



Biomass from Logging Residue and Mill Residue in East Texas, 2008

by

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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 Texas Forest Service (VanderSchaaf, 2009) and a wood utilization study published by the U.S. Department of Agriculture Forest Service (Mathison et al., 2009). The 43 East Texas counties, delineated by Northeast and Southeast regions, form the scope of this study (Figure 1).

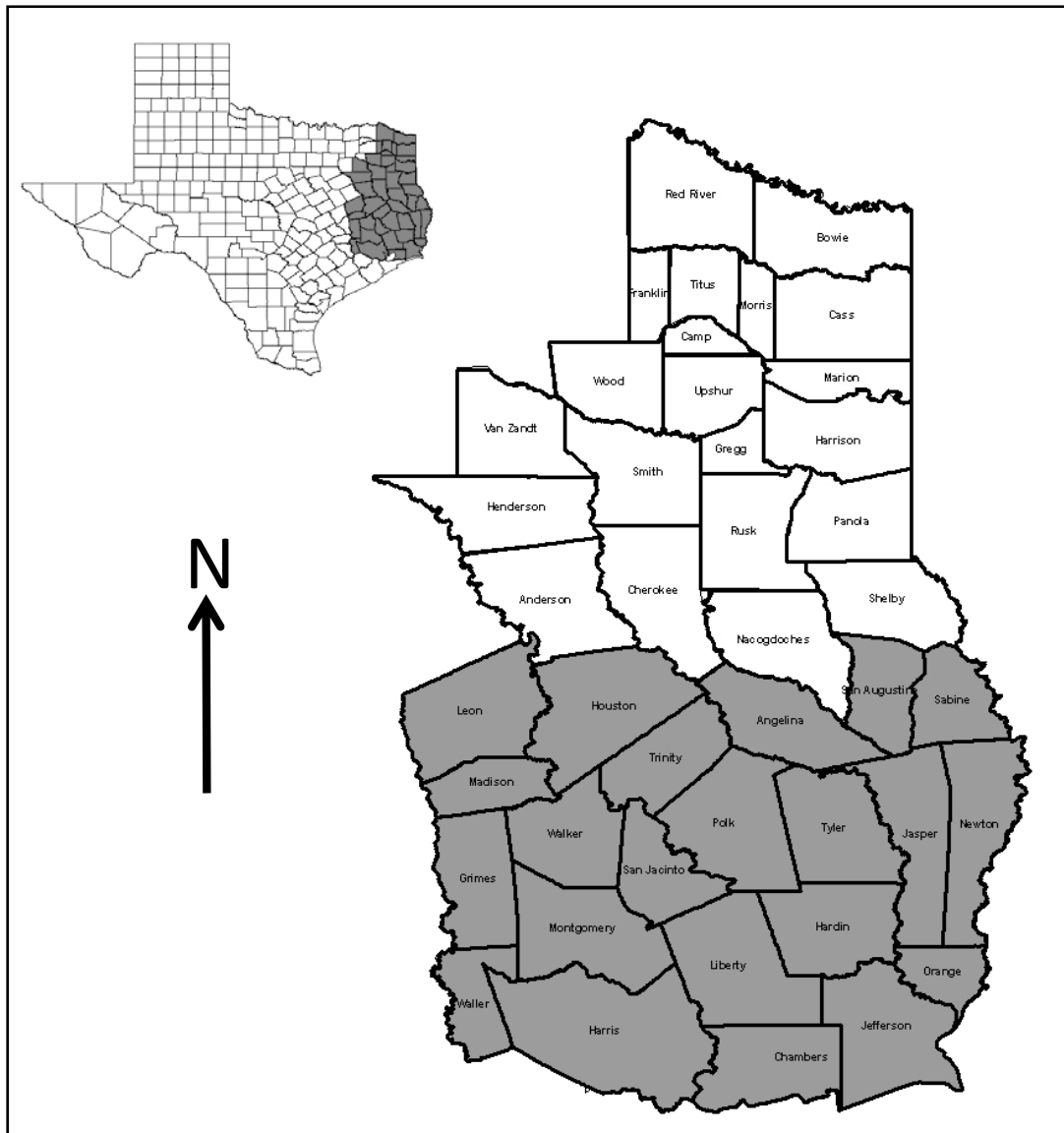


Figure 1. Counties in Northeast Texas have no fill while those in Southeast Texas are filled.

