

**Title:** Assessment of Tree Mortality from the 2011 Drought

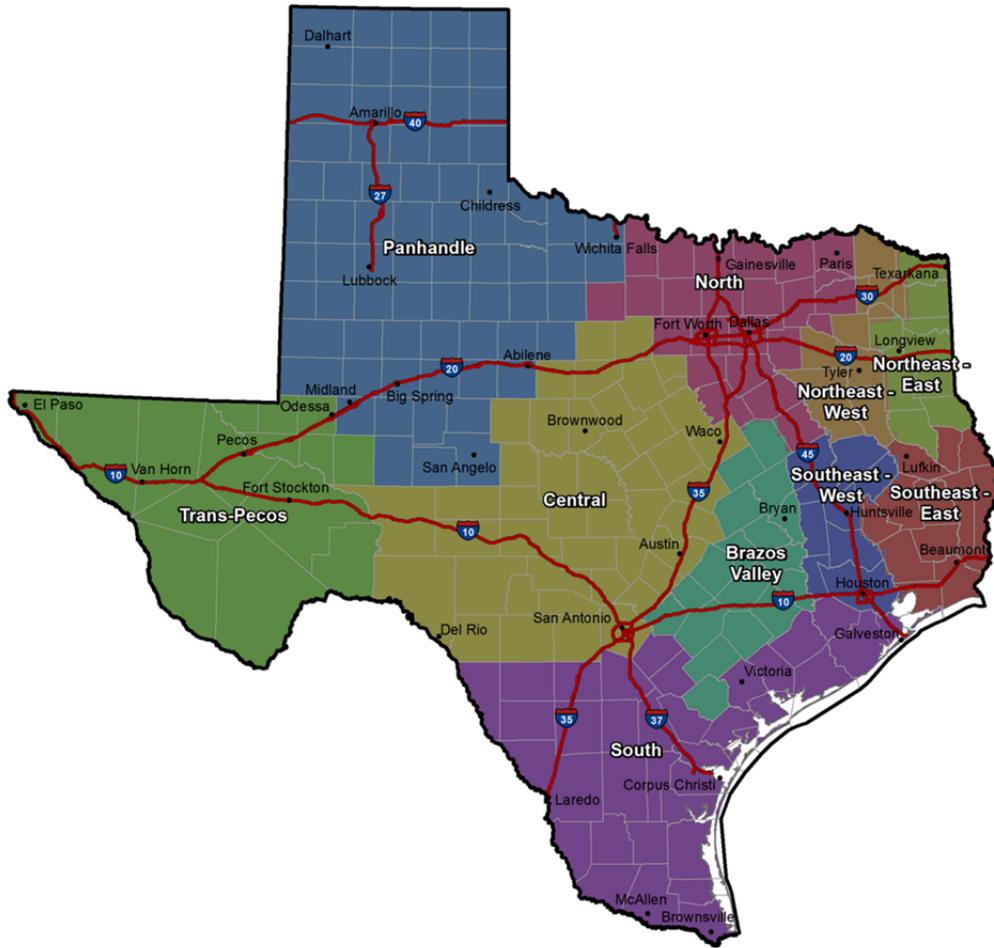
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**Introduction:** Texas experienced record-breaking heat and drought in 2011. Wide-spread, exceptional drought can have major negative impacts on forest resources including loss of growth, crown dieback, early dormancy, increased susceptibility to insects and disease, and mortality. Preliminary analyses by Texas Forest Service in December 2011 estimated drought-related mortality at 100 million to 500 million trees, which is 2 to 10 percent of the trees in the state. This preliminary estimate was based on the opinion of forestry and natural resource experts throughout the state back in December 2011. In the summer of 2012 Texas Forest Service conducted a new scientific assessment of tree mortality that involved analysis of satellite imagery and extensive field work.

**Materials and Methods:** The objective of the study was to estimate the number of trees that died in the drought of 2011. The population sampled was forestland in the state of Texas. Forestland is defined as land having at least 10 percent canopy cover or an equivalent level of stocking. Using a two-stage unequal probability sample, 700 plots were randomly located on forestland throughout the state. Landowners were contacted and asked if they would allow a field crew to measure trees at a selected locations (or locations) on their property. (Of the 700 plots, 3 fell on City of Austin property.) When permission was granted a field crew was sent to measure tree mortality. Plots were circular in shape extending outward 75 feet from plot center. Crews tallied (counted) trees that were alive at the onset of the drought and now dead or nearly dead. Species and diameter were recorded for each tree as well as any notes pertaining to the cause of death. No materials were collected or removed from the plots. All three plots were measured in one day.

**Results:** Plot data were combined with satellite-based change vegetation data to produce an estimate of number of drought-killed trees. Key findings are summarized in the following figure and table:



Region	Live trees prior to the drought (million trees)	Drought-related mortality (million trees)	Drought-related mortality (percentage)
Southeast - East	597.1	7.5	1.3
Southeast - West	289.7	18.8	6.5
Northeast - East	356.0	13.9	3.9
Northeast - West	309.4	25.3	8.2
North	370.5	30.9	8.3
Brazos Valley	256.4	24.9	9.7
South	431.2	31.7	7.4
Central	1,540.0	102.3	6.6
Panhandle	556.3	33.1	6.0
Trans-Pecos	163.4	12.2	7.5
<b>Total</b>	<b>4,869.9</b>	<b>300.6</b>	<b>6.2</b>

**Discussion and Conclusion:** An estimated 301 million trees at least 5 inches diameter at breast height/diameter at root collar died as a results of the drought. Impacts varied by region within the state with the highest rate of mortality (9.7 percent) observed in the Brazos Valley Region and the lowest rate of morality (1.3 percent) observed in the Southeast – East Region.

**Literature Cited:** Not applicable.