

Future Management of the Southern Pines

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The only rational basis for this discussion must be within the framework of Don Stevenson's observation that the intensity of our future forest management will depend only little upon our technical prowess, and, indeed, only partially upon future supply and demand, but will be affected largely by the complexities of the world, national, and regional economies, and especially those peculiar to each forest operating organization.

But if we will presume that these relationships will be favorable for additional investments in forestry, which will in turn yield additional economic benefits, we might spend a few minutes in speculating how we might intensify these investments, and hence our forest practices.

Several years ago I had the assignment of trying to find out what the research needs were for the management of the southern pines. It seemed to me at the time that the best way to approach this was to find out what the future management practices were likely to be, and that the best way to do this was to hit the road and talk with forest managers.

I finally cornered about 50 professional foresters of many faiths and persuasions. They represented pulp and paper companies, lumber companies, State forestry commissions, National forests, schools of forestry, as well as research foresters, both public and industrial. They were a diverse group, but they had one thing in common: each held a responsible position, roughly equivalent to woodlands manager (or assistant or staff forester) or was recognized as qualified in some segment of forest management or research.

To these, the following questions were put: (1) What do you think the future forest practices will be in the southern pine region? (2) In connection with these practices, what are the problems needing solution?

As might be expected, the answers to the first question varied by objectives of management and locality, and, of course, there was considerable discussion of what products were to be produced. But everyone agreed that practices will become more intensified, with greater investments in cultural measures resulting in lower unit production costs. Further, with the exceptions to be noted later, there were strong opinions that future practices, particularly on the larger ownerships, would be intensive culture for the mass production of wood *fiber* of

high quality especially in woodlands in proximity to the mills. This will be done by :

- a. Complete ground preparation, not only for type conversion but for many pine sites.
- b. Artificial regeneration, by planting and direct seeding.
- c. Such cultural measures as may be profitable: fertilization, cultivation, protection from pests, etc.
- d. The shortest possible rotations, consistent with the production of the desired size, quality, and uniformity of the fiber-package.
- e. Efficient extraction and conversion into a marketable and competitive product.

Divergent opinions were expressed by a small group of foresters whose product objective is sawtimber, and especially those whose timberlands are located in areas of high site quality. In such areas, natural regeneration of the pine types is relatively easy, given a modest investment in the control of competitors. Seed supply is consistently high, and moisture for germination and survival is seldom limiting. Natural reproduction is considered to be more suited to the production of saw logs, poles, and piling, where rate of wood increment is secondary to quality increment. Nor is the longer regeneration period as vital a factor as it is in short rotations.

There are trends and countertrends, yet it is the consensus that the relative production of sawtimber will decline in the future, and that the management of the forest will be geared to the production of wood fiber on essentially an assembly line basis. These notions could easily come from a sampling heavily weighted with pulp company foresters. But the fact remains that intensive forestry will be practiced by foresters—and large holdings by lumber companies in the region are declining.

This is no place to toll the bells or mourn the passing of a vital segment of the forest products industry. The production of lumber still absorbs the largest share of the production of the forest. And yet if we are to discuss future practices we must inevitably do so with the view of future products.

Perhaps this is an irresponsible and sweeping generality, but we are told that the processing of lumber would frequently be an unprofitable venture if it were not for the sale of chips from mill

residues. We are further informed that the current market is more favorable to the lower grades of lumber than the better grades. We see the increase in lamination and the rapid rise in the production of particle-board. One can reasonably question the advisability of choosing to grow high-quality saw logs, on a purposeful investment basis with rotations in excess of 50 years.

But whether you agree or not as to whether the lumber industry will decline or not, the most significant point remains: the advanced practices of the region will be directed toward the production of wood fiber for conversion products.

It appears, then, that these advanced techniques, whatever they may be, are likely to be applicable mainly to the large industrial ownerships. The problems peculiar to the small owner, and those of the National forests too, will call for somewhat different approaches. But let no one suggest that the forester is not aware of the many problems associated with these practices. He knows full well, for example, that if the 30 million acres of large ownerships are to be managed on a 30-year rotation, 1 million acres must be regenerated each year—and if planted, almost *1 billion* seedlings must be planted *each year*. He is also aware that much is still to be learned about planting and direct seeding, and of the management of plantations. He knows, too, that insects and disease will have a greater impact upon his intensively cultured stands. But he looks hopefully for answers, through organized research and through his own mass empiricisms and those of his colleagues.

What are the specific practices and what are some of the main problems associated with them? Briefly, they break down into:

1. Seed and seedling production.—If artificial regeneration becomes common practice, it is evident that large quantities of seed and seedlings will be required. As for quantity of either, there seems to be no great concern, although some adjustments will certainly be needed. With rotations being shorter, seed production areas will become even more necessary, with the collection and storage of seed in good seed years to meet anticipated demands.