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 2.9 million green tons of logging residue was generated in 2008, 66 percent from softwood and 34 percent from hardwood. Tops, limbs, and cull trees account for 2.4 million tons, while 0.5 million tons is from stumps.

Logging residue by county in Northeast Texas is presented in Table 3. Northeast Texas produced 1.2 million tons of logging residue, 42 percent of the East Texas total. Fifty percent of the logging residue from Northeast Texas is from softwood and 50 percent is from hardwood. Tops, limbs, and cull trees account for 1.0 million tons, while 0.2 million tons is from stumps. Cherokee, Cass, Nacogdoches, Harrison and Rusk 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 1.7 million tons of logging residue, 58 percent of the East Texas total. Seventy-eight percent of the logging residue from Southeast Texas is from softwood and 22 percent is from hardwood. Tops, limbs, and cull trees account for 1.4 million tons, while 0.3 million tons is from stumps. Angelina, Polk, Newton, Tyler and Jasper counties are the top five producers of logging residue in Southeast Texas.

Figure 2 shows estimated available logging residues (excluding stumps) by county. This map provides a general idea of where logging residue will be greatest.

The amount of logging residue available annually will vary with the amount of wood harvested (Figure 3). The total amount of residue from 2007 to 2008 decreased 15% (0.5 million green tons) because of the substantial decline in the amount of timber harvested, 628.8 million cubic feet in 2007 as compared to 538.0 cubic feet in 2008 (Table 5). Thus, logging residue available for energy production closely follows timber product markets and planners should account for annual variability in residue amounts. Logging residue estimates for the years of 2003 and 2005 were obtained from previous publications (Xu and Carraway, 2005, Xu and Carraway, 2007) and use wood utilization rates presented in Bentley and Johnson (2004).

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 4 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 as a by-product from logs used to produce 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 5.4 million tons of mill residue produced in East Texas in 2008, with 85 percent from softwood and 15 percent from hardwood (Table 2). Chips account for 52 percent of the total mill residue, followed by bark at 34 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 38 percent of the East Texas total (Table 6). Seventy-four percent of the mill residue from Northeast mills was from softwood and 26 percent was from hardwood. Rusk, Nacogdoches, Bowie, Cass, and Harrison counties represent the top five mill residue producers in Northeast Texas.

Southeast Texas mills produced 3.4 million tons of residue, which represents 62 percent of the East Texas total (Table 7). Ninety-two percent of the mill residue from Southeast Texas mills was from softwood and 8 percent was from hardwood. Polk, Sabine, Angelina, 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 potentially 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

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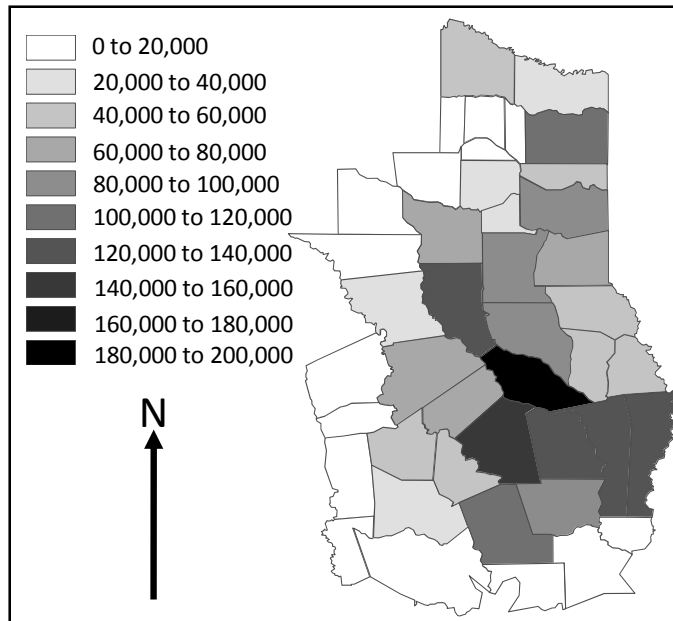


Figure 2. Available logging residue (excluding stumps) by county. Unit is green ton.

