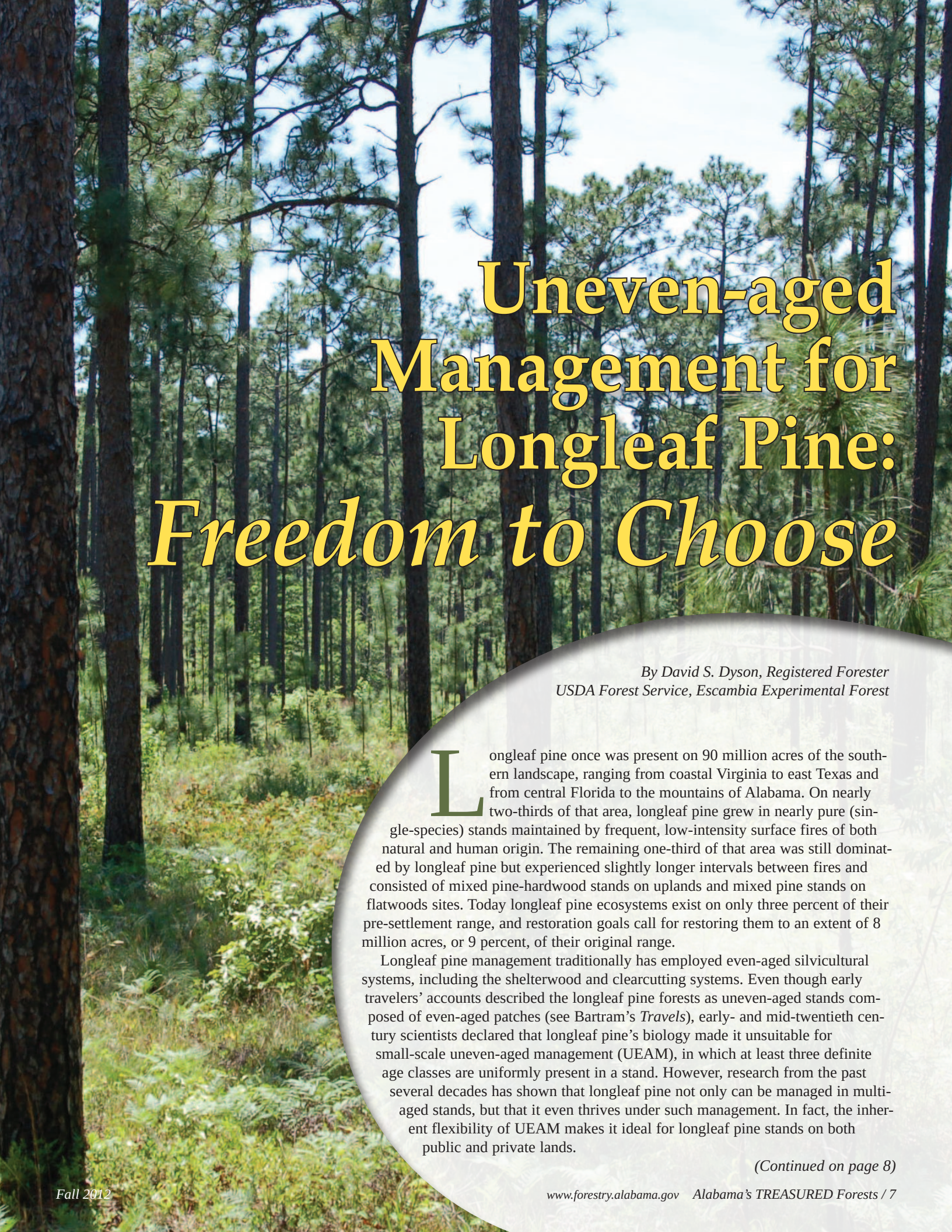

# Uneven-aged Management for Longleaf Pine: *Freedom to Choose*

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Longleaf pine once was present on 90 million acres of the southern landscape, ranging from coastal Virginia to east Texas and from central Florida to the mountains of Alabama. On nearly two-thirds of that area, longleaf pine grew in nearly pure (single-species) stands maintained by frequent, low-intensity surface fires of both natural and human origin. The remaining one-third of that area was still dominated by longleaf pine but experienced slightly longer intervals between fires and consisted of mixed pine-hardwood stands on uplands and mixed pine stands on flatwoods sites. Today longleaf pine ecosystems exist on only three percent of their pre-settlement range, and restoration goals call for restoring them to an extent of 8 million acres, or 9 percent, of their original range.

Longleaf pine management traditionally has employed even-aged silvicultural systems, including the shelterwood and clearcutting systems. Even though early travelers' accounts described the longleaf pine forests as uneven-aged stands composed of even-aged patches (see Bartram's *Travels*), early- and mid-twentieth century scientists declared that longleaf pine's biology made it unsuitable for small-scale uneven-aged management (UEAM), in which at least three definite age classes are uniformly present in a stand. However, research from the past several decades has shown that longleaf pine not only can be managed in multi-aged stands, but that it even thrives under such management. In fact, the inherent flexibility of UEAM makes it ideal for longleaf pine stands on both public and private lands.

