Uneven-aged Management, Cone Crops and Natural Regeneration of Longleaf Pine

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Although even-aged management (i.e., clearcutting, seedtree, shelterwood) has been the dominant paradigm for regenerating forests in the Southern US during most of the 20th century, uneven-aged management (i.e., single-tree selection, group selection) was also implemented on some public and private forest lands. With emergence of ecosystem management policies in the 1990s has come an increased public interest in uneven-aged forest management approaches. Advantages, such as maintaining a continuous canopy cover for wildlife and other resource values while periodically harvesting forest products, have encouraged many in the public and private sectors to take another look at selection silviculture.

Selection has been historically practiced in various forms, such as Diameter-Limit Cutting (DLC) and Volume-Guiding Diameter Limit (VGDL) methods. When a practitioner allows only the best trees to be removed from the stand, these methods unfortunately degenerate into exploitive “high-grading,” which seriously damages the long-term genetic health and growth of the forest. An important countermeasure to this is to follow Russ Reynolds’ Rule of “Cut the worst and leave the best trees,” remembering to select trees from a range of size-classes and not simply engage in “timber mining” of the largest trees. The Basal Area-Maximum Diameter-Diminution Quotient (BDq) method is less prone to such abuse, but is rather complex to implement to the fine scales of stand control taught in classical texts. Its complexity, slowness and therefore greater expense have been the most often cited reasons for not practicing uneven-aged forest management.

The Proportional-B (Pro-B) method developed by Ed Loewenstein for application of selection silviculture is an approach that is easily learned, rapidly applied and functions at a scale sufficient to control stand structure through single-tree selection. It overcomes the objections raised to the BDq method and allows stands to be marked in a single pass with a relatively high degree of precision. The Pro-B Calculator was developed as a tool that allows forest managers to quickly evaluate a stand, compute marking guides and verify target results before implementation. The Pro-B method makes selection silviculture a more readily accessible management option and will perhaps encourage more managers to chose single-tree selection for practicing uneven-aged forest management in the future.

All uneven-aged management methods rely on natural regeneration to perpetuate the forest through the long term. All naturally-regenerated seedlings have their origin in the annual seed crops produced by mature longleaf pine trees present on the site. “Seed rain” falls from longleaf pine cones late in October of each year and germinates within about two weeks, producing numerous tiny seedlings. Although good seed years are reported to occur only once every 6 years on average (17% of the time), regional cone data and data from the Escambia EF indicate that crops sufficient for regeneration have been
occurring with increased frequency during the most recent 20 years. Although even-aged management methods must be conducted in a careful manner so as to avail themselves to the large less-frequent seed crops, uneven-aged management methods need not be conducted in this manner. Since a greater number of trees are maintained in the stand at all times, longleaf pine seed rain even in modest years is always incident on the site. Thus, if the forest floor is maintained in good condition though periodic prescribed burning, then a good seed catch is likely to result, even when cone crops are not at their peak. Therefore, uneven-aged methods free the manager from being slavishly dependent on the cyclic cone crops produced by longleaf pine.

Mature, natural longleaf pine forests have been described as an uneven-aged mosaic of even-aged patches distributed across the landscape. As you look at such a forest, you will note the numerous cohorts of various sizes often occurring in clusters. This is a structure similar to that resulting from long-term application of selection methods. The actual pattern observed depends on the disturbance history of the forest, in terms of large-scale tropical storms and smaller scale tornados, lightning strikes, fires, bug-spots, etc. But, the observer should always be mindful that size-class is NOT always a good indicator of age-class. Longleaf pine seedlings can remain in the grass-stage for many years before bolting up toward the canopy. Quite often small seedlings are many years old and may occur adjacent to larger, though younger seedlings and saplings. The complex geometry of interspecific and intraspecific competition plays a role in determining what a longleaf pine stand looks like at any single point in time. Unlike even-aged methods, single-tree selection does not necessarily increase stand uniformity, since it can be implemented in a manner that preserves the natural variation at multiple scales and leads to a forest of variable density and structure (i.e., natural variation in the patterns of tree clustering and dispersion). When multiple waves of regenerating seedlings are added to the residual overstory, a complex, stable and sustainable forest results.

For more detailed information about longleaf pine regeneration ecology and methods, uneven-aged silviculture and numerous related topics, the following book is suggested:

Uneven-aged Stand Structure

Density (trees per acre)

Diameter Size Class (inches)

Fourth Wave

Idealized Uneven-aged Stand Structure Curve

Third Wave

Second Wave

First Wave of Regeneration
Regional Longleaf Pine Cone Production (1966-2008)

Cone crops for regeneration ($\geq 30$ cones per tree) = 17 of 43 = 40% of all years

Fair or better cone crops ($\geq 25$ cones per tree) = 21 of 43 = 49% of all years

Cones per Tree

Year


Bumper Crop 1

Good Crop 4

Fair Crop 16

Poor Crop 11

Failed Crop 11
Escambia EF Longleaf Pine Cone Production (1958-2008)

Cone crops for regeneration ($\geq 30$ cones per tree) = 15 of 51 = 29% of all years

Fair or better cone crops ($\geq 25$ cones per tree) = 17 of 51 = 33% of all years
Longleaf Pine Management for the Private Landowner Forestry Field Day

In celebration of the 60th Anniversary of the Escambia Experimental Forest and the Farm 40

May 12th, 2009
Escambia Experimental Forest
Brewton, AL

"Dedicated to a future in American forestry for one of the finest timber trees the world has ever known."
W. C. Wahlenberg, from Longleaf Pine