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RESOURCE UPDATE FS-151

FORESTS OF east Texas, 2016

This resource update provides an overview of forest resources in east Texas based on an inventory conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program at the Southern Research Station (SRS) in cooperation with Texas A&M Forest Service. The 254 counties of Texas are consolidated into seven FIA survey units—Southeast (unit 1), Northeast (unit 2), North Central (unit 3), South (unit 4), West Central (unit 5), Northwest (unit 6), and West (unit 7). The estimates presented in this update are limited to east Texas, which is made up of units 1 and 2 with a total of 43 counties (fig. 1). Forest resource estimates are based on field data collected using the FIA annualized sample design and are updated yearly (Bechtold and Patterson 2005). The data used in this publication were accessed from the FIA Database on March 23, 2018.

East Texas was allocated 3,986 plots, and 3,895 of these were sampled. Reported estimates on current values such as area and volume are based on these 3,895 plots. Estimates on change variables such as growth, disturbance, and removals are based on a subset of 3,756 plots, which were remeasured.

Overview

East Texas is home to 12.1 million acres of forest land (± 0.1 million acres) (table 1). This is a decrease of about 0.3 percent (39.4 thousand acres) from the forested acres reported in 2015. The number of live trees on Texas's forest land is estimated at 7.2 billion (± 0.1 billion trees) a 2 percent decrease from the 2015 estimation. Net volume increased about 0.7 percent to 17.7 billion cubic feet (± 0.3 billion cubic feet), while biomass increased 0.2 percent to 0.4 billion tons (± 6.5 million tons). Net growth saw very little change, increasing only by 0.9 million cubic feet per year to 593.1 million cubic feet per year (± 24.4 million) a change of only 0.2 percent. Removals were up substantially (9.3 percent) to 602.7 million cubic feet per year (± 32.2 million). Annual mortality also increased considerably, 3.2 percent, to 378.4 million cubic feet per year (± 16.6 million cubic feet). Timberland followed the same trends as total forest land. See Bechtold and Patterson 2005, for definitions of forest and timberland.

Table 1 – Texas forest statistics, change between 2015 and 2016

Forest statistics	2015[a] estimate	Sampling error percent	2016[b] estimate	Sampling error percent	Change since 2015
Forest land					
Area (*thousand acres*)	12,150.11	0.74	12,110.74	0.75	-39.37
Number of live trees ≥1 inch d.b.h. (*million trees*)	7,328.51	1.86	7,176.78	1.89	-151.73
Net volume live trees ≥5 inches d.b.h. (*million cubic feet*)	17,620.45	1.68	17,740.28	1.69	119.84
Live trees aboveground biomass (*thousand oven-dry tons*)	440,633.46	1.47	441,629.48	1.48	996.02
Net growth live trees ≥5 inches d.b.h. (*million cubic feet per year*)	592.80	4.27	593.72	4.11	0.92
Annual removals of live trees ≥5 inches d.b.h. (*million cubic feet per year*)	551.63	5.66	602.72	5.35	51.09
Annual mortality of live trees ≥5 inches d.b.h. (*million cubic feet per year*)	366.68	4.77	378.37	4.38	11.69
Timberland					
Area (*thousand acres*)	11,956.23	0.79	11,922.00	0.80	-34.23
Number of live trees ≥1 inch d.b.h (*million trees*)	7,215.46	1.89	7,063.61	1.92	-151.85
Net volume live trees ≥5 inches d.b.h. (*million cubic feet*)	17,198.05	1.73	17,312.52	1.74	114.47
Live trees aboveground biomass (*thousand oven-dry tons*)	430,392.98	1.51	431,267.41	1.53	874.43
Net growth live trees ≥5 inches d.b.h. (*million cubic feet per year*)	590.48	4.29	592.33	4.13	1.84
Annual removals of live trees ≥5 inches d.b.h. (*million cubic feet per year*)	562.85	5.59	613.67	5.29	50.82
Annual mortality of live trees ≥5 inches d.b.h. (*million cubic feet per year*)	360.81	4.84	372.91	4.44	12.10

[a]Estimates for 2015 comprise panels 2011, 2012, 2013, 2014, 2015
[b]Estimates for 2016 comprise panels 2012, 2013, 2014, 2015, 2016

