



Central & West Texas Forestlands

2007 Report

T E X A S
FOREST SERVICE
The Texas A&M University System

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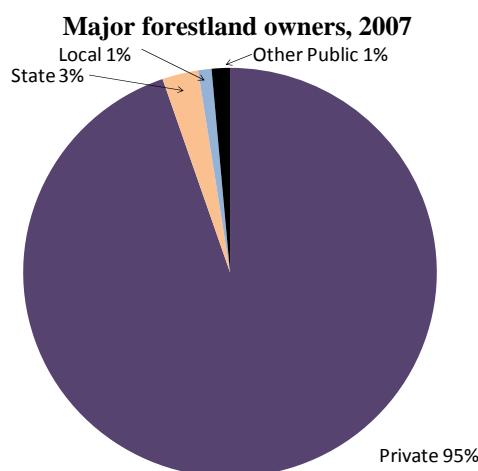
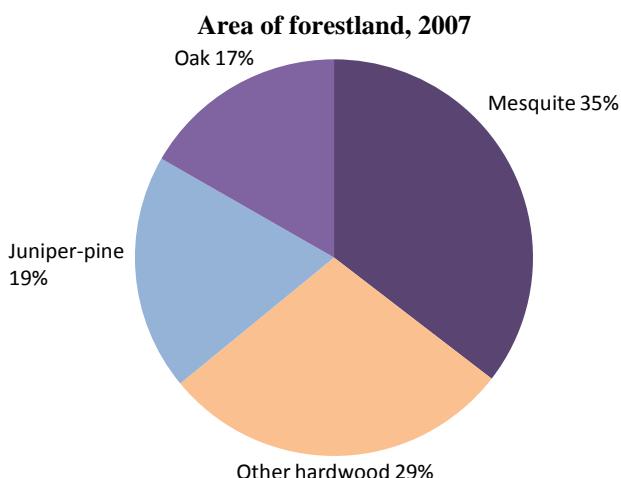
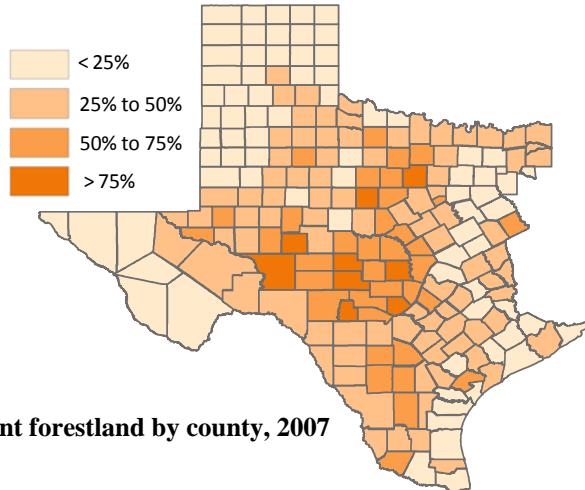
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Texas Forest Service Forest Inventory and Analysis Program

In 2004, Texas Forest Service, in cooperation with the Southern Research Station's Forest Inventory and Analysis (FIA) Program, initiated an inventory of 211 counties in Central and West Texas.

The information contained in the FIA database is based on the first cycle of inventory data collected in Central and West Texas and represents just four of the 10 panels. The data was based on the measurement of 10,062 plots. For the sake of brevity, the term Central and West Texas generalizes all regions of the state outside East Texas.



Area

Forest type

Mesquite woodland is the dominant forest type and comprises nearly 35 percent of the forestland area. It is located throughout Central and West Texas, but heavily concentrated in more southwesterly counties

(Appendix I – Figure 1). The majority of acres of juniper-pine can be found in southwestern counties while oaks are more predominant in more easterly counties.

Forestland

Estimates show forestland makes up about 35 percent of the Central and West Texas region. There are an estimated 48,074,726 acres of forestland in the region (Appendix I – Figure 2).

Ownership

Ninety-five percent of the forestland is controlled by private owners while 5 percent is operated by a public agency. Private owners include family forest owners as well as private companies such as limited liability companies (LLC) and land conservation groups.

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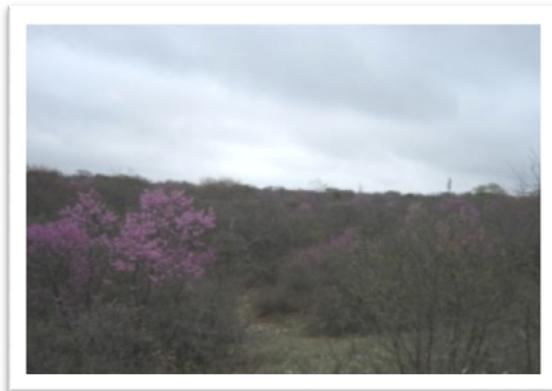


Questionnaires focusing on tree removal operations and property size were delivered during 2007 to an area-weighted sample of 1,255 land owners. There was a 37 percent return rate.

According to results from the survey, Central and West Texas boasts 37.4 million acres of family forest land. Forty-seven percent of family forests were associated with some sort of tree removal, according to the survey. The questionnaire also found that most people own small tracts of land, with large acreage being owned by just a few people.

Response by family forest owner (formerly NIPF), 2006

Tree removal activity	Area		Size of forest		Area		Owners	
	million acres	percent	Acres	Acres	thousand	percent	thousand	percent
Tree removal			1-9	305	1	115	48	
Yes	17.4	47	10-19	170	<1	15	6	
No	19.1	51	20-49	1240	3	46	19	
No answer	0.8	2	50-99	885	2	12	5	
Harvested past 5 years	12.6	34	100-1000	11689	31	43	18	
			>1000	23106	62	8	3	



Stand structure by forest type

Estimates show the majority of mesquite forests are comprised of small- and medium-diameter trees while the majority of juniper-pine, oak and other hardwood forests contain medium sized trees.

Stand-diameter class by forest type, forestland, 2007

Forest type	Area	Determined	Stand-diameter class (inches)			
			Not	0 to	5 to	9 to
			< 5	< 9	< 20	< 40
thousand acres						
Mesquite	17039.3	16.7	6796.2	9043.9	1157.5	24.9
Juniper-pine	9256.1	-	792.7	6392.6	2066.7	4.2
Oak	8025.1	10.4	710.5	5431.1	1800.9	72.1
Other hardwood	13754.3	109.8	3481.3	8580.0	1569.8	13.4
Total	48074.7	136.9	11780.6	29447.7	6594.9	114.5

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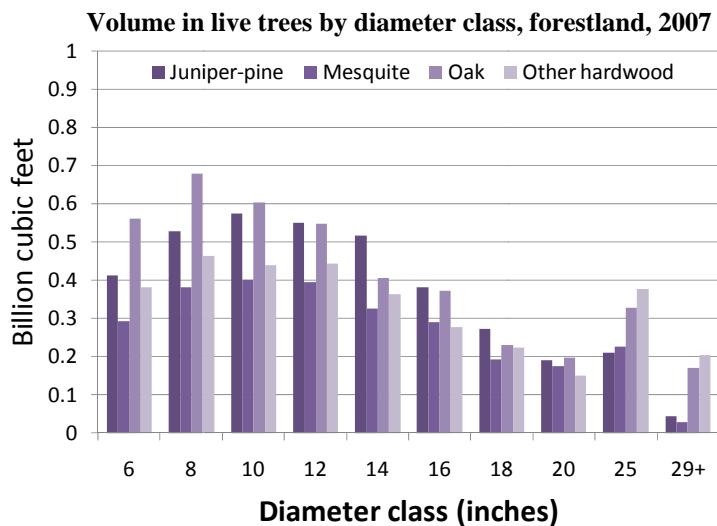
Trees per acre

When examining tree density, mesquite is distributed throughout the region while juniper, oak and other hardwood densities are generally greatest in the eastern region of Central and West Texas (**Appendix I – Figure 3**). Across all forest types, the Northcentral region has the greatest density per acre while the West region has the lowest density per acre (**Appendix I – Figure 4**).

