



Broad Scale Inventory of Shortleaf Pine

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Shortleaf pine (*Pinus echinata*) is an economically and ecologically important eastern pine that, according to Forest Inventory and Analysis (FIA) estimates, has declined 53% since the 1980s. The most significant decline has occurred east of the Mississippi River; whereas, states in the western range (Arkansas, Louisiana, Missouri, Oklahoma, Texas) still contain concentrated areas of shortleaf-dominated forests. Several factors are known to contribute to shortleaf's decline, including land use change and urbanization, species preference, fire exclusion, and forest health issues. Evaluating the magnitude of this decline is made possible through FIA.

FIA Data

The USDA Forest Service FIA program collects and analyzes the extent, condition, status and trends of US forest resources across different ownership types (federal, state, private)³. Using this data, the current and future status of shortleaf can be investigated through time and across the species range.

The 2013 FIA inventory of eastern U.S. forests includes observations of shortleaf pine (> 1 inch) on more than 5,000 forested plots.

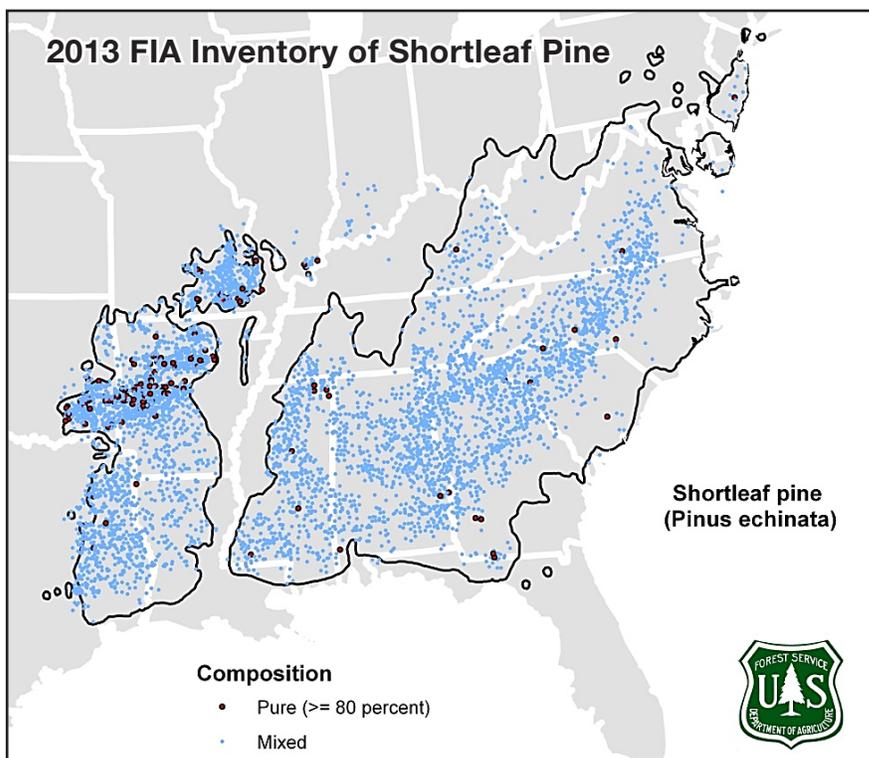


Figure 1: Geographical location of sampled shortleaf pine (≥ 1 inch dbh) in mixed (shortleaf and mixed shortleaf-oak forest type) and pure stands ($> 80\%$ stand is shortleaf) during the 2013 inventory. Range data: Little, 1971. Credit: Chris Oswalt, USFS Southern Research Station, Forest Inventory and Analysis Program

Of the 6 million acres of shortleaf dominated forests across 17 states (Table 1), 3.2 million acres are considered to be the shortleaf forest type* while the remaining 2.8 million acres are considered to be the mixed

*The shortleaf forest type is an FIA-defined forest type group where pines comprise 50% of the species present in a forest stand and shortleaf is the most common pine that occurs. The mixed shortleaf-oak forest type contains 25-50% pines where shortleaf is the dominant pine species.



