 shows the logging residue available in East Texas. A total of 3.4 million tons of logging residue was generated in 2003, 69 percent from softwood and 31 percent from hardwood. *Tops*, *limbs*, and *cull trees* account for 2.8 million tons, while 0.6 million tons is from *stumps*.

Logging residue by county in Northeast Texas is presented in Table 3. Northeast Texas produced 1.5 million tons of logging residue, 43 percent of the East Texas total. Fifty-eight percent of the logging residue from Northeast Texas is from softwood and 42 percent is from hardwood. *Tops*, *limbs*, and *cull trees* account for 1.2 million tons, while 0.3 million tons is from *stumps*. *Cass*, *Harrison*, *Nacogdoches*, *Panola* and *Cherokee* counties are the top five producers of logging residue in Northeast Texas.

Logging residue by county in Southeast Texas is presented in Table 4. Southeast Texas produced 2.0 million tons of logging residue, 57 percent of the East Texas total. Seventy-seven percent of the logging residue from Southeast Texas is from softwood and 23 percent is from hardwood. *Tops*, *limbs*, and *cull trees* account for 1.6 million tons, while 0.4 million tons is from *stumps*. *Tyler*, *Polk*, *Jasper*, *Angelina* and *Newton* counties are the top five producers of logging residue in Southeast Texas.

Mill Residue

Mill residue, including *chips*, *sawdust*, *shavings* and *bark*, is generated in the process of producing primary wood products. The major primary wood products produced in East Texas include lumber, plywood, veneer, OSB, chips, and posts/poles. Figure 2 depicts the mill residue types from producing primary wood products. Chips as a primary product are produced from pulpwood roundwood while residue chips are produced from the tops of sawlogs that are used for producing lumber, veneer, or plywood. Sawdust is produced from sawing lumber from sawlogs and shavings are produced from lumber surfacing. All primary products have bark as mill residue.

There was a total of 5.9 million tons of mill residue produced in East Texas in 2003, with 85 percent from softwood and 15 percent from hardwood, (Table 2). Chips account for

50 percent of the total mill residue, followed by bark at 36 percent. Sawdust and shavings account for 8 percent and 6 percent respectively, of the total mill residue produced.

Northeast Texas mills produced 2.1 million tons of mill residue, representing 35 percent of the East Texas total, (Table 5). Seventy-one percent of the mill residue from Northeast mills was from softwood and 29 percent was from hardwood. *Bowie, Cass, Marion, Nacogdoches* and *Rusk* counties represent the top five mill residue producers in Northeast Texas.

Southeast Texas mills produced 3.9 million tons of residue, which represents 65 percent of the East Texas total, (Table 6). Ninety-three percent of the mill residue from Southeast Texas mills was from softwood and 7 percent was from hardwood. *Polk, Angelina, Sabine, Jasper,* and *Liberty* counties are the top five producers of mill residue in Southeast Texas.

Conclusion

East Texas has substantial biomass in the form of logging and mill residue. Except for stumps, all other biomass from logging and mill residue is available for energy production or chemical extraction. Most of the logging residue in East Texas has not been marketed for competing uses and is left at the logging sites. However, nearly all of East Texas mill residue has already been marketed for competing uses, such as chips for pulping, sawdust, shavings and bark for fuel or landscaping. It is important to note that logging residue is generated on logging sites, while mill residue is produced in mills. Therefore, county logging residue amounts are associated with the timber harvests occurring within a county, while county mill residue totals are associated with the amount and types of primary forest products produced within a county. Additionally, part of the mill residue could be generated from wood shipped to Texas mills from other states.

References

Bentley, James W.; Johnson, Tony G. 2004. Eastern Texas harvest and utilization study, 2003. Resource Bulletin SRS-97. Asheville, N.C.: U.S. Department of Agriculture, Forest Service, Southern Research Station.

Xu, Weihuan. 2004. Harvest trends, 2003. Publication 165. College Station: Texas Forest Service.

Figure 2. Mill Residue from Producing Primary Wood Products in East Texas.