Volume

Stand structure by forest type

Oak forests have the greatest live tree volume with 4.1 billion cubic feet. There are 3.7 billion cubic feet of juniper-pine forests and 2.7 billion cubic feet of mesquite forests. Other hardwoods have a volume of 3.3 billion cubic feet. The total amount of volume across all species is 13.8 billion cubic feet.



Forest type

The majority of mesquite and juniper volume is concentrated in the central part of Central and West Texas while most of the oak volume is in more easterly counties (**Appendix I – Figure 5**). Other hardwood volume is scattered throughout the state.

When combining all forest types, the largest volume of trees are in the Westcentral region while only a relatively small volume exists in far westerly counties (**Appendix I – Figure 6**). The Northcentral region also contains a relatively large amount of volume.

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Standing Biomass Supply

For the purposes of this report, standing biomass is defined as the oven-dry weight (tons) of all aboveground wood and bark in all live trees that are one-inch or greater in diameter on forestland. Thus, foliage and roots are excluded.

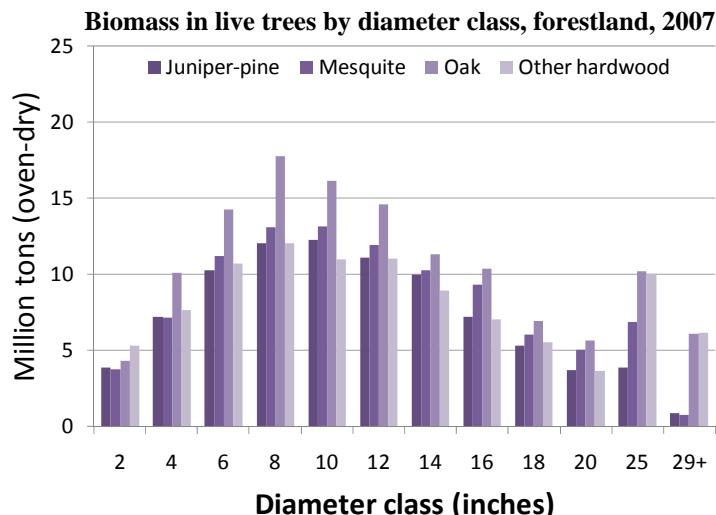
Stand structure by forest type

Biomass in juniper-pine trees is 87.9 million tons (oven-dry), mesquite biomass is 98.8 million tons and the other hardwoods biomass is 99.3 million tons. The greatest biomass (128.0 million tons) can be found in oaks.

Forest type

The majority of mesquite and juniper biomass is concentrated in the central part of Central and West Texas while most of the oak biomass is in more easterly counties ([Appendix I – Figure 7](#)). Other hardwood biomass is scattered throughout the region.

When combining all forest types, the majority of biomass is in the Westcentral region ([Appendix I – Figure 8](#)). In fact, the biomass in this region is greater than the summation of the Northwest, South and West regions. Total biomass (oven-dry) across all species is 414 million tons. This amount is comparable to the total amount of biomass in East Texas (476.3 million tons) and demonstrates the potential use of Central and West Texas trees for biomass/bioenergy.



Precautions

Estimates presented in this publication are calculated using a sample obtained from forestlands in the Central and West Texas regions. Although this publication presents useful information, all estimates have error associated with them.

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Definition of Terms

Diameter (non-woodland species): Tree stem diameter in inches measured outside the bark and 4.5 feet above the ground (breast height), commonly referred to as DBH.

Diameter (woodland species): For those woody species that have clumps of stems rather than a single stem, the definition of diameter differs from the traditional DBH measure. Diameter is calculated as the square root of the sum of the squared stem diameters that are at least one foot in length, and one inch in diameter one foot up from the stem diameter measurement point. FIA refers to this diameter as the Diameter at Root Collar (DRC). Notable species include juniper, pinyon pine and mesquite.

Forestland: Land that is at least 10 percent stocked by trees of any size, or land that has been at least 10 percent stocked in the past, and is not currently developed for nonforest use. Minimum dimensions require the land to be at least one acre in size and 120 feet in width.

Forest type: Forestland classification of the species forming a plurality of live tree stocking, and largely based on an algorithm of tallied trees.

Hardwoods: Dicotyledonous trees, usually broadleaf and deciduous.

Softwoods: Coniferous trees, usually evergreen, having needles or scale-like leaves.

Volume: The amount of sound wood in live trees at least five inches in diameter from a one-foot stump to a minimum four-inch top diameter outside bark of the central stem.

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Users can conduct their own analysis by going to the FIA web site:
<http://www.fia.fs.fed.us/tools-data/default.asp>

