GROWTH IMPROVES STOCKING

by

R. F. Kennedy

ABSTRACT

The FIC (Forest Industries Council) Productivity Study of 1979 indicates 2.5 million acres of NIPF lands should be regenerated each year in the south. This figure is repeated by other state studies of the Forest Survey which indicate 1/2 of cutover lands are not regenerated. Provisions for natural reproduction offer the only feasible near term opportunity to reach this goal.

Forest Survey standards for less than good stocking start at approximately 60 ft²/Ac. basal area of desirable species. Studies show less than half of the stocking will grow into "well stocked" by release from undersirable. Four acres can be so treated for the cost of mechanically treating the site and planting.
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We are probably under-utilizing the best investment opportunity available to us in the South for improving the southern pine forest. The release of existing pine stocking on pine land from overtopping and undesirable hardwood by tree injection can be accomplished today at a cost of around $35 per acre. By contrast, intensive site preparation and planting will range from $100 to $150 per acre.

Forest Survey data show the average acre of pine site supports 150 2 in. and 4 in. trees. Although many acres support far more than this, there are thousands of acres with this minimal stocking that, if released, will develop into acceptable stands of sawtimber. For the same investment 3 to 4 acres of this lower level of stocking will develop more income than the one acre of ideal stocking.

Survey data indicate that of the 200 million acres of commercial forest in the South, approximately 135 million acres may be classified as pine sites, regardless of the type that may now occupy the land. Of this, approximately 90 million acres are held by non-industrial private forest land (NIPF) owners. Many agencies have addressed their attention to these holdings as having the greatest potential for improved production.

A recent report by the FIC on forest productivity indicates 9.3 million acres of cut-over land need to be regenerated and 21.7 million acres require the conversion to pine. The southeastern region reports no need for TSI while the southern region reports 10.6 million acres. These acreages total 41.6 million, or 46% of the NIPF pine land in need of heavy cultural investment.
Harvest cutting is proceeding at an increasing rate but the acres affected are not reported on an annual basis. Recent studies by Boyce and Knight, of the Southeastern Station, and by Beltz, of the Southern Station report that approximately half of the forest land is cut in one form or another in the decade between Forest Surveys. This suggests an area of 4.5 million acres per year is cut over on NIPF pine lands. They further report that half or more of this cut-over land is not regenerated. These data suggest we must regenerate 2.5 million acres per year to make inroads into the backlog of poor stocking. Yet, the Forest Service in Tree Planters Notes, the FIC productivity study and the Pine Reforestation Task Force report planting on NIPF land at only the 300 to 350 thousand acre per year level with a near term nursery capacity of no more than 400 thousand acres, Figure 1. Clearly two options are available to us: we can utilize natural reproduction where feasible or we can release existing pine stocking from undersirable trees.

Thirty-five years of experience in Southeastern Arkansas indicates that management with the use of fire and control of hardwood readily establishes pine reproduction. Management programs from Mississippi to East Texas indicate this is not unique. On private lands small tracts will regenerate naturally with hardwood control (cutting or otherwise) when the timber is harvested provided there is an available seed source. Witness to this is the common practice by industry to clear areas larger than needed to avoid natural reproduction. On larger areas, seed trees, or a light shelterwood, must be used to establish reproduction but hardwood control is the key to success. An operable cut must be left in order for it to be practical to remove the overstory as reproduction is established.
The second option is more difficult to evaluate. The release of established well-stocked stands of pine from overtopping hardwood has been well documented. Reconnaissance of a tract should readily identify these areas. Bear in mind the Forest Survey was not designed for management or cultural options. Hence, a seedling count is not made, although the number of 2 in. and 4 in. trees is reported. We are thus appraising the potential of this ownership with no estimates of the number of pine seedlings.

However, the Survey will publish "Special Resource Analysis Tables" by state upon request, including tables listing area by stocking percent of desirable trees. A desirable tree is one that would be favored under management of the area. The area by stocking groups is shown for Arkansas in 1969 in Figure 2. Note that only 2.5 million acres, less than 15 percent of the forest, are classified as well stocked by Forest Survey standards, 60 percent or greater stocking. This standard is 40 ft²/acre of basal area in 6 in. trees, 60 ft²/acre of basal area in 18 in. trees, or 300 ft²/acre of basal area in 2 in. to 4 in. trees.

Analyses of our southern forest have presumed that areas less than well stocked will require planting to bring these areas into full productivity. However, data and experience indicate that at least half of the area classified as "poor" will grow into well stocked in ten years upon release from "undesirable" trees.

Dr. Walter Meyer of Yale described this tendency of stands to approach normality. In its simplest terms he was referring to the fact that trees at low levels of stocking grow faster and that with increasing levels of stocking individual trees slow in growth. Recently, Murphy and Farrar of
the Southern Experiment Station reported on over 20 years of growth records on extensive cutting cycle studies. In these areas hardwood was not a factor as a part of the overstory. Within the range of observation from 30 to 80 ft²/acre of basal area in merchantable pine, 3 ft²/acre of basal area was added each year throughout the range of stocking.

A dense 6 ft. x 6 ft. plantation was reduced to 100 of the best trees at age 9, leaving 15 ft²/acre of basal area. In ten years it was necessary to thin to 85 ft²/acre of basal area. At age 30, 10MBF Doyle had been produced and we had a full stocking at 85 ft²/acre of basal area with 40 trees per acre. Although conditions for growth had been maintained at ideal, this study illustrates the tremendous potential of low stocking to grow into full stocking given the room. It is the sudden sawlog study at Crossett.

The Farm Forestry 40 at Crossett was established in 1937 and is widely reported. We find, however, that new foresters have not been exposed to this data at school, much of the industry has overlooked it in dealing with private timberland owners and the Forest Survey ignores it. The study shows that 35 ft²/acre of basal area with 85 trees/acre became 70 ft²/acre with 5000 board feet per acre with a PAI of 240 broad feet Doyle in 13 years while 700 board feet per acre of pine was cut along with all the hardwood. This was typical woods run residual development of second growth timber following 23 years after the old growth was removed.

Figure 3 presents a reasonable cash flow expectancy given 2 levels of "poor" stocking following release from hardwood at a cost of $35/acre
compared with complete site preparation and planting. Total production is assumed at 8 thousand board feet Doyle for the plantation, 13 thousand Doyle for the poor stand of 6 in. trees, and 13 thousand for the 35 ft²/acre of basal area on the poor Farm Forestry 40 plus the 2 thousand board feet original volume.

No inflation has been assumed for this illustration in stumpage price or interest rate. Various other experience could be utilized for this comparison. However, the point remains that low levels of pine stocking, given release, will grow into good stocking with significant savings in time and money.

This release cutting approach has great application on the southern NIPF lands as it calls for far less cultural investment and provides for earlier returns than site preparation and planting. Because of the magnitude of the job, planting should be confined to areas where there is no other alternative.
Fig. 1. Acres Planted or Direct Seeded On Private Non-industrial Ownership In The 13 Southern States 1956-1976
Fig 2. Area by Stocking in desirable trees, AK, 1969.
Fig 3. Cumulative PV Cash Flow @ $10/ed, $200/m @ 7% (no inflation)