Table 1: Area (acres) of shortleaf and shortleaf-oak forest types, by state in year 2013.

| State | Shortleaf | Shortleaf-Oak | Total |
|-------------------------|------------------|------------------|------------------|
| Alabama | 153,766 | 228,392 | 382,157 |
| Arkansas | 1,248,433 | 803,540 | 2,051,973 |
| Florida | 11,353 | 16,445 | 27,798 |
| Georgia | 106,641 | 173,154 | 279,794 |
| Illinois | 24,194 | 7,355 | 31,549 |
| Indiana | 14,784 | 4,837 | 19,621 |
| Kentucky | 13,689 | 23,358 | 37,049 |
| Louisiana | 56,644 | 42,718 | 99,361 |
| Mississippi | 201,431 | 185,613 | 387,044 |
| Missouri | 248,567 | 322,429 | 570,997 |
| New Jersey | 6,837 | 6,679 | 13,516 |
| North Carolina | 111,838 | 162,556 | 274,395 |
| Oklahoma | 503,575 | 410,734 | 914,309 |
| South Carolina | 51,300 | 99,356 | 150,656 |
| Tennessee | 79,054 | 111,505 | 190,559 |
| Texas | 340,473 | 183,279 | 523,752 |
| Virginia | 53,878 | 44,028 | 97,906 |
| Range-wide Total | 3,226,457 | 2,825,978 | 6,052,436 |

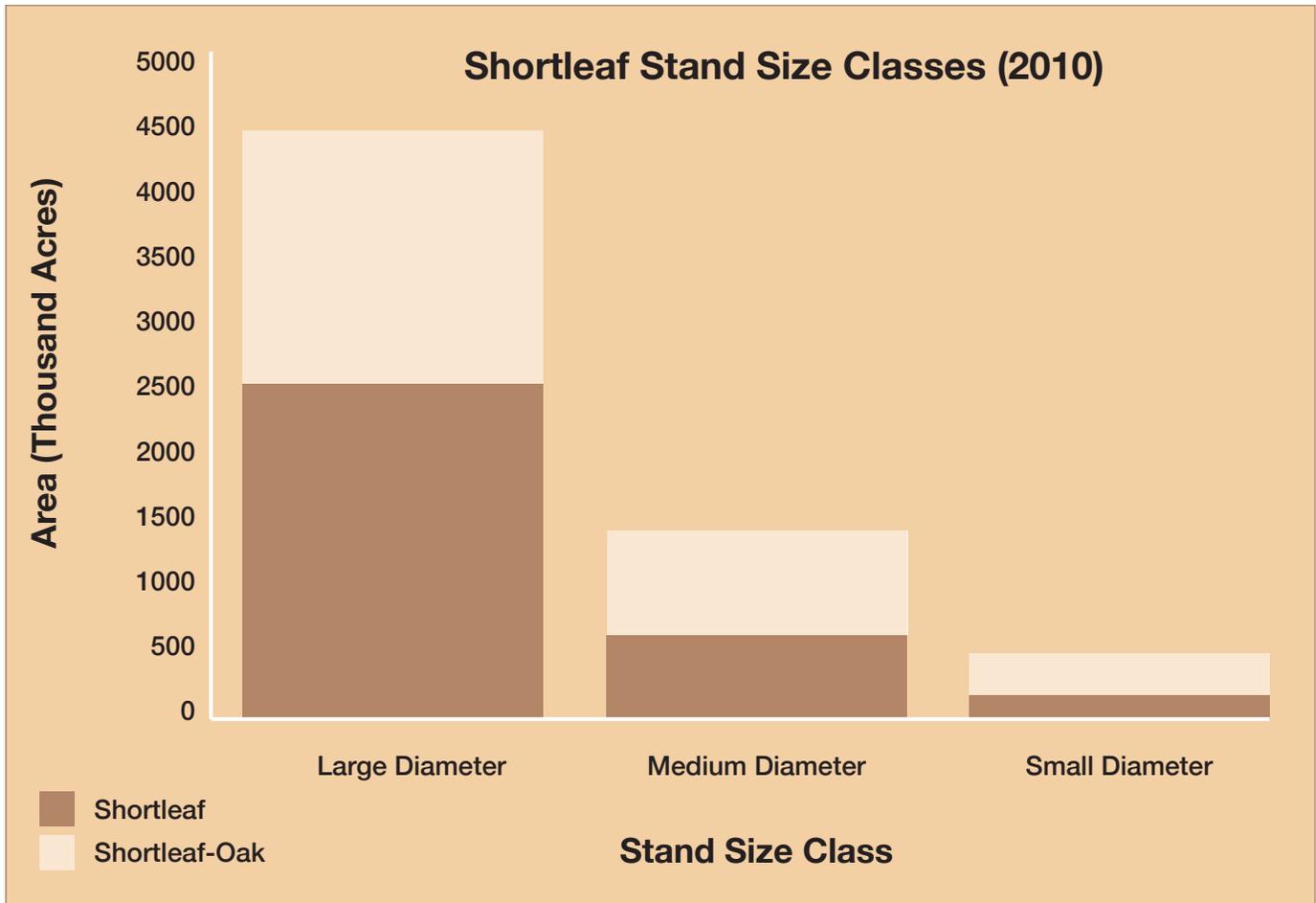
shortleaf-oak forest type* (Fig. 1). Arkansas contains 34% of shortleaf dominated acreage and nearly 70% (4.2 million acres) of all shortleaf dominated forests are found within 5 states west of the Mississippi River (Arkansas, Louisiana, Missouri, Oklahoma, Texas).