Primary Product	Chips	Sawdust	Shavings	Bark
Lumber	x	x	x	x
Veneer	x			x
Plywood	x			x
OSB				x
Chips				x
Posts/Poles				x

Table 1. Logging Residue in East Texas, 2003

unit: ton						
Region	Species Group	Stump	Top/Limb	Unused Cull	Total Residue	Available Residue
Northeast	Softwood	161,674	504,749	178,684	845,107	683,433
	Hardwood	106,527	341,854	161,003	609,384	502,857
	All	268,201	846,603	339,687	1,454,491	1,186,290
Southeast	Softwood	298,314	905,571	295,934	1,499,818	1,201,505
	Hardwood	78,041	253,428	125,146	456,615	378,574
	All	376,354	1,158,999	421,080	1,956,433	1,580,079
East	Softwood	459,988	1,410,320	474,618	2,344,926	1,884,938
	Hardwood	184,568	595,282	286,149	1,065,998	881,431
	All	644,555	2,005,602	760,767	3,410,924	2,766,369

Table 2. Mill Residue in East Texas, 2003

unit: ton						
Region	Species Group	Chips	Sawdust	Shavings	Bark	Total
Northeast	Softwood	742,512	112,946	108,035	495,192	1,458,685
	Hardwood	187,817	117,933	18,891	284,966	609,606
	All	930,329	230,878	126,926	780,157	2,068,291
Southeast	Softwood	2,005,077	219,831	210,273	1,168,261	3,603,442
	Hardwood	56,521	35,609	5,704	178,996	276,830
	All	2,061,598	255,440	215,977	1,347,257	3,880,272
East	Softwood	2,747,589	332,777	318,308	1,663,453	5,062,127
	Hardwood	244,338	153,541	24,595	463,962	886,436
	All	2,991,928	486,318	342,903	2,127,414	5,948,563

Table 3. Logging Residue by county in Northeast Texas, 2003

County	unit: ton											
	Softwood				Hardwood				All Species			
	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total
Anderson	5,523	17,473	6,406	29,401	3,838	13,091	7,662	24,592	9,361	30,563	14,068	53,993
Bowie	6,933	23,197	9,696	39,827	9,300	28,668	11,223	49,191	16,233	51,865	20,919	89,017
Camp	1,673	5,587	2,326	9,586	1,595	4,927	1,948	8,470	3,268	10,514	4,274	18,056
Cass	19,154	62,193	24,306	105,654	16,185	49,888	19,523	85,596	35,339	112,081	43,829	191,249
Cherokee	11,465	36,507	13,605	61,578	9,416	32,599	19,965	61,980	20,882	69,107	33,570	123,558
Franklin	159	490	167	817	578	1,805	753	3,137	738	2,296	920	3,954
Gregg	2,354	7,547	2,862	12,763	2,178	7,661	4,908	14,747	4,532	15,208	7,770	27,510
Harrison	19,640	61,498	21,943	103,081	6,936	21,593	8,883	37,412	26,576	83,090	30,826	140,493
Henderson	1,116	3,508	1,266	5,889	1,548	5,619	3,911	11,078	2,663	9,128	5,177	16,968
Marion	9,522	30,809	11,942	52,273	6,633	20,880	9,050	36,563	16,155	51,690	20,992	88,836
Morris	2,063	7,253	3,344	12,660	1,632	5,224	2,437	9,293	3,695	12,477	5,781	21,953
Nacogdoches	20,018	61,125	20,327	101,470	6,018	20,285	11,436	37,740	26,036	81,411	31,764	139,210
Panola	16,633	50,566	16,596	83,795	8,055	24,573	9,102	41,730	24,688	75,139	25,698	125,525
Red River	2,943	9,406	3,537	15,887	7,876	24,272	9,491	41,639	10,819	33,678	13,029	57,526
Rusk	13,316	39,858	12,469	65,643	7,291	25,147	15,233	47,671	20,607	65,004	27,703	113,313
Shelby	16,354	47,539	13,464	77,357	4,674	14,375	5,563	24,612	21,028	61,914	19,027	101,968
Smith	6,203	19,824	7,455	33,482	4,273	14,618	8,639	27,531	10,476	34,442	16,094	61,012
Titus	517	1,613	572	2,702	2,669	8,214	3,190	14,073	3,185	9,828	3,762	16,775
Upshur	3,672	11,442	4,028	19,143	3,043	9,781	4,636	17,461	6,716	21,223	8,665	36,604
Van Zandt	182	649	305	1,136	1,141	3,562	1,485	6,188	1,324	4,211	1,790	7,324
Wood	2,233	6,665	2,067	10,965	1,648	5,069	1,964	8,682	3,881	11,735	4,031	19,647
Northeast Total	161,674	504,749	178,684	845,107	106,527	341,854	161,003	609,384	268,201	846,603	339,687	1,454,491