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Appendix I

Figure 1: Acres of forestland by forest type and county, 2007

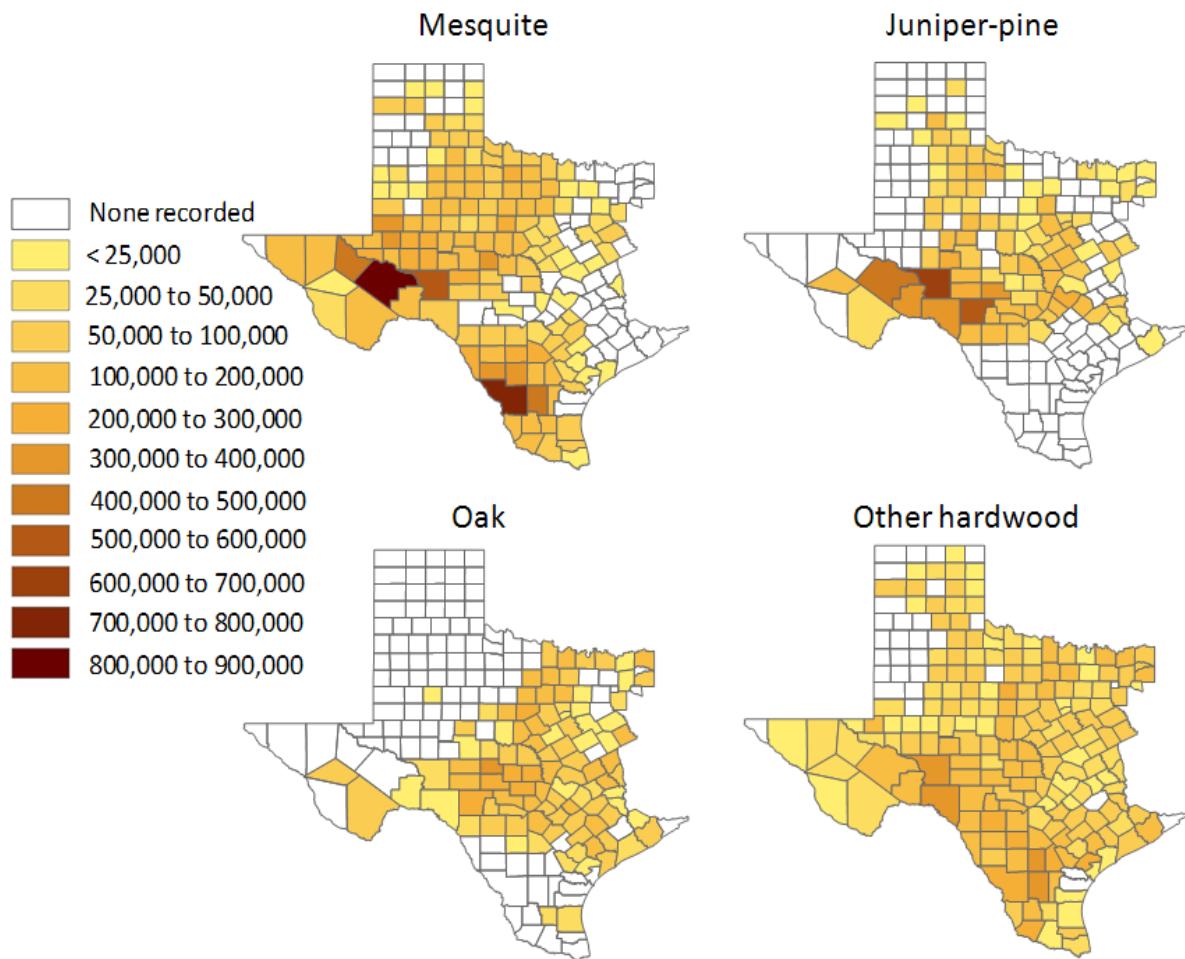
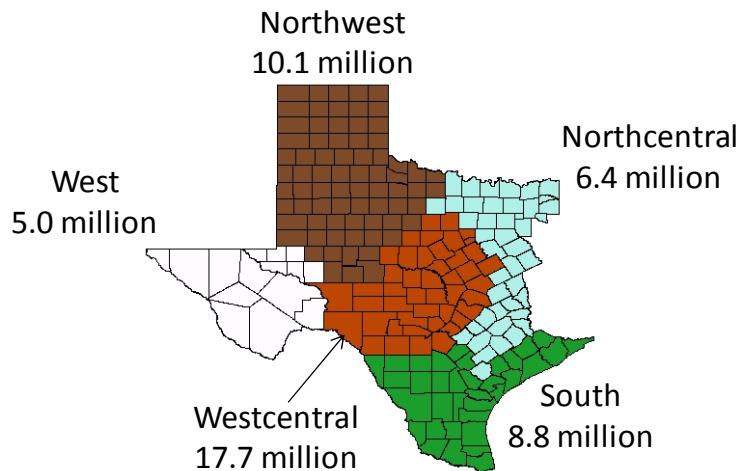


Figure 2: Acres of forestland by region, 2007



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Figure 3: Average trees per acre on forestland by forest type and county, 2007

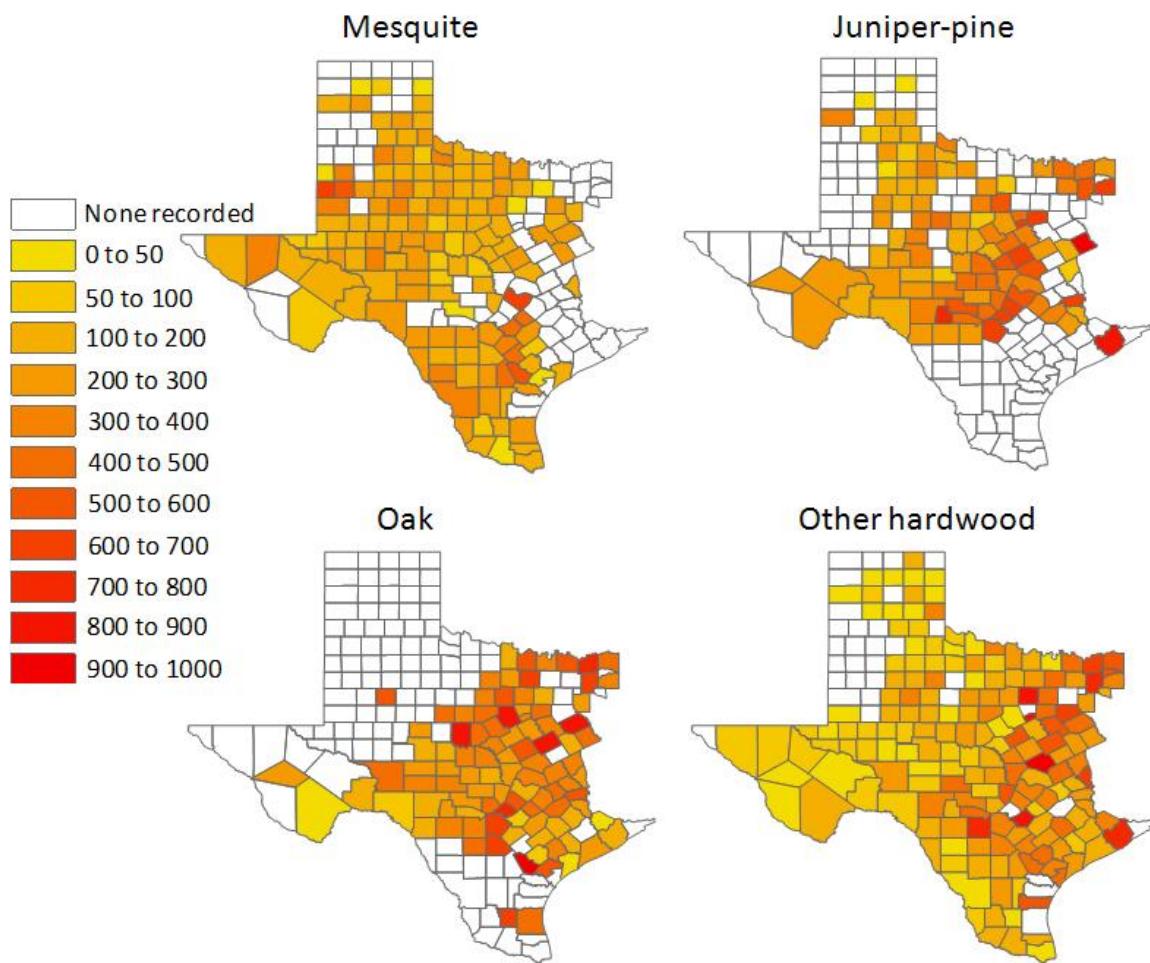
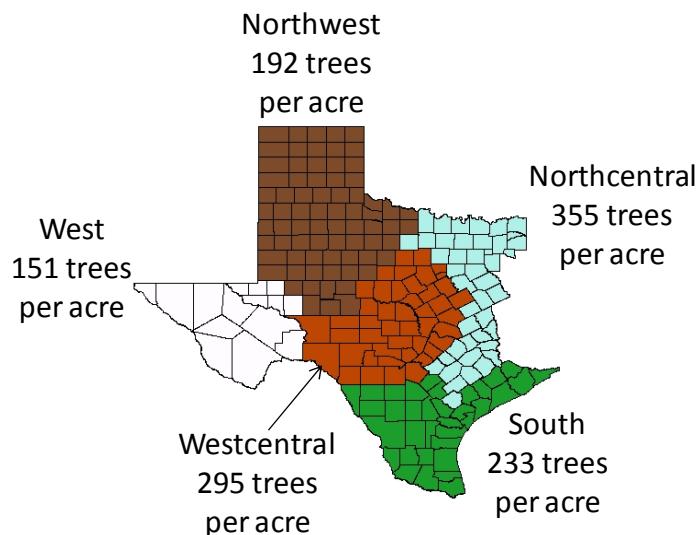