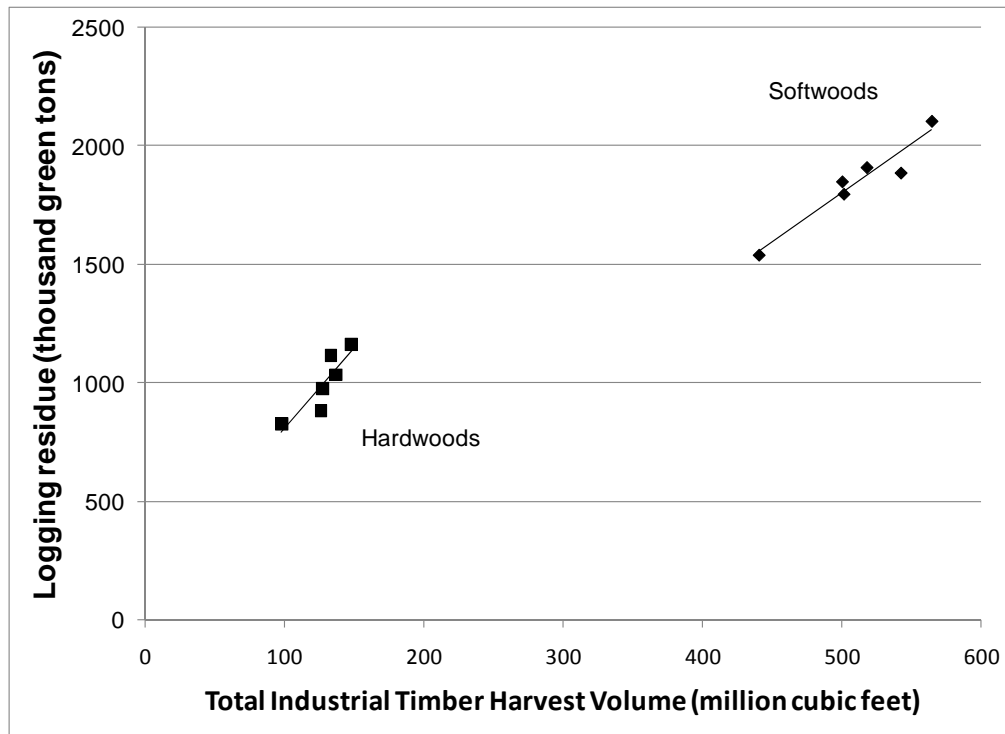


Figure 3. Relationship between available logging residue (excludes stumps) and the total industrial timber harvest volume for the years from 2003 to 2008.

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

Figure 4. Mill residue from producing primary wood products in East Texas.

Table 1. Logging Residue in East Texas, 2008. Unit is green ton.

Region	Species Group	Stump	Top/Limb	Unused Cull	Total Residue	Available Residue
Northeast	Softwood	120,496	341,462	147,248	609,207	488,711
	Hardwood	99,734	324,429	190,525	614,688	514,954
	All	220,230	665,891	337,773	1,223,894	1,003,664
Southeast	Softwood	260,508	735,424	314,892	1,310,824	1,050,317
	Hardwood	61,223	197,094	113,326	371,642	310,419
	All	321,730	932,518	428,218	1,682,467	1,360,736
East	Softwood	381,003	1,076,887	462,141	1,920,031	1,539,027
	Hardwood	160,957	521,522	303,851	986,330	825,373
	All	541,960	1,598,409	765,991	2,906,361	2,364,401

Table 2. Mill Residue in East Texas, 2008. Unit is ton.

Region	Species Group	Chips	Sawdust	Shavings	Bark	Total
Northeast	Softwood	783,565	119,351	114,162	527,477	1,544,555
	Hardwood	158,516	91,619	15,997	270,259	536,391
	All	942,081	210,970	130,159	797,735	2,080,946
Southeast	Softwood	1,785,269	204,038	195,167	891,717	3,076,190
	Hardwood	72,169	41,712	7,283	158,476	279,640
	All	1,857,438	245,750	202,450	1,050,193	3,355,831
East	Softwood	2,568,834	323,389	309,329	1,419,193	4,620,745
	Hardwood	230,685	133,332	23,280	428,735	816,031
	All	2,799,519	456,721	332,609	1,847,928	5,436,776

Table 3. Logging residue by county in Northeast Texas, 2008. Unit is green ton.