Forest Area

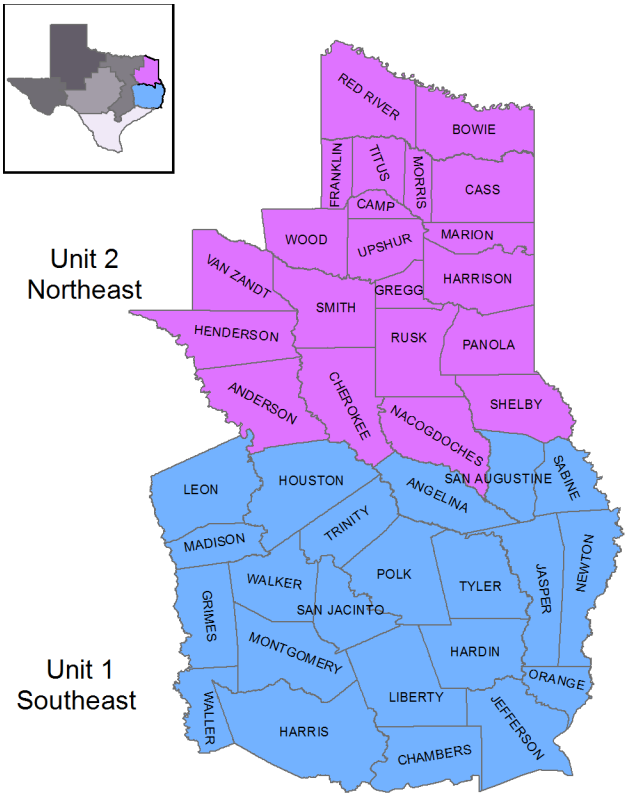

Figure 1--FIA survey units of Texas, with east Texas detail.

The 12.1 million acres of forest land described in the overview section contributes approximately 54 percent of the total area of east Texas which includes all land and water area. Almost all (98 percent) of the forest land in east Texas is timberland (fig. 2). FIA defines timberland as forest land that is capable of producing at least 20 cubic feet per acre per year of industrial wood, and which is not reserved (withdrawn from wood extraction by law or statute). Unless otherwise noted, the majority of discussions and figures within this publication will be focused on timberland.

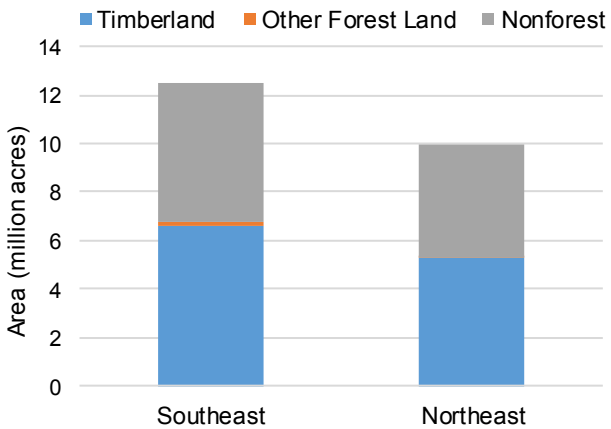

Figure 2—Land use by unit, east Texas 2016.

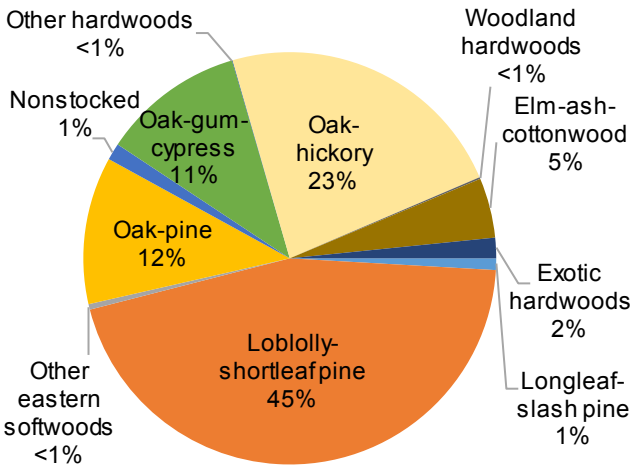

Figure 3—Distribution of t timberland by forest-type group, east Texas, 2016. Total area = 11.9 million acres.

At 5.4 million acres (45 percent of total), loblolly-shortleaf pine is the most dominant forest-type group on timberland (fig. 3). About 26 percent (3.1 million acres) of the timberland area was artificially regenerated, with softwood forest types being more heavily represented. Loblolly-shortleaf pine forest types, were 52 percent (2.8 million acres) artificially regenerated, about double the overall proportion.