Figure 4: Average trees per acre on forestland by region, 2007



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Figure 5: Growing stock volume (ft^3) on forestland by forest type and county, 2007

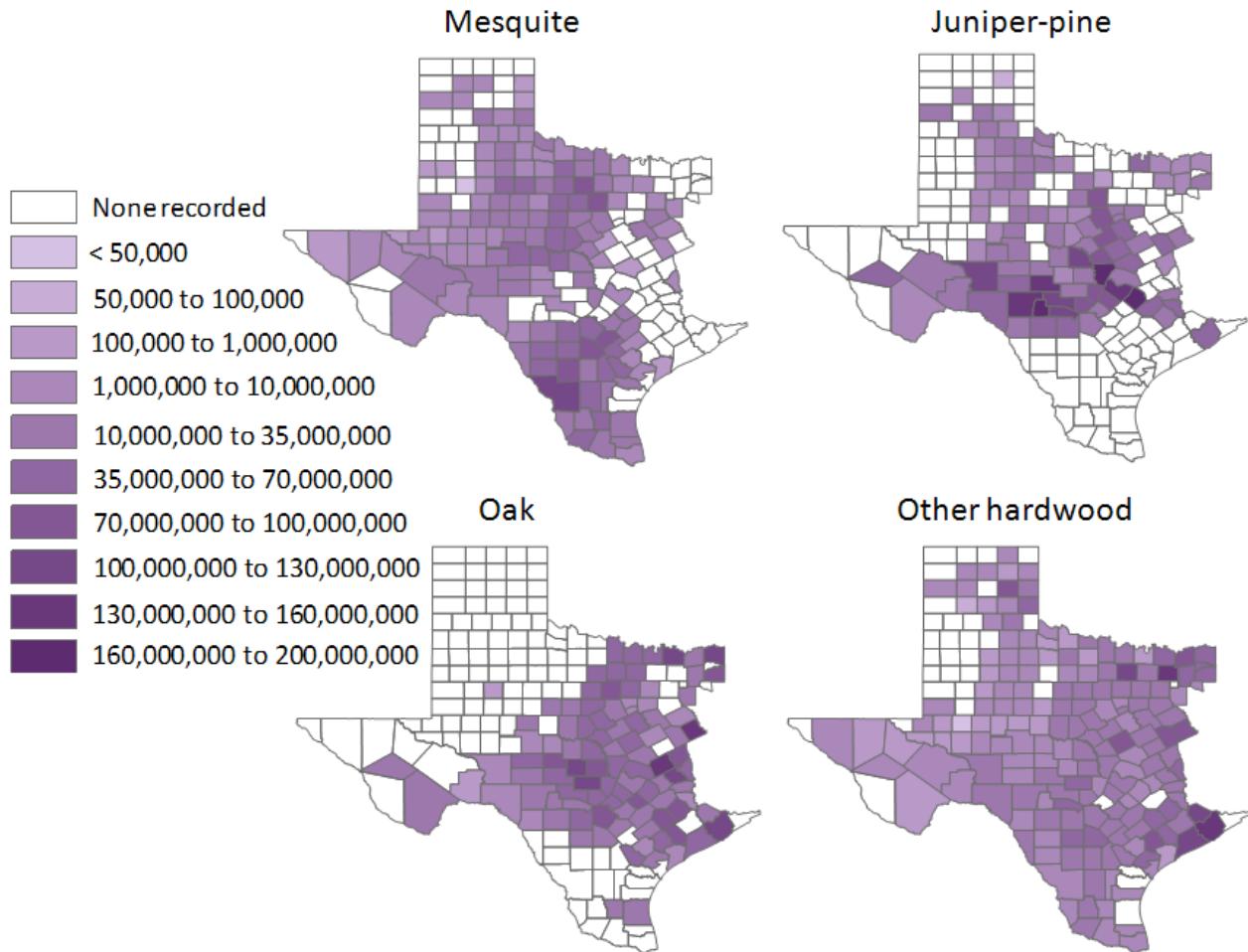
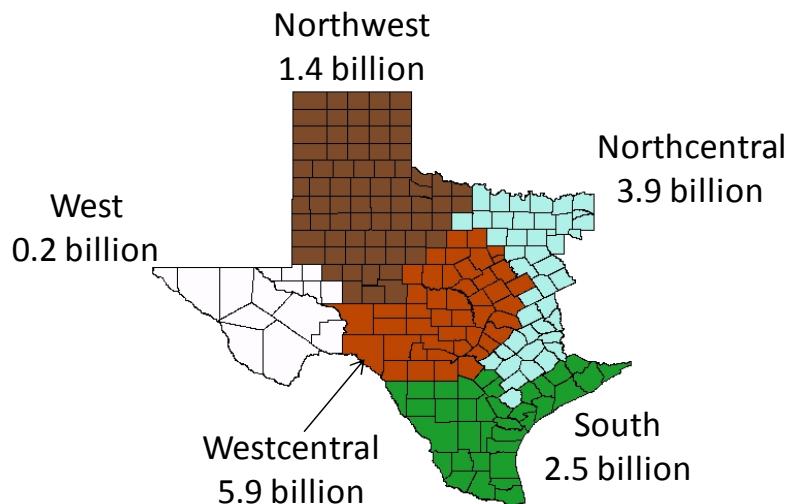


Figure 6: Growing stock volume (ft^3) on forestland by region, 2007



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Figure 7: Biomass (oven-dry tons) on forestland by forest type and county, 2007