County	Softwood				Hardwood				Total			
	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total
Anderson	5,767	16,608	7,375	29,749	2,710	9,503	6,391	18,604	8,476	26,111	13,765	48,353
Bowie	2,924	8,976	4,422	16,322	4,212	12,813	6,481	23,505	7,136	21,788	10,903	39,827
Camp	984	2,897	1,336	5,216	1,214	3,621	1,740	6,575	2,198	6,517	3,076	11,791
Cass	14,269	39,306	16,046	69,621	11,094	31,795	13,626	56,515	25,363	71,101	29,672	126,136
Cherokee	14,845	43,504	19,909	78,259	11,295	40,563	28,309	80,167	26,141	84,067	48,218	158,425
Franklin	118	347	160	625	544	1,911	1,287	3,743	662	2,259	1,448	4,369
Gregg	826	2,382	1,060	4,268	4,498	17,079	12,906	34,483	5,324	19,461	13,967	38,752
Harrison	12,379	37,860	18,550	68,790	6,366	18,812	8,819	33,997	18,746	56,673	27,369	102,787
Henderson	783	2,273	1,024	4,080	1,311	4,700	3,272	9,284	2,094	6,974	4,296	13,364
Marion	5,509	15,329	6,384	27,222	5,514	16,881	8,674	31,069	11,023	32,210	15,059	58,291
Morris	1,200	3,287	1,326	5,813	1,188	3,657	1,902	6,748	2,389	6,944	3,228	12,561
Nacogdoches	16,941	52,444	26,164	95,549	3,451	12,475	8,793	24,719	20,392	64,919	34,957	120,268
Panola	15,160	40,330	15,286	70,776	5,919	16,999	7,332	30,251	21,080	57,329	22,618	101,027
Red River	1,894	4,747	1,550	8,192	10,204	31,386	16,308	57,898	12,099	36,133	17,858	66,090
Rusk	8,038	21,225	7,911	37,174	9,315	33,173	22,856	65,344	17,353	54,398	30,767	102,518
Shelby	9,757	26,316	10,282	46,355	2,336	6,855	3,153	12,344	12,093	33,172	13,434	58,699
Smith	4,099	10,708	3,892	18,699	8,651	31,362	22,204	62,216	12,750	42,070	26,095	80,915
Titus	720	1,788	570	3,078	2,361	7,709	4,560	14,630	3,081	9,497	5,129	17,707
Upshur	2,361	5,999	2,033	10,393	4,568	14,506	8,106	27,179	6,929	20,505	10,139	37,573
Van Zandt	52	142	58	252	355	1,154	676	2,185	407	1,296	734	2,438
Wood	1,869	4,993	1,911	8,773	2,627	7,474	3,130	13,231	4,496	12,467	5,041	22,004
Northeast Total	120,496	341,462	147,248	609,207	99,734	324,429	190,525	614,688	220,230	665,891	337,773	1,223,894

Table 4. Logging residue by county in Southeast Texas, 2008. Unit is green ton.

