

Past and Present Forest Restoration in Missouri

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History of Missouri Forests

When the first European pioneers arrived in Missouri at the beginning of the 19th century, much of Missouri forests, particularly those found in the Ozarks, must have looked like a paradise. Explorers and later settlers found a rich land with few human inhabitants, herds of elk and buffalo, and vast forests of giant old growth shortleaf pine (*Pinus echinata* Mill.) and oak (*Quercus* spp.) that covered 70 percent of the State. Forests of open, park-like stands, with an understory of native grasses dominated the landscape. For many years this resource was inaccessible, but, eventually, this forest land was viewed as the raw stuff of industrial development. Rivers, then roads, then railroads were used to ship the lumber to Eastern U.S. markets.

The first settlers cut wood for houses, for fuel, and to sell, but had little effect on the timber resource. Within a few decades, however, Missouri's timber resources were increasingly harvested (Benac and Flader 2004). Timber was cut and floated downstream to mills in larger settlement areas, where it might be used for lumber or as cordwood to fuel the boilers of steam-powered riverboats. The pine forests of the Ozarks attracted lumbermen from the Eastern United States, and from about 1880 until 1920, Missouri was one of the leading lumber-producing States in the Nation. Huge sawmills in the towns of Grandin and Eminence produced building lumber, shingles, molding, and railroad ties for a growing Nation. Narrow gauge railroads were built to access every creek and river valley, facilitating the harvesting of even the most remote stands of timber. For a number of years in the early 1900s, Missouri boasted the largest sawmill in the Nation (Nagel 1970).

By 1920, the big mills, the jobs, and much of the vast forests of the State were gone, except for the swamplands of the Missouri bootheel. In the bootheel of Missouri, swamps kept the heavy logging out for awhile, but during the early 1900s huge drainage canals were built to drain the swamps and during the next 50 years about 2.5 million acres of bottomland forests were drained, logged, and converted to farmland. In the Ozarks, homesteaders moved in and began farming the thin soils. This farming lasted less than a generation as the soils produced poor crops and erosion soon forced much land

to be abandoned. Annual burning and open range grazing of hogs and cattle further reduced the already depleted timber resource of the State.

As with many other parts of the United States, the term “harvest” was not used to describe the destruction of Missouri forests—it was more of a cut-and-get-out approach that forever changed the forest landscape. It was not until 1925 that any attempt was made to manage the State forests (Nagel 1970). In 1925, the State Legislature created the office of State Forester under the Missouri Department of Agriculture. The 1931 legislative session, however, neglected to budget funds for the Forestry Division and after 6 short years and only a few employees, the Division ceased to exist. An attempt had been made to do some fire control in the central Ozarks, but the departing State Forester concluded in his final report that “it was impossible to establish fire control in the Ozarks” (Keefe 1987).

A Change in Fortunes

From 1931 until 1936, Missouri had no organized forestry agency. By the mid-1930s, Missouri's fish, wildlife, and forestry resources were nearly depleted after years of uncontrolled burning, unregulated harvests of wildlife and fish, and repeated harvests and conversion of forests. Much of the Ozark region was in economic and ecological ruin. But change was in the air. A group of concerned citizens got together in Columbia, MO, in 1935 and began an initiative petition drive to create a nonpolitical, Constitution-based, conservation agency. Forestry was included along with fish and wildlife in the proposed new agency. Citizens saw forest management as an important part of fish and wildlife restoration. Without good forest management and control of wildfires, fish and wildlife restoration would not be possible (Keefe 1987). In November 1936, Missouri voters approved Amendment 4, creating the Missouri Conservation Commission (now Missouri Department of Conservation [MDC]), one agency that manages the State's fish, forests, and wildlife. Creating a land management agency, by Constitutional amendment, was and still is very unusual in the United States and it gives stability to land management by taking it out of the hands of politicians and putting into the hands of wildlife, forestry, and fishery professionals.

In 1976, Missouri voters went another step to ensure quality management of the fish, forests, and wildlife by passing a one-eighth of 1 percent sales tax to fund the agency. The Missouri Department of Conservation, including its Forestry Division, is now fully self-funded and self-governed. The agency receives no funds from the Missouri legislature.

When the Missouri Department of Conservation began business on July 1, 1937, the Forestry Division was created and began to form a plan to restore the State's forests. Forest fire control was the first and foremost challenge for the Forestry Division. Without controlling the wildfires, which, in some years of the 1930s had burned more than 50 percent of the land area in the Ozarks, forest management would be difficult, if not impossible (Nagel 1970). In the 1930s, fire control was considered impossible, but by 1950, total area burned had been reduced to less than 1 percent of the land area. In most recent years, annual wildfire losses are minimal.