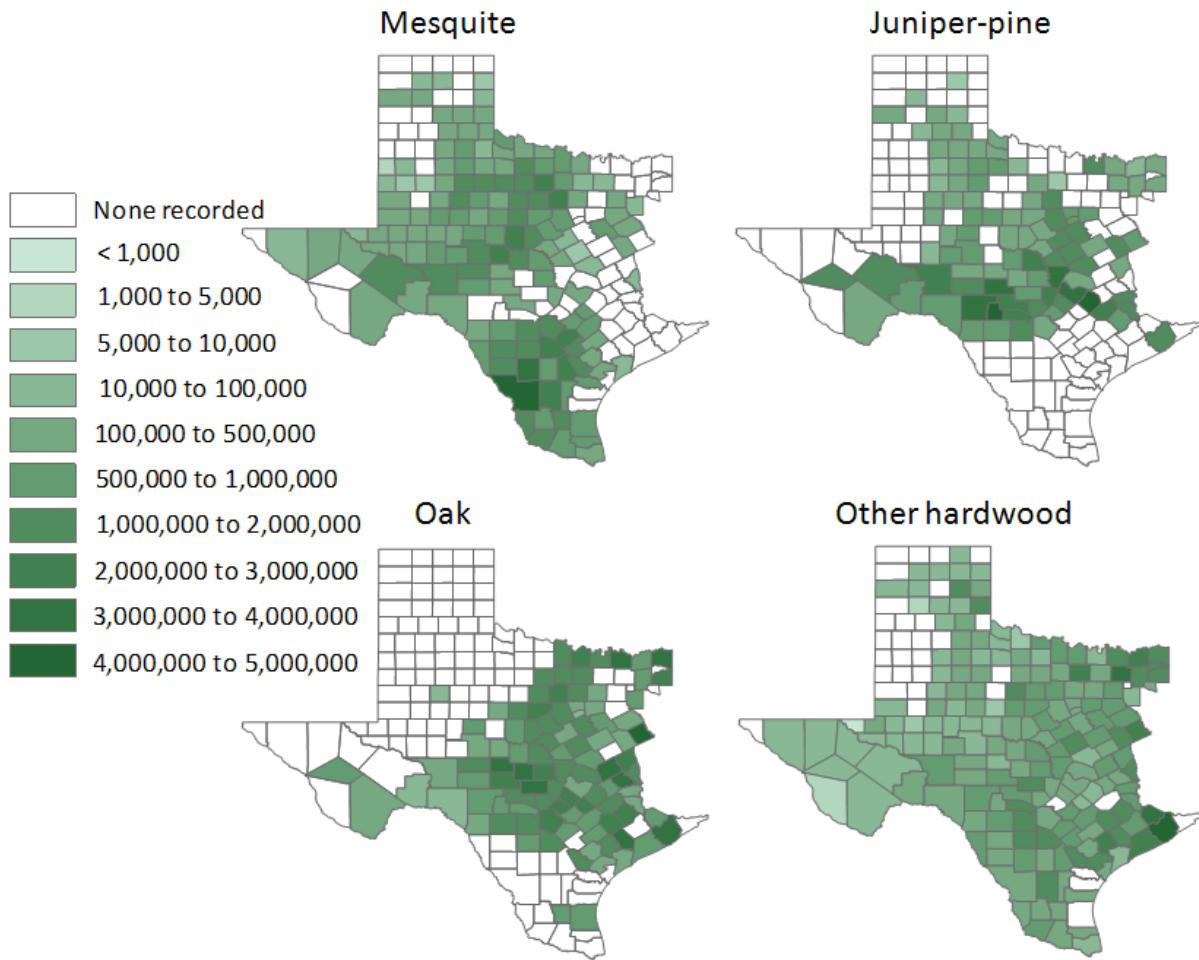
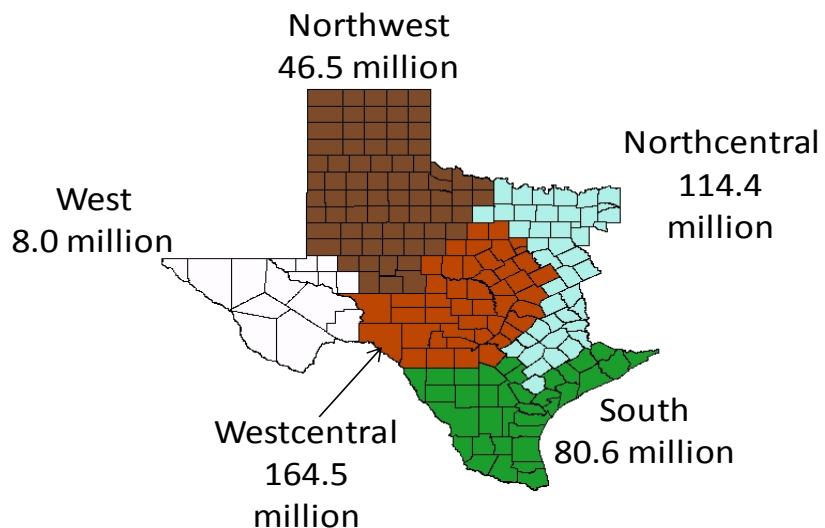


Figure 8: Biomass (oven-dry tons) on forestland by region, 2007



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Figure 9: Average biomass (oven-dry tons) per acre on forestland by forest type and county, 2007

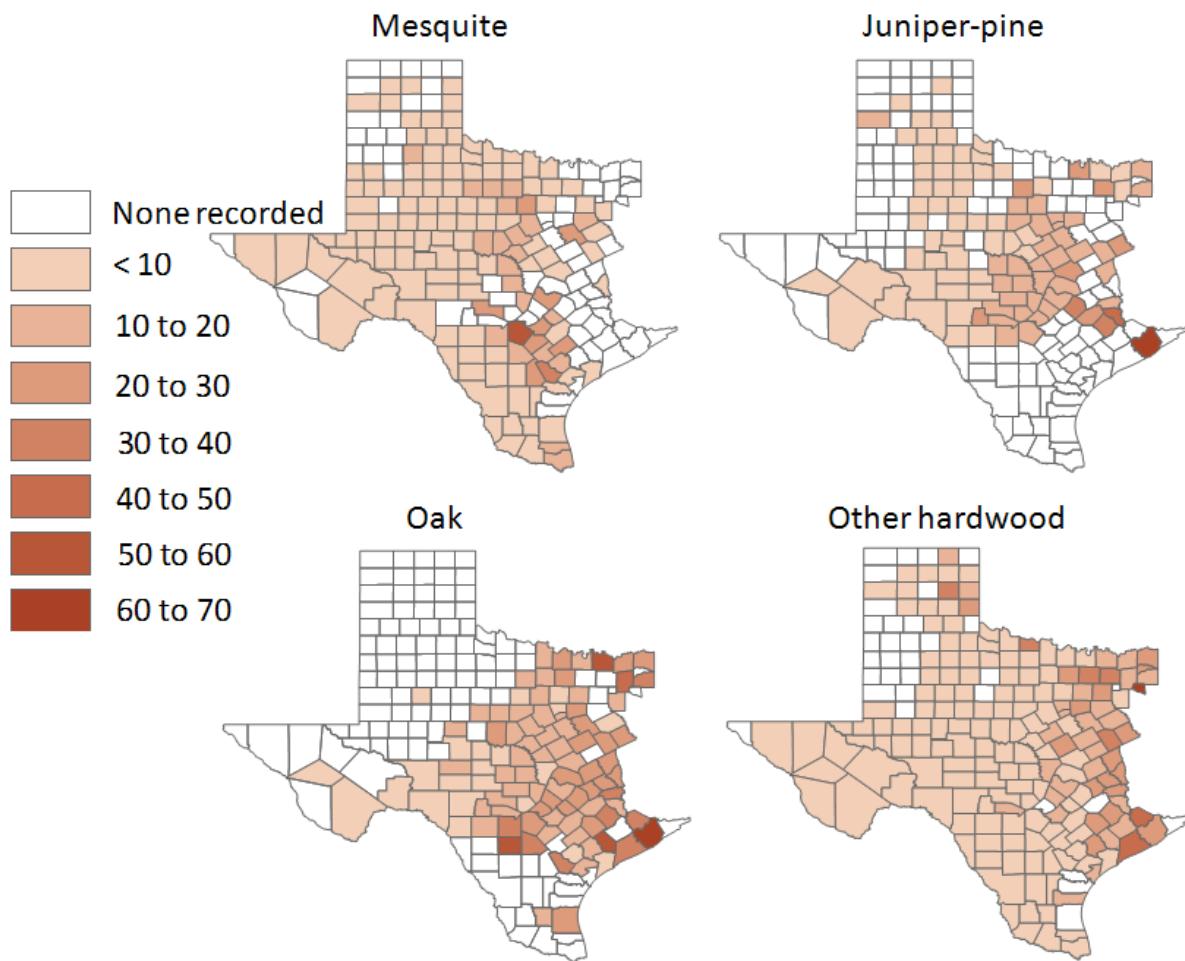
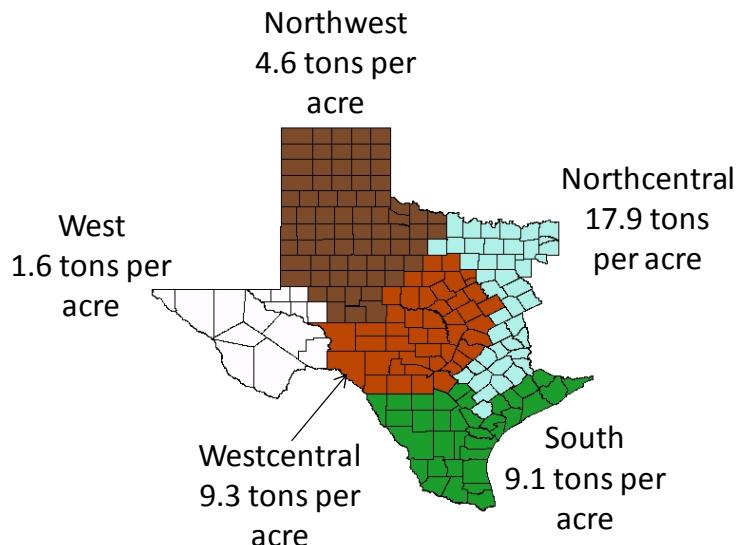