Table 4. Logging Residue by county in Southeast Texas, 2003

County	Softwood				Hardwood				All Species			
	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total
Angelina	27,085	81,716	26,207	135,009	5,460	18,069	9,569	33,098	32,546	99,785	35,776	168,107
Chambers	1,263	3,668	1,037	5,967	135	413	158	705	1,397	4,081	1,194	6,673
Grimes	963	3,578	1,814	6,354	408	1,295	584	2,286	1,370	4,873	2,397	8,640
Hardin	21,070	61,603	17,811	100,484	5,387	16,841	7,068	29,296	26,457	78,444	24,879	129,780
Harris	3,340	11,929	5,658	20,926	2,483	7,693	3,088	13,264	5,823	19,621	8,746	34,190
Houston	12,698	39,629	14,015	66,342	5,306	16,522	6,802	28,630	18,004	56,151	20,816	94,972
Jasper	40,154	114,775	30,507	185,436	7,189	23,479	11,849	42,518	47,343	138,254	42,356	227,953
Jefferson	2,527	6,563	1,054	10,144	2,303	8,356	5,804	16,463	4,831	14,919	6,857	26,608
Leon	1,342	4,575	1,989	7,906	1,471	4,876	2,597	8,943	2,813	9,451	4,585	16,849
Liberty	9,194	27,508	8,595	45,296	5,855	18,562	8,304	32,720	15,048	46,069	16,899	78,016
Madison	5	19	10	34	30	87	25	142	35	106	35	176
Montgomery	8,299	28,703	12,831	49,834	2,711	8,454	3,506	14,672	11,010	37,157	16,338	64,506
Newton	25,694	75,370	22,045	123,109	5,446	17,692	8,749	31,887	31,140	93,061	30,795	154,996
Orange	3,795	10,263	2,118	16,176	1,536	4,706	1,784	8,026	5,331	14,969	3,902	24,202
Polk	37,001	118,039	44,198	199,238	5,623	17,176	6,406	29,205	42,624	135,215	50,604	228,444
Sabine	14,986	42,938	11,519	69,444	2,379	7,273	2,729	12,381	17,365	50,212	14,248	81,824
San Augustine	20,894	64,120	21,635	106,649	2,698	8,066	2,654	13,417	23,592	72,186	24,289	120,066
San Jacinto	8,000	28,322	13,226	49,548	1,598	5,016	2,146	8,760	9,598	33,338	15,373	58,308
Trinity	16,365	50,353	17,120	83,838	5,361	18,344	10,849	34,555	21,725	68,697	27,969	118,392
Tyler	34,515	99,892	27,840	162,248	13,670	47,518	29,447	90,634	48,185	147,410	57,287	252,882
Walker	8,920	31,261	14,330	54,511	986	2,968	1,021	4,975	9,906	34,229	15,350	59,486
Waller	202	747	376	1,325	7	23	9	39	209	770	385	1,364
Southeast Total	298,314	905,571	295,934	1,499,818	78,041	253,428	125,146	456,615	376,354	1,158,999	421,080	1,956,433