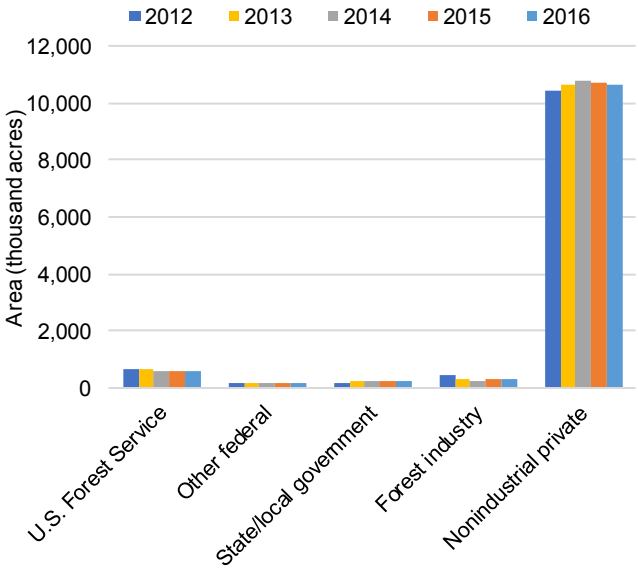

Figure 4—Acres of timberland by ow nership group, east Texas, 2012 - 2016.

As in previous years nonindustrial private landowners accounted for 90 percent of timberland acres (fig. 4) This group includes all nongovernmental individuals, groups, and corporations who do not own an industrial processing plant for forest products. After rather large shifts from industry to nonindustrial private ownerships in 2012-2014, there has been little change in ownership groups.

Volume, Biomass, and Trends

Table 2—Species contributions to number, volume, and biomass of all live trees on timberland, east Texas, 2016

Number live trees[a] (million)	Species	Net volume live trees[b] (million cubic feet)	Species	Aboveground dry biomass[a] (million short tons)	Species
1,851.96	Loblolly pine	8,443.89	Loblolly pine	178.86	Loblolly pine
992.85	Sweetgum	1,331.65	Sweetgum	34.29	Sweetgum
510.16	Winged elm	1,052.03	Shortleaf pine	32.34	Water oak
503.16	Water oak	1,046.30	Water oak	21.75	Post oak
326.54	Chinese tallowtree	712.61	Post oak	21.47	Shortleaf pine
178.19	Red maple	561.61	Southern red oak	16.00	Southern red oak
153.95	Eastern redcedar	382.74	Willow oak	11.66	Willow oak
151.44	Post oak	344.27	White oak	10.25	White oak
148.13	American hornbeam	280.05	Baldcypress	9.79	Winged elm
146.65	Blackgum	278.77	Blackgum	8.24	Cherrybark oak
2,100.60	All others	2,878.59	All others	86.61	All others
7,063.61	Total	17,312.52	Total	431.27	Total

[a]Trees ≥1.0 inch diameter.

[b]Trees ≥5.0 inch diameter.

Net all live timber (excludes rotten, missing, and form cull) on timberland was 17.3 billion cubic feet (table 2). This is a slight increase from the 17.2 billion cubic feet reported in 2015, and is consistent with volumes since the start of the annualized forest inventory. The timberlands of east Texas hold approximately 431.3 million tons of biomass (aboveground dry weight), again a slight increase from 2015. The number of trees decreased a bit to 7.1 billion trees. By individual species, loblolly pine contributed the most to net volume, biomass, and number of live trees, followed by sweetgum in all three categories (table 2). Beyond the top two species however, the order of dominance differed among the three classifications.

From 2015 to 2016 growth of softwoods increased by 7.5 million cubic feet, and for hardwoods by 6.4 million cubic feet. Both groups also have higher growth over the past 5 years. However, the mortality rates have impacted the net growth and net change, to varying degrees.

For softwoods, the mortality has increased each of the last 5 years, from 110.8 million cubic feet in 2012 to 163.7 million cubic feet in 2016 (fig. 5A). This has resulted in reduced net growth (growth less mortality) as well as reduced net change (net growth less removals). Despite the reduction in net change, it is still positive for softwoods, meaning that growth is still greater than mortality and removals combined.

This is not the case for hardwood species. For these species mortality has been higher than net growth or removals each of the last 5 years (fig. 5B) and the net change has been negative for all 5 years. Mortality, and associated reduced net volumes, do appear to be leveling off and heading in a positive direction. In 2015 mortality was at 209.7 million cubic feet with net growth at 73.4 million cubic feet, while in 2016 mortality was at 209.2 and net growth at 80.3 million cubic feet.