As for quality, everyone seems confident that the programs in tree improvement will produce seed and seedlings with superior qualities. This, they point out, is one of the most compelling reasons for shifting over to artificial regeneration.

Those who propose planting programs believe that more efficient nursery practice will provide seedlings of better vigor and improved field survival and growth. They are counting on improved culture in the nursery and better methods of lifting, handling, packaging, transportation, and storage of seedlings.

2. Site preparation.—This has been thoroughly covered by Don Stevenson, but I should mention one matter of concern to the foresters in the northern part of the region. They wonder whether the

techniques, mainly mechanical, but also fire, will cause deterioration of the heavier soils, as in the Piedmont and parts of the upper Coastal Plain. Although bulldozing or any method of topsoil movement is no longer advocated, they are alert to the possibility of soil compaction through the use of heavy equipment, and of erosion through disturbance.

3. Techniques of artificial regeneration.—The regeneration period—that most vulnerable point in the rotation—will come more frequently. It is here that losses are most likely to occur, and costs to soar. We need to know how to insure successful regeneration, with our blooded stock, and how to do this with the least cost. It may be surprising that so many organizations have proceeded with large-scale programs of artificial regeneration with so little actual experience and background in woods planting. It is presumed that the planting techniques are the same as those of the extensive old-field plantings of the past 20 to 30 years. Yet those who have observed the misshapen roots of planted trees, as reported by Trousdell and others, are wondering now if trees are currently being planted less carefully than back in the days of the Civilian Conservation Corps and whether it makes much difference if the roots are "balled-up" anyway.

Since there should be little difference in root development between plantings in old fields as opposed to well-prepared woods sites, they feel that if root arrangement proves significantly to affect survival and growth, then more care can be exercised in planting, and if this cannot be done efficiently, then there is always the alternative of direct seeding.

As a matter of fact, the success of direct seeding during the past few years has given the forester considerable confidence. Its advantages are well known, as are the disadvantages. The forester feels that broadcast seeding has adequately served the purpose of quick regeneration of large areas, but future seeding will be mainly by spots or rows.

So it appears that the forester has several alternative techniques for artificial regeneration. One bothersome point, for which he has no ready answer, is the invasion of volunteer seedlings into the neatly spaced plantation; if heavy, this could be quite annoying.

4. Growing stock levels.—The forester presently has only scant information on which to base his decisions as to spacing in his plantations. He knows, for example, that close spacing generally yields more total volume of fiber for the first 15 or 20 years or so than the wider spacings—but the wider spacings produce more usable wood more efficiently extracted. And he also knows that it is cheaper to plant 500 trees per acre than 1,000. So the trend is toward 8 by 8, 8 by 10, 10 by 10, and wider. But how should this vary by site quality? Or by intensity of ground preparation? How does spacing affect wood quality and fiber yield? Or its effect upon competing species? What are the growth responses to thinning? How might spacing be varied

with the use of intensive cultural practices, such as fertilization, cultivation, and pest control?

At present, and for some time to come, the forester will be managing three distinct populations: the natural stands, old-field plantations, and forest-origin plantations. How different are these populations in their growth responses to different levels of growing stock?

It is well to note that few foresters have precisely similar objectives and resources for timber management. Some are more concerned with wood quality than others; some have limited and consolidated holdings, while others may have scattered lands distant from the mills. Financial structures and objectives may differ; one may choose to produce greater yields per acre at lower returns on invested capital, while another may be vitally concerned with generating the highest rate of return. So it seems futile to search for regional "optimum stocking." These foresters are quite capable of choosing their own optima, given the biological responses of any array of stocking levels and treatments.

5. *Site improvements.*—As one forester in Virginia put it: "We can't buy reasonably good forest land any more; in fact, because of population pressures and all sorts of progress, we're being pushed off our better lands now. We are going to have to learn how to grow crops of trees on the dry deep sands, the organic wetlands, and the heavily eroded soils." So we see sizable programs of scrub-oak clearing in the sandhills and ditching for water control in the wetlands. How will the pines perform? And in between the drylands and the wetlands there are a lot of shallow soils, sites 50 to 70, where pine trees are growing slowly.

What can be expected in site improvement? The addition of nutrients through fertilization, the control of moisture both excess and deficient, modification of organic hardpans—are all possible. Another approach would be some modification of the trees instead of the soil: perhaps, the development of drought-resistant and flood-resistant strains, or the adaptation of species to site, such as the current trials with sand pine on the dry sites.