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Primary among the economic benefits of UEAM (also called selection systems) is its conservative nature, both fiscally and ecologically. Not only are capital expenditures such as upfront regeneration costs minimized or even eliminated, but also high-value stems are maintained within the stand at all times, thus providing a reserve that can be tapped when either markets or financial needs dictate doing so. Furthermore, some UEAM systems maintain 50 percent of stand basal area in sawtimber and 80 percent of basal area in merchantable stems. (Some ongoing experiments have maintained almost 80 percent of basal area in sawtimber). As a result, the majority of growth occurs on high-value, merchantable stems instead of low-quality, potentially unmerchantable stems. Even though UEAM's short-term per-acre returns may not equal those of even-aged stands and depend on accounting procedures, its production of diverse forest products, particularly high-quality poles and sawtimber, virtually ensures positive returns.

> *"As with all longleaf pine management systems, frequent prescribed fire is crucial, but its importance in UEAM cannot be understated."*

Adaptability to changing markets is also a central advantage of UEAM — with careful management, selection systems can be adjusted to allocate more growing space to particular product classes. Yet, the conservative philosophy of UEAM can also provide a hedge against changing markets, as it produces stands that provide a variety of products at frequent intervals. Although tree recruitment rates may be reduced, the effect is less important than in even-aged systems because growing space is allocated along a continuous diameter distribution, such that each diameter class constantly adds volume. Thus, harvesting can occur at more frequent intervals and there is no time lag in which little or no merchantable volume is accruing. Furthermore, in UEAM there is efficiency in that "rotations" are overlapped in both space and time because any given acre may contain seedlings, saplings, and merchantable stems.

Because of the precision required for proper uneven-aged management of longleaf pine, the attention of a professional forester experienced in UEAM and longleaf pine ecosystems is a necessity. Uneven-aged management is an art and a science, but of utmost importance is the forester's ability to quantify the management system, showing that adequate growing stock is retained to ensure sustainability of future harvests and prevent long-term damage to forest productivity. UEAM systems follow principles that stem from longleaf pine's biology and its resulting population dynamics, yet an experienced forester can make adjustments to UEAM prescriptions to achieve specific landowner objectives. For example, harvesting schedules and volumes can be adjusted to better coincide with mast years for recruitment purposes, or overstory density can be maintained through time to suppress excess undesirable midstory or understory stems or species. Still, growing space must be carefully allocated among diameter classes in order to ensure and maintain continual recruitment and upgrowth.

As with all longleaf pine management systems, frequent prescribed fire is crucial, but its importance in UEAM cannot be understated. Because uneven-aged management relies on natural regeneration, understory competition must be managed continually to encourage proper seedling establishment and recruitment. Even though longleaf pine "bumper-crop" mast years typically occur infrequently, less abundant "seed rain" from the continuous presence of mature seed trees combined with a receptive understory — a result of proper prescribed burning — allows for some regeneration to take place at more frequent intervals. Although regeneration is a highly site-specific process, long-term data from the Escambia Experimental Forest in Brewton show that "fair or better" cone crops have occurred every three years on average (an interval as long as 10 years has also been documented). Thus, the forest is able to perpetuate itself on the landscape, and the landowner is free from worries about regeneration but can still capitalize on exceptional seed crops if so desired. Uneven-aged management and prescribed burning thus form a positive feedback cycle, as regular prescribed burning promotes the seedling recruitment that perpetuates the overstory, and the overstory litter builds a continuous fuel bed that supports fire and a receptive understory for seedling recruitment.

Scientists from the USDA Forest Service and cooperating universities have been conducting UEAM research in longleaf pine ecosystems at the Escambia Experimental Forest for four decades. Different selection systems under investigation include methods for both volume regulation and structure regulation. This research is ongoing, but data currently demonstrate the sustainability of these management systems even after repeated har-

*Stand managed with volume regulation for four decades, three weeks after a spring prescribed fire.*

vesting. However, results are also beginning to show the risk of misapplying UEAM, as stands managed by the diameter-limit cutting method appear to be developing diameter distributions that could prove to be unsustainable.

A drawback to uneven-aged management is that it cannot necessarily be applied to small tracts. Because modern harvesting operations are highly mechanized and have high overhead costs, it may not be economically viable for buyers to purchase marked sales which remove only a percentage of the periodic growth increment from small acreages.

Nevertheless, a balanced, well-managed longleaf pine forest contains products of high quality and value that may make smaller harvests feasible. Additionally, the flexibility in timing of harvests in UEAM allows landowners to coordinate timber sales with neighboring owners so that loggers can harvest multiple tracts in the same area, making sales more attractive to bidders. Also, due to the resulting diversity of cover and plant species, longleaf pine stands managed with UEAM contain high-quality habitat for a diversity of wildlife species including deer, quail, turkey, and fox squirrels, in addition to non-game species such as songbirds and the gopher tortoise.

With hunting, recreation, and aesthetics becoming more popular management objectives, UEAM provides an invaluable tool for multiple-value ecosystem management.

*The 3,000-acre Escambia Experimental Forest is managed by the USDA Forest Service Southern Research Station on land owned and provided at no cost by the T.R. Miller Mill Company of Brewton, Alabama. The forest is dedicated to researching and improving longleaf pine timber management, focusing on ecosystem restoration, management systems, fire ecology, growth-and-yield, and landowner demonstrations. For more information, contact the USDA Forest Service, RWU-4158, Auburn, Alabama at (334) 826-8700, or visit http://www.srs.fs.usda.gov/longleaf/. To see UEAM in action, visit the Escambia Experimental Forest, 35 Red Branch Road, Brewton, Alabama. Telephone: (251) 867-3942.*