Approximately 62% of all shortleaf pine-dominated forests in the eastern U.S. are owned by private individuals or corporations. An estimated 330,000 acres (10%) of the shortleaf forest type were planted, or artificially regenerated, whereas 57,000 acres (2%) of the shortleaf-oak forest type were artificially regenerated.

Shortleaf pine-dominated forests are heavily concentrated in the large diameter stand size class (older age class). Large diameter stands are defined as stands where greater than

50% of stocking is in large (≥ 11 inch dbh for hardwoods and ≥ 9 inch dbh for softwoods) and medium (≥ 5.0 inch dbh but smaller than large diameter) diameter trees. An estimated 71% of all shortleaf pine-dominated forests were identified as belonging to large diameter stands and 93% were found to be in large and medium diameter stands combined (Fig. 2). Very few acres of shortleaf or shortleaf-oak forest type are in small diameter stands. This suggests that few shortleaf stands are in early successional stages of growth, meaning the next generation is not available to replace the current, older trees. Additionally, present forest conditions can be inferred from shortleaf stand class. Since shortleaf requires low understory shade and exposed mineral soil for seed germination, lack of small diameter classes may suggest forest conditions are too shaded (dense understory foliage) to support natural regeneration.

Figure 2: Area (thousand acres) of shortleaf and shortleaf-oak forest types among three stand size classes. Data: FIA 2010 inventory. Credit: Chris Oswalt, USDA Forest Service



Shortleaf-dominated forests, as evidenced by a 53% loss between the 1980s and 2013, are in decline. In an analysis of earlier FIA data, lack of regeneration across the shortleaf range indicated shortleaf abundance would continue to deteriorate². This forecast is becoming a reality. Coupled with the fact that current shortleaf pine-dominated forests are overwhelmingly found in large diameter or late-successional stands, the future of shortleaf pine forest in the eastern U.S. poses a significant conservation challenge.

While range-wide declines are troublesome, there is a clear difference between shortleaf-dominated forests