Forest Cover and Land Types

Currently, nearly one-third of Missouri acreage is forest land (figure 1). During the past 25 years, the forest area in the State has actually increased slightly. The annual growth of Missouri forests now far exceeds the annual harvest, ensuring forests for future generations (figure 2). Today, Missouri boasts more than 15 million acres (6.07 million hectares) of forest land (Moser and others 2011). Most of this acreage is owned by private landowners (figure 3). The remainder is owned by the Federal Government (mostly in the Mark Twain National Forest), the State of Missouri, and local governments.

Shortleaf pine was once the dominant species in much of the Ozarks, but today oak and hickory dominate nearly all the forest land in the State. Northern and western Missouri, never heavily forested and mostly native prairie in presettlement times, are oak forests where black walnut (*Juglans nigra* L.), bur oak (*Quercus macrocarpa* Michx.), swamp white oak (*Quercus bicolor* Willd.), eastern red cedar (*Juniperus virginiana* L.), Kentucky coffeetree (*Gymnocladus dioica* [L.] K. Koch), northern red oak (*Quercus rubra* L.), and white oak (*Quercus alba* L.) are the dominant species. Along the river bottoms of the Missouri and Mississippi Rivers, silver maple (*Acer saccharinum* L.), sycamore (*Platanus occidentalis* L.), hackberry (*Celtis occidentalis* L.), cottonwood (*Populus deltoides* Bartram ex Marsh.), pecan (*Carya illinoensis* [Wangenh.] K. Koch), shellbark hickory (*Carya laciniosa* [Michx. f.] G. Don), willow (*Salix* L.), pin oak (*Quercus palustris* Münchh.), and green ash (*Fraxinus pennsylvanica* Marsh.) dominate. In the Bootheel area of Missouri, where very little forest land remains, tree species include bald cypress (*Taxodium distichum*

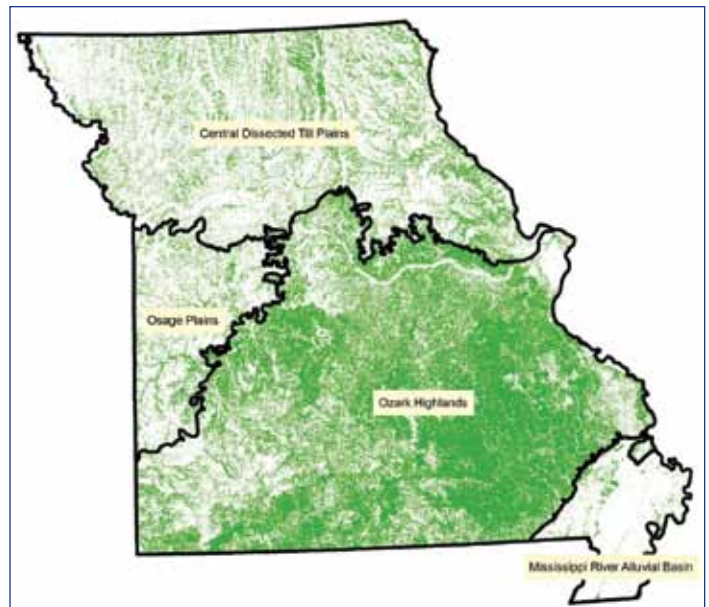


Figure 1. Missouri forest cover and ecological regions. (Map source: National Land Cover Database [NLCD] 2006).

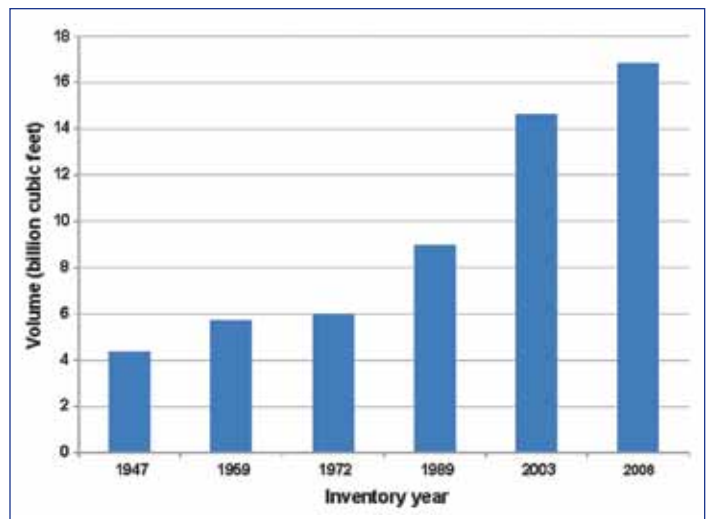


Figure 2. Growing stock volume on timber land in Missouri, 1947–2008. (Source: Raeker and others 2011).