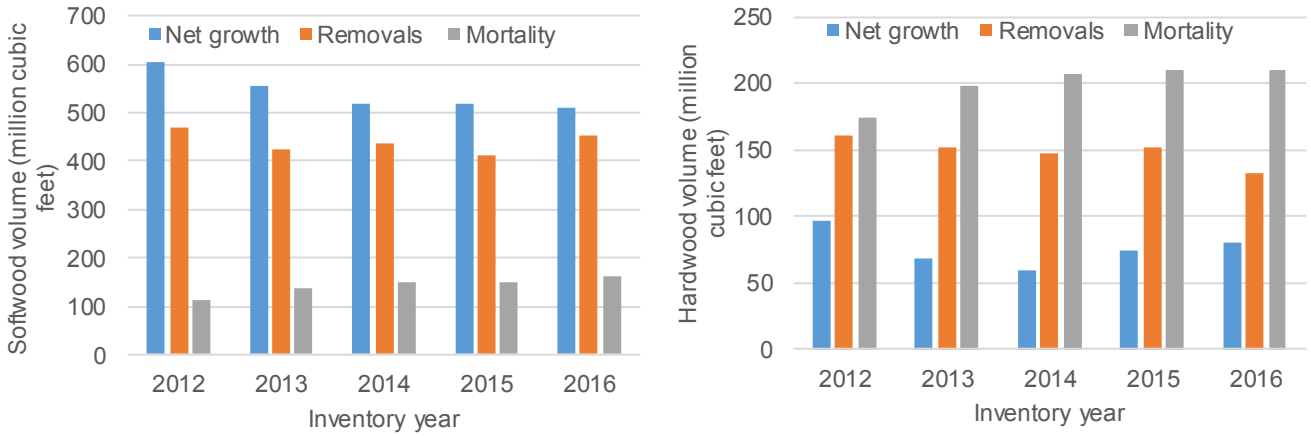

Figure 5—Growth, removals and mortality of softwood (A) and hardwood (B) species, east Texas 2016.

Tree mortality in east Texas 2012-2016

Table 3—Average annual mortality volume on timberland by major species group and cause of death, east Texas 2016

	Cause of death							
Species group	Insects	Disease	Fire	Animals	Weather	Vegetation	Unknown/ other	Total
	Thousand cubic feet							
Softwoods	39,895.35	7,432.32	11,150.15	229.52	85,427.56	11,612.16	7,939.48	163,686.55
Hardwoods	2,093.20	71,337.17	7,507.52	1,555.42	103,864.36	14,414.46	8,446.34	209,218.48
Total	41,988.55	78,769.50	18,657.67	1,784.95	189,291.92	26,026.62	16,385.82	372,905.03

For each sampled tree that has died since the previous measurement, a cause of death is recorded. As this report covers inventory years 2012-2016, the trees were previously measured in 2007-2011.

There were seven categories for cause of death recorded in Texas for these inventory years, including an unknown/ other choice. Dead tree volume on timberland is shown in table 3.

Weather was by far the largest contributor to mortality, with more than half of all mortality being attributed to this factor (table 3). Because of the record breaking drought of 2011 (Dooley 2017), and hurricane Ike in 2008, in addition to smaller and more localized weather events, it is not a surprise that weather contributed so greatly to this uptick in mortality.

As seen in figures 5A and 5B, hardwood mortality outpaced softwood mortality in total volume, and by an even larger margin when compared to net growth. Many of the mortality causes will affect all trees similarly, and this is reflected in the recorded causes of death for different species groups. Hardwood and softwood species saw similar proportions for tree death caused by weather (49.6 and 52.2 percent of all mortality, respectively), vegetation (6.9 and 7.1 percent), other/unknown (4.0 and 4.9 percent), and animals (<1 percent in either group). Fire was the cause of slightly more of the softwood mortality totals (6.8 percent) than hardwoods (3.6 percent of all mortality). But insects and diseases showed the greatest difference between major species groups. For softwoods insects were the second greatest contributor to mortality, at 24.4 percent, while disease caused only 4.5 percent of deaths. For hardwoods, disease was the second greatest contributor, causing about 34.1 percent of mortality by volume, while insects only accounted for 1.0 percent. The species group "other red oaks" appears to be most severely affected. Other red oaks make up 12 percent of live volume yet account for 40 percent of the mortality caused by disease.

The negative net change in hardwood volumes over the last several years is a concern. However, the mortality rates appear to be stabilizing or reducing, while the growth has continued to increase. Softwoods have maintained positive net change, but are still seeing increased mortality rates. It will be important to continue monitoring these data in the coming years, to verify that the hardwoods are on the track to recovery and that the softwoods do not see continued increase in mortality.

Literature Cited

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