Figure 10: Average biomass (oven-dry tons) per acre on forestland by region, 2007



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Appendix II (cont.)

Acre, tree, volume and biomass estimates for the Juniper-pine forest type by county.

County	Acres	Trees	Trees Per Acre	Volume	Volume Per Acre	Biomass	Biomass Per Acre
Robertson	9,462	490,238	52	4,471,503	473	123,774	13.1
Rockwall	.	.	.	.	.	.	.
Runnels	.	.	.	.	.	.	.
San Patricio	.	.	.	.	.	.	.
San Saba	152,253	67,646,614	444	125,887,871	827	2,677,088	17.6
Schleicher	136,286	17,075,554	125	15,252,778	112	372,868	2.7
Scurry	37,164	4,821,815	130	4,388,880	118	113,529	3.1
Shackelford	.	.	.	.	.	.	.
Sherman	.	.	.	.	.	.	.
Somervell	57,254	39,438,174	689	33,744,361	589	959,152	16.8
Starr	.	.	.	.	.	.	.
Stephens	20,820	6,755,045	324	15,937,889	766	324,082	15.6
Sterling	145,206	26,867,616	185	7,729,564	53	218,025	1.5
Stonewall	71,049	12,761,561	180	26,298,689	370	616,913	8.7
Sutton	268,060	68,162,639	254	61,786,756	230	1,436,869	5.4
Swisher	13,625	755,096	55	1,893,626	139	65,863	4.8
Tarrant	.	.	.	.	.	.	.
Taylor	82,616	39,046,783	473	28,075,730	340	805,291	9.7
Terrell	390,331	70,674,895	181	23,729,499	61	727,855	1.9
Terry	.	.	.	.	.	.	.
Throckmorton	.	.	.	.	.	.	.
Tom Green	96,756	29,120,455	301	17,402,432	180	532,050	5.5
Travis	236,855	129,395,744	546	156,721,716	662	3,642,431	15.4
Upton	.	.	.	.	.	.	.
Uvalde	140,919	39,499,903	280	40,453,212	287	930,214	6.6
Val Verde	305,750	42,946,410	140	40,609,137	133	945,361	3.1
Victoria	.	.	.	.	.	.	.
Ward	.	.	.	.	.	.	.
Washington	61,096	39,470,068	646	28,472,029	466	1,003,146	16.4
Webb	.	.	.	.	.	.	.
Wharton	.	.	.	.	.	.	.
Wheeler	.	.	.	.	.	.	.
Wichita	.	.	.	.	.	.	.
Wilbarger	.	.	.	.	.	.	.
Willacy	.	.	.	.	.	.	.
Williamson	14,805	4,546,506	307	11,575,017	782	258,662	17.5
Wilson	.	.	.	.	.	.	.
Winkler	.	.	.	.	.	.	.
Wise
Yoakum
Young	16,595	3,867,675	233	10,639,004	641	345,484	20.8
Zapata
Zavala

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Appendix III (cont.)

Acre, tree, volume, and biomass estimates for the Mesquite woodland forest type by county.

County	Acres	Trees	Trees Per Acre	Volume	Volume Per Acre	Biomass	Biomass Per Acre
Robertson	.	.	.	.	.	.	.
Rockwall	.	.	.	.	.	.	.
Runnels	129,211	27,840,015	215	16,505,958	128	760,300	5.9
San Patricio	75,844	21,286,427	281	18,062,869	238	646,952	8.5
San Saba	69,282	5,143,116	74	16,996,133	245	740,143	10.7
Schleicher	209,565	51,673,646	247	23,669,764	113	1,116,714	5.3
Scurry	160,162	48,438,310	302	24,168,395	151	1,016,599	6.3
Shackelford	163,557	22,928,571	140	45,005,115	275	1,391,103	8.5
Sherman	.	.	.	.	.	.	.
Somervell	.	.	.	.	.	.	.
Starr	192,846	23,898,744	124	37,150,880	193	1,319,218	6.8
Stephens	128,278	21,906,636	171	37,004,133	288	1,683,961	13.1
Sterling	142,669	32,636,979	229	8,732,305	61	388,163	2.7
Stonewall	129,953	20,256,491	156	37,537,424	289	1,240,556	9.5
Sutton	83,279	17,121,943	206	13,698,862	164	550,243	6.6
Swisher	.	.	.	.	.	.	.
Tarrant	.	.	.	.	.	.	.
Taylor	83,203	7,883,733	95	22,843,118	275	678,398	8.2
Terrell	104,235	16,521,200	158	2,178,871	21	110,013	1.1
Terry	16,717	10,029,782	600	.	.	8,290	0.5
Throckmorton	153,380	26,031,255	170	43,665,707	285	1,587,628	10.4
Tom Green	199,259	53,388,221	268	36,780,400	185	1,366,278	6.9
Travis	5,267	3,499,910	665	4,472,538	849	119,896	22.8
Upton	281,439	34,716,600	123	6,990,572	25	312,541	1.1
Uvalde	59,901	17,180,232	287	13,256,409	221	502,809	8.4
Val Verde	62,459	14,365,472	230	3,229,287	52	150,030	2.4
Victoria	.	.	.	.	.	.	.
Ward	236,569	34,226,638	145	3,319,330	14	258,870	1.1
Washington	.	.	.	.	.	.	.
Webb	743,638	234,123,920	315	122,023,870	164	4,689,790	6.3
Wharton	.	.	.	.	.	.	.
Wheeler	14,668	1,540,955	105	335,105	23	27,342	1.9
Wichita	65,331	11,963,464	183	12,854,778	197	477,032	7.3
Wilbarger	99,746	10,744,225	108	3,781,109	38	160,712	1.6
Willacy	72,157	13,544,068	188	27,801,356	385	899,412	12.5
Williamson	.	.	.	.	.	.	.
Wilson	75,892	26,673,132	351	70,630,837	931	2,004,061	26.4
Winkler	118,913	8,716,014	73	3,421,201	29	131,859	1.1
Wise	11,691	1,543,799	132	1,922,232	164	58,461	5.0
Yoakum	16,717	11,283,505	675	.	.	35,794	2.1
Young	157,427	29,616,160	188	72,440,491	460	2,540,321	16.1
Zapata	159,155	34,913,411	219	28,770,693	181	1,179,331	7.4
Zavala	177,075	35,226,296	199	56,414,513	319	1,704,170	9.6