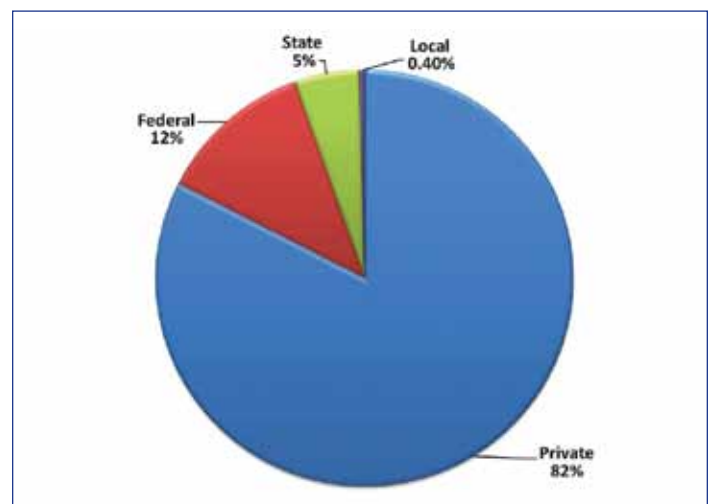


Figure 3. Missouri forest land ownership. (Source: Butler 2008).

(L.) Rich.), water tupelo (*Nyssa aquatica* L.), pin oak, overcup oak (*Quercus lyrata* Walter), Nuttall oak (*Quercus texana* Buckley), water oak (*Quercus nigra* L.), willow oak (*Quercus phellos* L.), and cherrybark oak (*Quercus pagoda* Raf.). Most of the forest land in Missouri is located in the Ozark Highlands (figure 1), a large land mass of thin soils and steep river hills that stretches from the Missouri River south into Arkansas and east and west across the southern third of the State. The main forest species in the Ozarks are red, black (*Quercus velutina* Lam.), and white oak, various hickory species, sugar maple (*Acer saccharum* Marsh.), black walnut, and shortleaf pine.

Nursery Production

From the inception of the Forestry Division in 1937, one of the agency's priorities was to grow bareroot seedlings to reforest Missouri. The Meramec Nursery, near Sullivan, opened and began seedling production in 1938, primarily producing hardwood tree and shrub seedlings. The seedlings were planted on Conservation Areas and sold to private landowners. In 1947, a second nursery was acquired. This was the U.S. Department of Agriculture (USDA), Forest Service Licking Nursery, which originally opened in 1935 as part of the Blooming Rose Civilian Conservation Corps (CCC) camp (figure 4). The original 40-acre nursery had about 15 acres of seedbeds, two bunkhouses and a mess hall for the CCC enrollees, a nursery residence, an office, and a shop. Seedling production was nearly all shortleaf pine and some hardwoods for reforesting the newly acquired Federal land that later became the Mark Twain National Forest. The Licking Nursery was shut down in 1942 during World War II, reopened briefly in 1946, and then closed. In 1947, the MDC assumed management and later full ownership of the Licking Nursery (figure 5). In 1960, it was renamed the George O. White State Forest Nursery to honor George O.



Figure 4. Civilian Conservation Corps enrollees tamping the nursery soil after seed was sown. (Photo Source: USDA Forest Service archives, 1934).

White, the first MDC State forester. By 1962, the Meramec Nursery closed, and since that time all of Missouri's seedling production has been at the George O. White Nursery. Since 1947, the nursery has expanded from 15 acres of seedbeds to more than 50 acres in production and the total nursery property is now more than 750 acres.

During the early years of production, shortleaf pine was the dominant species grown at the nursery. During the 1950s, 1960s, and 1970s, many nonnative species were grown, including autumn olive (*Elaeagnus umbellata* Thunb.), vitex (*Vitex* L.), multiflora rose (*Rosa multiflora* Thunb.), mimosa (*Albizia julibrissin* Durazz.), scotch pine (*Pinus sylvestris* L.), tatarian honeysuckle (*Lonicera tatarica* L.), and others. Native plant species that were grown included black walnut, many oak species, and some native shrubs. By the late 1990s, all of the nonnative hardwoods had been eliminated from production and only native hardwood trees and shrubs have been grown since (Hoss 2002). The conifer species that are grown include native shortleaf pine and eastern red cedar, and nonnative white (*Pinus strobus* L.), red (*Pinus resinosa* Aiton), and loblolly pine (*Pinus taeda* L.). Currently, the species inventory includes more than 70 species of hardwood trees and shrubs. Hardwood production and sales rates are about three times greater than the conifer production and sales rates (figure 6). The nursery's capacity can provide about 6 to 7 million seedlings annually, with the current mix of hardwoods and conifers.