County	Softwood				Hardwood				Total			
	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total	Stump	Top/Limb	Unused Cull	Total
Angelina	32,693	99,176	47,990	179,860	9,102	29,318	16,877	55,298	41,795	128,494	64,868	235,157
Chambers	830	3,147	1,993	5,970	2,064	5,791	2,316	10,172	2,894	8,938	4,309	16,141
Grimes	1,129	4,194	2,605	7,927	8	24	12	44	1,137	4,218	2,616	7,970
Hardin	18,404	45,935	14,833	79,172	4,928	15,717	8,860	29,506	23,333	61,652	23,694	108,678
Harris	1,966	7,303	4,535	13,804	336	1,281	973	2,589	2,302	8,583	5,508	16,393
Houston	12,447	37,669	18,162	68,278	2,834	8,698	4,496	16,028	15,281	46,367	22,658	84,306
Jasper	29,832	76,441	26,486	132,759	4,559	13,970	7,193	25,723	34,391	90,411	33,679	158,481
Jefferson	251	689	280	1,219	200	767	588	1,555	450	1,455	868	2,774
Leon	1,084	4,059	2,541	7,684	654	2,395	1,720	4,769	1,738	6,454	4,261	12,452
Liberty	12,472	37,912	18,405	68,789	7,498	26,257	17,614	51,369	19,970	64,170	36,019	120,159
Madison	670	1,834	739	3,243	30	84	32	146	700	1,918	771	3,389
Montgomery	4,535	16,062	9,493	30,091	1,969	7,131	5,039	14,139	6,505	23,192	14,532	44,230
Newton	32,977	85,706	30,763	149,446	3,361	10,601	5,837	19,798	36,338	96,307	36,600	169,244
Orange	1,186	3,042	1,057	5,284	120	462	355	937	1,306	3,504	1,412	6,222
Polk	28,848	80,002	33,101	141,951	8,352	25,830	13,596	47,777	37,200	105,831	46,697	189,728
Sabine	10,874	32,204	14,999	58,077	369	1,373	1,009	2,751	11,243	33,577	16,008	60,828
San Augustine	9,672	28,756	13,479	51,908	1,854	6,766	4,837	13,456	11,526	35,522	18,316	65,364
San Jacinto	9,791	29,507	14,133	53,431	2,165	6,543	3,256	11,964	11,956	36,050	17,389	65,395
Trinity	12,343	33,164	12,850	58,357	2,607	8,902	5,722	17,231	14,950	42,066	18,572	75,588
Tyler	28,188	72,707	25,616	126,511	7,503	22,879	11,640	42,022	35,691	95,586	37,256	168,533
Walker	10,115	35,170	20,371	65,657	706	2,295	1,346	4,348	10,821	37,466	21,718	70,005
Waller	202	747	461	1,410	3	10	8	20	205	756	468	1,429
Southeast Total	260,508	735,424	314,892	1,310,824	61,223	197,094	113,326	371,642	321,730	932,518	428,218	1,682,467

Table 5. Available logging residue (excludes stumps) and the total industrial timber harvest volume by year in East Texas.

Year	Available Logging Residue (green tons)		Industrial Timber Harvest Volume (cubic feet)	
	Softwood	Hardwood	Softwood	Hardwood
2003	2,344,926	1,065,998	542,146,038	126,118,752
2004	2,354,598	1,339,540	517,672,166	133,471,961
2005	2,589,039	1,255,085	564,267,659	137,175,033
2006	2,279,272	1,407,983	500,049,404	148,305,752
2007	2,229,842	1,184,401	501,201,447	127,619,841
2008	1,920,031	986,330	440,281,125	97,684,239

Table 6. Mill residue by county in Northeast Texas, 2008. Unit is ton.

County	Softwood					Hardwood					Total				
	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total
Anderson	.	.	.	1,952	1,952	8,175	4,725	825	7,327	21,052	8,175	4,725	825	9,279	23,004
Bowie	227,950	34,721	33,211	67,378	363,260	2,093	1,210	211	11,644	15,158	230,043	35,931	33,422	79,022	378,418
Camp	.	.	.	963	963	.	.	.	3,251	3,251	0	0	0	4,214	4,214
Cass	90,600	13,800	13,200	46,775	164,375	18,537	10,714	1,871	43,926	75,048	109,137	24,514	15,071	90,702	239,423
Cherokee	11,165	1,701	1,627	15,557	30,050	34,816	20,123	3,514	28,001	86,453	45,981	21,823	5,140	43,559	116,503
Franklin	.	.	.	212	212	.	.	.	562	562	0	0	0	774	774
Gregg	.	.	.	110	110	.	.	.	634	634	0	0	0	744	744
Harrison	73,962	11,266	10,776	23,555	119,558	.	.	.	17,587	17,587	73,962	11,266	10,776	41,142	137,145
Henderson	.	.	.	1,175	1,175	.	.	.	1,049	1,049	0	0	0	2,224	2,224
Marion	.	.	.	58,208	58,208	12,010	6,941	1,212	20,010	40,173	12,010	6,941	1,212	78,218	98,381
Morris	.	.	.	1,717	1,717	.	.	.	2,830	2,830	0	0	0	4,547	4,547
Nacogdoches	154,807	23,580	22,555	128,958	329,899	21,415	12,378	2,161	14,236	50,190	176,222	35,957	24,716	143,193	380,088
Panola	.	.	.	72,060	72,060	4,534	2,621	458	20,380	27,993	4,534	2,621	458	92,440	100,053
Red River	.	.	.	3,712	3,712	6,807	3,934	687	28,099	39,527	6,807	3,934	687	31,811	43,240
Rusk	182,252	27,760	26,553	60,169	296,734	40,036	23,140	4,040	30,188	97,404	222,287	50,900	30,594	90,356	394,137
Shelby	40,565	6,179	5,910	28,300	80,953	65	38	7	6,636	6,746	40,630	6,217	5,917	34,935	87,699
Smith	.	.	.	8,263	8,263	.	.	.	5,844	5,844	0	0	0	14,106	14,106
Titus	2,265	345	330	2,045	4,985	10,028	5,796	1,012	9,766	26,602	12,293	6,141	1,342	11,812	31,588
Upshur	.	.	.	2,216	2,216	.	.	.	9,476	9,476	0	0	0	11,693	11,693
Van Zandt	.	.	.	109	109	.	.	.	655	655	0	0	0	764	764
Wood	.	.	.	4,043	4,043	.	.	.	8,157	8,157	0	0	0	12,200	12,200
Northeast Total	783,565	119,351	114,162	527,477	1,544,555	158,516	91,619	15,997	270,259	536,391	942,081	210,970	130,159	797,735	2,080,946