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Appendix IV: Acre, tree, volume and biomass estimates for the Other hardwood forest type by county.

County	Acres	Trees	Trees Per Acre	Volume	Volume Per Acre	Biomass	Biomass Per Acre
Andrews	49,119	2,234,907	46	1,230,760	25	40,652	0.8
Aransas	24,891	11,064,117	445	9,137,483	367	431,738	17.3
Archer	45,020	2,253,253	50	894,701	20	46,394	1.0
Armstrong	54,729	1,205,262	22	373,749	7	20,368	0.4
Atascosa	148,703	50,696,173	341	45,540,329	306	1,477,281	9.9
Austin	52,956	14,359,105	271	25,561,813	483	697,368	13.2
Bailey	.	.	.	.	.	.	.
Bandera	133,009	65,578,181	493	69,846,053	525	1,973,894	14.8
Bastrop	45,822	16,002,273	349	1,673,346	37	99,862	2.2
Baylor	87,706	19,940,537	227	12,795,913	146	466,427	5.3
Bee	157,453	68,517,393	435	29,449,089	187	1,300,122	8.3
Bell	3,816	3,459,781	907	1,502,058	394	37,319	9.8
Bexar	35,340	12,886,637	365	10,267,113	291	240,997	6.8
Blanco	57,266	29,331,353	512	6,424,252	112	439,570	7.7
Borden	26,431	2,999,753	113	930,377	35	30,412	1.2
Bosque	55,417	5,722,527	103	8,454,921	153	219,464	4.0
Brazoria	149,877	107,292,902	716	147,283,292	983	4,078,571	27.2
Brazos	42,593	26,639,103	625	39,211,898	921	1,043,833	24.5
Brewster	47,353	6,195,510	131	750,375	16	44,483	0.9
Briscoe	65,519	3,724,430	57	3,506,735	54	89,189	1.4
Brooks	39,785	284,448	7	4,393,940	110	110,756	2.8
Brown	70,273	11,594,153	165	12,216,633	174	423,615	6.0
Burleson	18,341	2,892,375	158	17,960,149	979	457,663	25.0
Burnet	59,561	25,069,856	421	34,642,330	582	875,006	14.7
Caldwell	9,319	610,686	66	3,225,261	346	72,189	7.7
Calhoun	24,891	6,350,747	255	507,508	20	45,210	1.8
Callahan	132,591	17,630,570	133	13,672,404	103	516,876	3.9
Cameron	34,820	1,183,221	34	2,867,334	82	85,387	2.5
Carson	.	.	.	.	.	.	.
Castro	.	.	.	.	.	.	.
Childress	.	.	.	.	.	.	.
Clay	111,912	30,293,972	271	25,906,504	231	840,547	7.5
Cochran	.	.	.	.	.	.	.
Coke	16,717	1,857,359	111	766,897	46	27,755	1.7
Coleman	121,653	27,293,714	224	12,583,932	103	422,502	3.5
Collin	94,438	27,417,202	290	155,264,571	1,644	3,624,246	38.4
Collingsworth	46,352	15,756,623	340	57,049,446	1,231	1,382,167	29.8
Colorado	78,009	10,759,531	138	60,283,557	773	1,791,738	23.0
Comal	5,205	.	.	.	.	.	.
Comanche	89,746	4,423,825	49	17,805,633	198	563,274	6.3
Concho	73,679	6,646,851	90	6,194,530	84	195,351	2.7
Cooke	21,027	195,590	9	420,760	20	12,725	0.6
Coryell	73,498	20,604,200	280	77,644,363	1,056	1,949,923	26.5
Cottle	58,511	5,471,472	94	2,962,844	51	119,463	2.0
Crane	42,200	2,160,242	51	785,269	19	49,005	1.2
Crockett	323,262	69,155,360	214	21,724,734	67	872,790	2.7
Crosby	39,508	2,055,356	52	638,293	16	19,279	0.5
Culbersonn	30,402	1,720,529	57	550,796	18	19,374	0.6
Dallam	.	.	.	.	.	.	.
Dallas	26,275	44,939,471	1,710	17,657,150	672	712,939	27.1
Dawson	.	.	.	.	.	.	.
DeWitt	82,901	19,946,192	241	12,488,456	151	476,216	5.7
Deaf Smith	.	.	.	.	.	.	.
Delta	51,442	27,905,172	542	39,872,780	775	1,079,354	21.0
Denton	7,980	3,641,620	456	11,150,749	1,397	266,131	33.3
Dickens	83,185	5,103,393	61	2,605,173	31	115,320	1.4
Dimmit	98,267	7,480,025	76	4,371,053	44	184,023	1.9
Donley	34,276	523,290	15	2,165,223	63	59,818	1.7
Duval	337,189	68,039,143	202	28,529,818	85	1,103,771	3.3
Eastland	98,104	32,479,221	331	19,017,307	194	539,765	5.5
Ector	17,373	1,511,432	87	500,542	29	16,577	1.0
Edwards	183,279	64,900,146	354	14,164,181	77	560,585	3.1
El Paso	.	.	.	.	.	.	.
Ellis	35,937	23,126,715	644	21,354,119	594	621,674	17.3
Erath	93,758	4,596,597	49	5,301,822	57	123,639	1.3
Falls	31,568	7,763,495	246	17,655,656	559	498,606	15.8
Fannin	120,078	82,722,190	689	83,208,018	693	2,363,711	19.7
Fayette	.	.	.	.	.	.	.
Fisher	53,623	10,055,599	188	2,417,625	45	103,986	1.9
Floyd	.	.	.	.	.	.	.
Foard	16,717	402,424	24	442,136	26	10,878	0.7
Fort Bend	75,892	24,859,190	328	104,582,612	1,378	3,595,832	47.4
Freestone	99,710	28,559,282	286	88,163,513	884	2,517,813	25.3
Frio	234,809	64,837,278	276	50,436,066	215	1,803,700	7.7
Gaines	.	.	.	.	.	.	.
Galveston	.	.	.	.	.	.	.
Garza	65,444	6,713,771	103	592,271	9	42,656	0.7
Gillispie	145,414	12,468,938	86	43,475,154	299	1,108,695	7.6
Glasscock	16,717	1,555,541	93	486,717	29	20,785	1.2
Goliad	45,360	21,425,773	472	5,670,363	125	249,939	5.5
Gonzales	91,349	10,971,158	120	17,521,919	192	600,314	6.6
Gray	51,835	5,268,028	102	71,890,592	1,387	1,622,015	31.3
Grayson	100,320	42,815,512	427	59,063,890	589	1,650,322	16.5
Guadalupe	57,643	51,809,140	899	21,314,521	370	766,185	13.3

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Appendix IV (cont.): Acre, tree, volume and biomass estimates for the Other hardwood forest type by county.