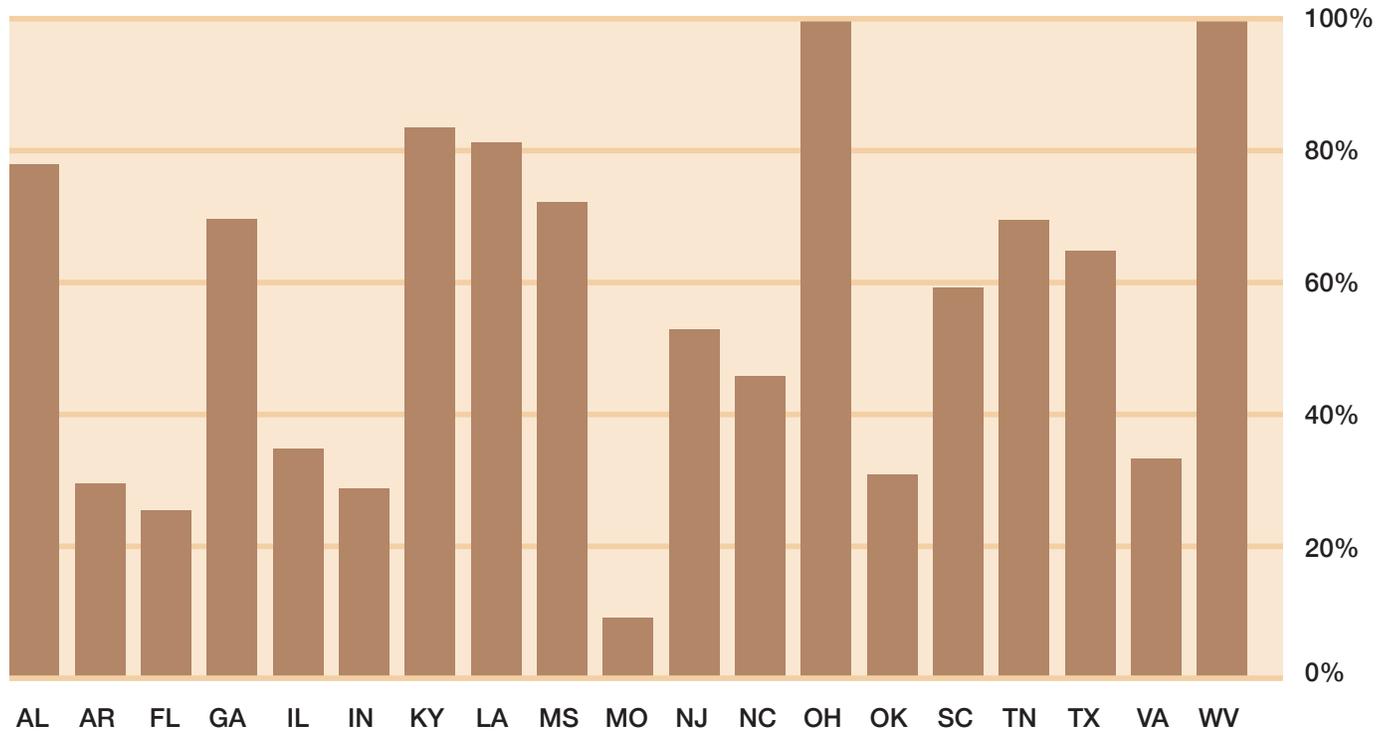
east of the Mississippi River and those west of the River. Eastern losses are far greater than losses in the western states (Arkansas, Oklahoma, Missouri, and Texas), where the vast majority of current shortleaf-dominated forests occur (Fig. 3).

While broad-scale inventory data, such as that of the FIA program, can be used successfully to identify large conservation issues, many times the data are limited in capacity to address causal factors. Further examination of the tremendous amount of data compiled by the FIA program may help identify leading factors in the decline of the shortleaf pine resource.



Shortleaf pine (*Pinus echinata*) forests and associated habitats contain extraordinary cultural, ecological, and economic value by providing wildlife habitat, recreational opportunities, enhanced water quality, and high value wood products. Despite these values and services, shortleaf pine has significantly declined across much of its 22-state range. These fact sheets provide tools and resources necessary for the restoration of shortleaf pine.

Figure 3: Relative declines in shortleaf pine dominated forests range-wide and for each state comparing 1980's timberland inventories with the 2013 inventory. Credit: Chris Oswalt, USFS



References

¹Little, E.L., Jr. 1971. Atlas of United States trees, volume 1, conifers and important hardwoods: U.S. Department of Agriculture Miscellaneous Publication 1146, 9 p., 200 maps. McWilliams, W.H.; Sheffield, R.M.; Hansen, M.H.; Birch, T.W. 1986. The shortleaf resource. In: Proceedings of the symposium on the shortleaf pine ecosystem; 1986 March 31 – April 2; Little Rock, AR. Monticello, AR: Arkansas Cooperative Extension Service: 9-24.

²Moser, W. Keith; Hansen, Mark; McWilliams, William H.; Sheffield, Raymond M. 2007. Shortleaf pine composition and structure in the United States. In: Kabrick, John M.; Dey, Daniel C.; Gwaze, David, eds. Shortleaf pine restoration and ecology in the Ozarks: proceedings of a symposium; 2006 November 7-9; Springfield, MO. Gen. Tech. Rep. NRS-P-15. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 19-27.



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