unit: ton

Table 5. Mill Residue by county in Northeast Texas, 2003

County	unit: ton														
	Softwood					Hardwood					All Species				
	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total
Anderson	-	-	-	-	-	8,175	5,150	825	4,500	18,650	8,175	5,150	825	4,500	18,650
Bowie	193,410	29,460	28,179	122,108	373,157	2,180	1,373	220	133,949	137,722	195,590	30,833	28,399	256,057	510,879
Camp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cass	94,526	14,398	13,772	29,469	152,165	26,160	16,481	2,640	55,613	100,894	120,686	30,879	16,412	85,082	253,059
Cherokee	3,718	414	396	1,297	5,825	51,853	32,275	5,170	28,254	117,551	55,571	32,689	5,566	29,551	123,376
Franklin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gregg	-	-	-	-	-	2,180	1,373	220	1,200	4,973	2,180	1,373	220	1,200	4,973
Harrison	60,504	9,216	8,815	16,829	95,363	-	-	-	-	-	60,504	9,216	8,815	16,829	95,363
Henderson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marion	-	-	-	66,505	66,505	31,828	20,052	3,212	17,524	72,616	31,828	20,052	3,212	84,029	139,121
Morris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nacogdoches	159,134	24,239	23,185	101,471	308,029	26,042	16,407	2,628	14,338	59,415	185,177	40,646	25,813	115,809	367,444
Panola	-	-	-	76,000	76,000	4,534	2,857	458	2,497	10,346	4,534	2,857	458	78,497	86,346
Red River	-	-	-	810	810	-	-	-	-	-	-	-	-	810	810
Rusk	193,938	29,540	28,256	53,943	305,676	23,592	14,863	2,381	12,986	53,822	217,530	44,403	30,637	66,929	359,499
Shelby	36,300	5,529	5,289	19,207	66,325	4,970	3,131	502	2,736	11,339	41,271	8,661	5,790	21,943	77,665
Smith	982	150	143	7,553	8,828	1,507	949	152	8,729	11,337	2,489	1,099	295	16,282	20,165
Titus	-	-	-	-	-	4,796	3,021	484	2,640	10,941	4,796	3,021	484	2,640	10,941
Upshur	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Van Zandt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Northeast Total	742,512	112,946	108,035	495,192	1,458,685	187,817	117,933	18,891	284,966	609,606	930,329	230,878	126,926	780,157	2,068,291

Table 6. Mill Residue by county in Southeast Texas, 2003

County	unit: ton														
	Softwood					Hardwood					All Species				
	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total
Angelina	329,784	50,232	48,048	287,309	715,373	-	-	-	30,662	30,662	329,784	50,232	48,048	317,970	746,034
Chambers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grimes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hardin	76	12	11	55,128	55,226	26,689	16,814	2,693	50,293	96,489	26,764	16,825	2,704	105,422	151,715
Harris	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Houston	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jasper	233,925	35,631	34,082	291,492	595,130	602	379	61	16,055	17,097	234,527	36,010	34,143	307,547	612,227
Jefferson	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Liberty	190,077	7,036	6,730	42,122	245,965	8,720	5,494	880	4,800	19,894	198,797	12,530	7,610	46,922	265,859
Madison	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Montgomery	37,886	5,771	5,520	10,538	59,714	-	-	-	-	-	37,886	5,771	5,520	10,538	59,714
Newton	25,017	3,811	3,645	10,559	43,032	-	-	-	-	-	25,017	3,811	3,645	10,559	43,032
Orange	6,019	917	877	181,233	189,045	-	-	-	-	-	6,019	917	877	181,233	189,045
Polk	628,397	40,856	39,080	105,581	813,915	2,725	1,717	275	3,206	7,923	631,122	42,573	39,355	108,788	821,838
Sabine	445,792	59,100	56,531	112,892	674,314	4,319	2,721	436	2,377	9,852	450,111	61,821	56,966	115,269	684,167
San Augustine	3,390	516	494	13,943	18,343	5,837	3,677	589	27,975	38,079	9,227	4,194	1,083	41,918	56,421
San Jacinto	32,445	4,942	4,727	9,025	51,139	-	-	-	-	-	32,445	4,942	4,727	9,025	51,139
Trinity	30,200	4,600	4,400	8,400	47,600	-	-	-	-	-	30,200	4,600	4,400	8,400	47,600
Tyler	-	-	-	21,694	21,694	7,630	4,807	770	43,627	56,834	7,630	4,807	770	65,321	78,528
Walker	42,069	6,408	6,129	18,346	72,952	-	-	-	-	-	42,069	6,408	6,129	18,346	72,952
Waller	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Southeast Total	2,005,077	219,831	210,273	1,168,261	3,603,442	56,521	35,609	5,704	178,996	276,830	2,061,598	255,440	215,977	1,347,257	3,880,272