County	Acres	Trees	Trees Per Acre	Volume	Volume Per Acre	Biomass	Biomass Per Acre
Robertson	35,186	10,796,186	307	26,658,550	758	713,293	20.3
Rockwall	.	.	.	.	.	.	.
Runnels	20,820	2,312,522	111	487,012	23	36,983	1.8
San Patricio	.	.	.	.	.	.	.
San Saba	104,000	14,037,126	135	22,017,184	212	631,947	6.1
Schleicher	109,304	2,881,765	26	9,297,582	85	180,716	1.7
Scurry	41,802	15,651,895	374	3,159,617	76	161,491	3.9
Shackelford	233,340	52,864,326	227	30,922,325	133	1,114,556	4.8
Sherman	.	.	.	.	.	.	.
Somervell	13,948	11,325,806	812	10,531,380	755	253,523	18.2
Starr	207,161	21,549,880	104	17,013,920	82	619,971	3.0
Stephens	77,950	21,667,423	278	16,151,176	207	500,733	6.4
Sterling	34,314	2,259,784	66	731,262	21	29,198	0.9
Stonewall	50,866	16,390,030	322	6,779,100	133	332,126	6.5
Sutton	180,889	11,146,601	62	7,150,564	40	250,490	1.4
Swisher	.	.	.	.	.	.	.
Tarrant	32,583	14,204,402	436	21,620,161	664	493,518	15.1
Taylor	33,435	503,031	15	402,312	12	7,783	0.2
Terrell	138,980	6,995,708	50	5,113,420	37	118,888	0.9
Terry	.	.	.	.	.	.	.
Throckmorton	69,556	2,280,713	33	4,516,175	65	133,843	1.9
Tom Green	74,732	10,758,053	144	1,486,214	20	81,208	1.1
Travis	23,665	8,583,968	363	10,775,746	455	262,495	11.1
Upton	65,549	4,090,820	62	879,723	13	60,616	0.9
Uvalde	206,337	53,006,123	257	15,771,041	76	605,570	2.9
Val Verde	310,742	28,754,596	93	18,329,943	59	495,390	1.6
Victoria	106,352	24,794,128	233	83,609,623	786	2,249,736	21.2
Ward	34,745	2,243,271	65	618,415	18	46,505	1.3
Washington	31,229	7,287,400	233	33,452,257	1,071	725,670	23.2
Webb	229,932	11,077,935	48	8,148,016	35	302,526	1.3
Wharton	42,683	7,657,345	179	25,647,467	601	666,037	15.6
Wheeler	17,559	634,026	36	11,939,720	680	253,100	14.4
Wichita	19,453	6,800,095	350	31,082,403	1,598	731,904	37.6
Wilbarger	33,257	176,545	5	331,810	10	8,301	0.2
Willacy	64,391	6,650,338	103	4,094,070	64	164,071	2.5
Williamson	45,839	5,915,834	129	4,840,874	106	131,793	2.9
Wilson	61,283	14,528,079	237	17,614,831	287	563,609	9.2
Winkler	100,525	3,998,614	40	4,672,068	46	162,749	1.6
Wise	101,361	29,190,456	288	112,566,374	1,111	2,796,103	27.6
Yoakum	.	.	.	.	.	.	.
Young	71,325	10,254,094	144	6,263,360	88	261,753	3.7
Zapata	94,532	4,791,128	51	4,725,367	50	177,569	1.9
Zavala	175,377	8,430,132	48	8,396,142	48	352,358	2.0

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Appendix V (cont.): Acre, tree, volume and biomass estimates for the Oak forest type by county.

County	Acres	Trees	Trees Per Acre	Volume	Volume Per Acre	Biomass	Biomass Per Acre
Robertson	106,009	35,794,958	338	85,174,711	803	2,586,526	24.4
Rockwall	.	.	.	.	.	.	.
Runnels	.	.	.	.	.	.	.
San Patricio	.	.	.	.	.	.	.
San Saba	91,394	33,079,518	362	42,868,524	469	1,152,596	12.6
Schleicher	119,713	29,321,864	245	39,468,375	330	1,325,333	11.1
Scurry	.	.	.	.	.	.	.
Shackelford	.	.	.	.	.	.	.
Sherman	.	.	.	.	.	.	.
Somervell	4,649	1,729,890	372	1,985,304	427	58,566	12.6
Starr	.	.	.	.	.	.	.
Stephens	126,614	49,560,043	391	35,069,752	277	1,250,304	9.9
Sterling	.	.	.	.	.	.	.
Stonewall	.	.	.	.	.	.	.
Sutton	113,672	36,619,688	322	23,483,727	207	667,466	5.9
Swisher	.	.	.	.	.	.	.
Tarrant	12,684	1,526,714	120	8,680,242	684	234,247	18.5
Taylor	27,188	11,794,242	434	11,930,498	439	484,496	17.8
Terrell	17,373	1,929,626	111	838,602	48	29,627	1.7
Terry	.	.	.	.	.	.	.
Throckmorton	.	.	.	.	.	.	.
Tom Green	16,717	2,515,153	150	6,336,964	379	126,411	7.6
Travis	20,820	3,382,942	162	11,604,951	557	280,064	13.5
Upton	.	.	.	.	.	.	.
Uvalde	73,442	26,441,423	360	29,858,296	407	1,065,714	14.5
Val Verde	20,820	1,252,941	60	2,835,814	136	70,278	3.4
Victoria	111,563	37,973,130	340	50,855,351	456	1,496,915	13.4
Ward	.	.	.	.	.	.	.
Washington	14,075	7,594,314	540	16,197,576	1,151	435,758	31.0
Webb	.	.	.	.	.	.	.
Wharton	.	.	.	.	.	.	.
Wheeler	.	.	.	.	.	.	.
Wichita	.	.	.	.	.	.	.
Wilbarger	.	.	.	.	.	.	.
Willacy	.	.	.	.	.	.	.
Williamson	57,227	18,846,864	329	48,439,663	846	1,473,664	25.8
Wilson	54,398	8,031,844	148	25,241,388	464	823,737	15.1
Winkler	.	.	.	.	.	.	.
Wise	52,422	32,337,145	617	49,995,768	954	1,540,909	29.4
Yoakum	.	.	.	.	.	.	.
Young	133,024	50,271,665	378	39,101,824	294	1,381,753	10.4
Zapata	.	.	.	.	.	.	.
Zavala	.	.	.	.	.	.	.