For many years, shortleaf pine dominated nursery seedling production, with more than 10 million shortleaf pine seedlings produced in some years (figure 7). Most of these shortleaf seedlings were for USDA Forest Service and Conservation Department plantings. Many private landowners also established shortleaf pine plantations. During the early 2000s, under the Conservation Reserve Program (CRP), pine



Figure 5. Nursery crew grading shortleaf pine seedlings, winter 1952. (Photo source: Don Wooldridge, Missouri Department of Conservation).



Figure 6. The George O. White State Forest Nursery currently grows more than 70 hardwood tree and shrub species. On the left, a bed of pecan is irrigated. On the right, the nursery crew lifts a crop of swamp white oak seedlings. (Photo source: Greg Hoss, Missouri Department of Conservation).



Figure 7. Four-year-old shortleaf pine plantation located on the nursery property. (Photo source: Greg Hoss, Missouri Department of Conservation).

became less important to tree planters and hardwoods became the dominant tree purchased. By 2005, hardwood seedling production peaked at more than 5 million seedlings a year. Today, shortleaf pine is still one of the most popular species grown and sold, but black walnut, bur oak, pecan, northern red oak, white oak, and pin oak dominate hardwood sales.

Currently, many landowners seem to be more interested in planting trees and shrubs for wildlife than for forestry purposes. The production levels and variety of wildlife trees and shrubs have increased during the past 10 years, while the production of conifers and hardwood trees has declined. More than 10 new shrub species have been added to the inventory in the past 10 years. Hazelnut (*Corylus americana* Walter), blackberry (*Rubus* L.), and wild plum (*Prunus* L.) are usually the shrubs most in demand. Gray dogwood (*Cornus racemosa* Lam.), roughleaf dogwood (*Cornus drummondii* C.A. Mey.), witch hazel (*Hamamelis vernalis* Sarg.), paw paw (*Asimina triloba* (L.) Dunal), aromatic sumac (*Rhus aromatica* Aiton), and a number of other shrubs species are in high demand (Hoss 2006).

The reduction in funding from Federal Cost Share programs and the poor economy have led to a slow decline in nursery seedling sales since 2008 (table 1). The popularity of the State seedling program is high and the customer base is still large, but the huge tree planting projects of the early CRP days seem to be a thing of the past. In addition to adding new species over the past decade, the nursery now offers a wider variety of special bundles to landowners in an effort to increase sales volumes and add customers. The nursery offers tree and shrub bundles for fruit production, wildlife cover, nut production, and quail habitat improvement. These bundles

Table 1. Seedlings distributed by the George O. White State Forest Nursery during the past decade.

Year	Total seedlings distributed
2001–2002	6,970,525
2002–2003	5,528,125
2003–2004	6,305,750
2004–2005	4,707,125
2005–2006	5,022,175
2006–2007	5,050,875
2007–2008	4,190,600
2008–2009	3,863,550
2009–2010	3,564,725
2010–2011	3,333,200

offer landowners a wider variety of species in lower numbers and have been very popular. In some of the hardwood species, extra large seedlings, more than 30 in (76 cm) tall, are offered for sale. All of the tall oak, walnut, bald cypress, and tulip poplar seedlings produced at the nursery are sold each year.

Future Outlook

The future looks very good for the George O. White State Forest Nursery and forest restoration efforts in Missouri. The MDC Administration continues to have strong support for growing native plants in Missouri. Supporting a State-owned nursery that grows native seedlings from in-State seed sources shows citizens that MDC has a strong commitment to restoration, reforestation, wildlife habitat improvement, and the many other benefits of planting native trees and shrubs. Landowners continue to use State nursery planting stock for a wide variety of projects. MDC has teamed up with the Missouri Department of Transportation to provide free trees to all fourth graders in the State for Arbor Day and to provide trees to Future Farmers of America, Scouts, 4H, and other youth organizations for projects. MDC foresters and wildlife and fisheries managers regularly use seedlings for planting on agency-owned lands, for programs affecting a wide variety of State citizens, and for giving away at fairs and exhibits. The nursery will continue to add native species and drop other species as demand changes. Total production may decrease as Federal Cost Share program funding continues to decline, but quality seedlings from a wide variety of species will keep the nursery program viable for years to come.

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Acknowledgments

Mike Morris, Field Programs Specialist, Missouri Department of Conservation, provided all the graphs and forest cover information.

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