6. *Control of insects and diseases.*—As recently as 15 years ago the average forester in the region dismissed as minor nuisances the few forest insects and diseases he encountered. He had been aware, of course, of the threat of the southern pine beetle and others, but as the years went by without major depredations, this too was dismissed. He took comfort in the knowledge, for example, that littleleaf disease was restricted to stands on depleted soils. He learned that the frequently extensive damage caused by tip moth in young old-field plantations became less important as the plantations became older. He dutifully salvaged his Ips-killed trees, or absorbed the loss, with the view that this was one of the hazards to be expected in growing timber, especially in the dry years.

As long as the forester was busily engaged with the many household chores needed before the truly professional job of management could begin, and

as long as he was dealing with (and frequently liquidating) naturally grown, second-growth timber, such things as insects and diseases were of minor concern. More pressing jobs needed to be done. Land acquisition, boundary surveys, fire protection, road construction, inventories, etc., took all available time. Following these came the job of large-scale rehabilitation of understocked, depleted, and idle lands.

But during the course of all this, the forester began to take a closer look at his trees because he is determined to let nothing upset his carefully planned program of management, and certainly not his "forester-grown" timber stands. He discovered *Pales* weevil, the cone insects and diseases, *Fomes annosus*, and tip moths on the tops of 80-foot trees where they were not supposed to be. When he plants 600 trees to the acre he wants 600 to survive, and if any thinning needs to be done he wants to control it.

With all his enthusiasm for the intensive production of trees, the forester seems a bit uneasy, for he knows that his forest will be vulnerable to the common insects and diseases. He is aware that even if no new pest arises to plague him, there will be a greater impact upon his intensively cultured stands than ever before. Even so, he is quite optimistic about his ability to cope with this problem. He hopes that research will provide him with effective control techniques, particularly with the use of systemics. He is counting on the development of genetic strains resistant to all pests. But most of all he feels that he is flexible enough to change his practices if and when the pests become dominant.

7. *Methods of harvesting.*—Another point of agreement among almost all foresters in the region is that along with our intensive culture of the forest we must streamline our methods of extraction of products, and this will strongly influence our management practices. The need for more efficient extraction techniques is evident. Decreasing supply of woods labor, the drudgery of it and inefficiency, increasing minimum wage standards, increasing taxation, and the tremendous rise in paperwork connected with it all surely indicate that improvements must be made.

In speaking of pulpwood logging, one of our foresters commented, "The tree itself, free of limbs, forms a nice package, but we proceed to sail into it, cutting it up into confetti at the stump—and then struggle to re-assemble these pieces on a truck or railroad car."

But whether we leave the tree as confetti or whether we go into long-length logging, it is certain that mechanization will necessitate large-scale operations. For one thing, we will have to change some of our notions about thinnings—although I am not so sure that we will be thinning in our short rotations. But if we do thin our stands, spacings must be such as to permit access of the mechanized equipment, and volumes must be high enough to justify its use.

And at the same time we must accept systematic selection of trees to be removed as thinnings: whole rows or some such. But no longer will we spend time making judicious professional decisions as to which tree to cut and which to leave. Because of the anticipated advances in tree improvement, all our trees will be alike as peas in a pod, and the only decision to make is how much to cut.

Trend Toward a Monotype

What will the intensively cultured forest be like? If the forester has his way, there will be sizable areas of pure, even-aged stands with a minimum of competing species. No one conceives of vast areas, for the land-use pattern in the region is such, as are the sites, that it is unlikely that there will be many stands in excess of a thousand acres homogeneous as to species and age.

The forester doesn't seem to be impressed by the several classic examples of failure of tree monotypes. He points out that pure even-aged stands of the southern pines have existed in the region for many years, without untoward losses. He also knows that any forest management will increase the risk of economic loss, and that although the unmanaged wild and mixed-species forest may be the "safest," it is certainly not the most productive.

He further argues that even though risks can be scattered, and perhaps minimized, by scattering his stands and age classes, these will be more complex and costlier to manage. And yet, paradoxically, if he achieves success in his search for improved strains of trees, he may incur even greater risks, for how vulnerable will be the monotype, especially if founded upon an increasingly narrow genetic base?

Just a few words in conclusion. I don't suppose that what I have said is really new, for many of these practices are currently being applied. But I would like to insert a word of caution. The streamlining of our forest operations is inevitable as we strive toward greater efficiency, for to remain competitive in this free enterprise system we must increase production with decreased unit cost. And here may be the trap; may we not be led into what might be called forestry by the average? To streamline, we must smooth out the bumps and depressions. Yet these bumps and depressions represent the biological variations inherent in forestry, many of which may be profitably ignored because they would be too costly to recognize. To ignore others, however, could lead to substantial losses of production opportunity.

No one advocates the tree-by-tree forestry typical of the Europeans. But let us beware of the sausage grinder.