Table 7. Mill residue by county in Southeast Texas, 2008. Unit is ton.

County	Softwood					Hardwood					Total				
	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total	Chips	Sawdust	Shavings	Bark	Total
Angelina	365,136	55,617	53,199	131,204	605,155	5,109	2,953	516	20,416	28,994	370,245	58,570	53,714	151,620	634,150
Chambers	.	.	.	41	41	.	.	.	6,662	6,662	0	0	0	6,703	6,703
Grimes	.	.	.	194	194	.	.	.	21	21	0	0	0	215	215
Hardin	30	5	4	43,907	43,946	21,892	12,653	2,209	22,073	58,828	21,923	12,658	2,214	65,980	102,774
Harris	.	.	.	339	339	153	88	15	116	373	153	88	15	455	711
Houston	.	.	.	3,528	3,528	.	.	.	6,821	6,821	0	0	0	10,349	10,349
Jasper	151,177	23,027	22,026	187,904	384,134	4,491	2,596	453	13,515	21,055	155,667	25,623	22,479	201,419	405,188
Jefferson	.	.	.	192	192	.	.	.	.	0	0	0	0	192	192
Leon	.	.	.	61	61	.	.	.	368	368	0	0	0	429	429
Liberty	132,496	2,712	2,594	33,179	170,982	6,813	3,938	688	11,696	23,134	139,308	6,650	3,282	44,875	194,116
Madison	.	.	.	1,130	1,130	.	.	.	100	100	0	0	0	1,230	1,230
Montgomery	42,938	6,540	6,256	14,497	70,231	.	.	.	1,358	1,358	42,938	6,540	6,256	15,855	71,589
Newton	19,957	3,040	2,908	78,586	104,491	5,995	3,465	605	10,496	20,561	25,952	6,505	3,513	89,082	125,052
Orange	7,452	1,135	1,086	5,125	14,797	.	.	.	.	0	7,452	1,135	1,086	5,125	14,797
Polk	527,044	29,857	28,559	131,143	716,602	1,405	812	142	20,266	22,626	528,449	30,669	28,701	151,409	739,228
Sabine	411,871	62,735	60,008	126,140	660,754	2,180	1,260	220	1,341	5,001	414,051	63,995	60,228	127,481	665,755
San Augustine	3,176	484	463	9,278	13,400	5,668	3,276	572	4,234	13,750	8,844	3,760	1,035	13,512	27,150
San Jacinto	44,059	6,711	6,419	26,937	84,127	.	.	.	5,525	5,525	44,059	6,711	6,419	32,462	89,652
Trinity	30,200	4,600	4,400	23,323	62,523	.	.	.	3,476	3,476	30,200	4,600	4,400	26,800	66,000
Tyler	.	.	.	56,597	56,597	15,792	9,128	1,594	27,220	53,734	15,792	9,128	1,594	83,817	110,331
Walker	49,733	7,575	7,246	18,359	82,914	2,671	1,544	270	2,770	7,253	52,404	9,119	7,515	21,129	90,167
Waller	.	.	.	52	52	.	.	.	.	0	0	0	0	52	52
Southeast Total	1,785,269	204,038	195,167	891,717	3,076,190	72,169	41,712	7,283	158,476	279,640	1,857,438	245,750	202,450	1,050,193	3,355,831