In the Eye of the Beholders

Figure 1a. Tallassee. No control - 13 years.

Public Views on the Aesthetic Value of Pine Stands Regenerated by Different Methods

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Figure 1b. Tallassee. Woody control - 13 years.

Most people enjoy the beauty of forest scenery. There is a unique beauty that emanate, from forests that has been treasured by generations of Americans and continue to inspire us all at times. Many non-industrial private forest landowners consider forest scenery as one of their top ownership objectives. Public forest managers, on the other hand, must consider the "visual impacts" of forestry operations when planning any management activity. Forest aesthetics is becoming one of the most demanded "non-timber outputs" and often drives forest policy decisions, like limiting clcarcutting. Yet, how do we manage for forest aesthetics? How do we assign value to aesthetic attributes? How do people vary in their sense of forest stand aesthetics! Answering these questions is only in the initial stages, and will take some time. Assessing or valuing forest scenery is a challenging job, especially since there is no real market or price for it. It is also common that one person's likes may be another person's dislikes.

Our study of forest aesthetics used a very common yet somewhat difficult subject matter-young pine stands and plantations at about midrotation. These are not generally considered the most beautiful of forest settings, yet such stands are an increasing component

across many forested landscapes. In our research, we studied large research plots with documented establishment procedures using a wide range of site preparation treatments. Both a National Forest site and an industrial forestry site were studied. Our research approach used individual interviews from a wide range of people who were shown color photographs of the test stands. This is becoming a common approach used by researchers to study non-commodity values of forest stands and landscapes. Here we summarize what we found on the *perceived* aesthetic value of the loblolly pine stands regenerated by different site preparation methods. The entire report has appeared in the *Southern Journal of Applied Forestry*, August, 2000 issue.

Figure 1d. Tallassee. Total control - 13 years.

Site Prep Outcomes

Two sets of experimental plots had been established 15 years earlier on harvested sites in the Tuskegee National Forest and on a nearby industrial forestry tract. Both were located in the loam hills of the Hilly Coastal Plain in eastern Alabama and were medium-high in pine productivity. Four different site preparation treatments were being tested at each site, some experimental, some common, ranging from extensive to intensive. The treatments cover a full range of regeneration approaches in use today.

Figure 1c. Tallassee. Herb control - 13 years.

To start our study at the National Forest site, only pines greater than 4 inches diameter were harvested from a 42-year old loblolly pine plantation that had been planted by the Civilian Conservation Corps. Large to small hardwoods remained along with natural pine regeneration. The site preparation methods tested were (1) none, leaving the unharvested pines and hardwoods, (2) chainsaw felling of all woody plants, (3) herbicide tree injection using Tordon® for controlling both hardwoods and pines, and (4) spot-grid applications of the soil-active herbicide Velpar®. In the following winter, loblolly pine seedlings were planted on all plots using an 8 ft square spacing.

Fifteen years later, these site preparation methods yielded four different forest stands (***Figure 2a-d***). No site

Figure 2a. Tuskegee. None.

preparation yielded a mixed uneven-aged stand regenerated by both volunteer and planted pines along with a quarter of the basal area (BA) in old and resprouted hardwoods. The stands regenerated using chainsaw felling and tree injection both resulted in even-aged plantations, with one-half to one-quarter of the BA in hardwoods, respectively. In stands treated with the soil-active herbicide, most hardwoods were controlled (mainly oaks), which left the volunteer and planted pines to yield an uneven-aged stand with only 5% hardwood BA and high pine densities. The projected net present value of these stands for a 40-year rotation (with thinnings) were $810/ac with no site prep, $514 with chainsaw felling, $561 with tree injection, and $978 using the soil-active herbicide. Thus, the use of soil-active herbicide gave the greatest return followed by the no site preparation [illegible] advanced pine regeneration.

At the industrial forestry site near Tallassee, both pines as well as hardwoods greater than 4 inches diameter were also harvested from a previous pine plantation. But here the entire site was roller drum chopped and burned, and loblolly pine seedlings were planted at a 9 ft square spacing. Additional intensive competition control treatments were then applied. The four treatments used were (1) no treatment, only chopping and burning, (2) complete woody control for the first 4 years of the stand using repeated herbicide applications, (3) complete herbaceous plant control for 4 years while leaving woody vegetation, and (4) total control of both woody and herbaceous competition for 4 years. These experimental treatments represent extreme outcomes not often seen operationally. They simulate when operational herbicide applications applied during site preparation are completely successful in controlling target competition components.

At age 15, the even-aged plantations at the industrial site differed significantly in both hardwood component and herbaceous ground cover (***Figure 1a-d***). Plots receiving no additional control after chopping and burning, as well as the herbaceous control plots, had one-quarter of their total BA in

Figure 2b. Tuskegee. Chainsaw felling.

Figure 2c. Tuskegee. Tree injection.

hardwoods. Herbaceous ground cover was 3% on both of these treatments at age 15. Woody control and total control plots had less than 1% of their BA in hardwoods, but 42% and 1% ground cover, respectively, which was mainly vines. Compared to the chop-burn and herbaceous control plots, the basal area in pine was 31% and 68% greater on the woody control and total control plots, respectively. Projected net present values for a 30-year rotation for these stands using substituted operational equivalent costs were $535/ac for chop-burn, $600 for woody control, $344 for herb control (without woody control), and $585 for both woody and herbaceous control. Thus, these even-aged stands presented wide variation in composition and structure, and financial outcomes.

Assessment of Aesthetic Value

Surveys were conducted to identify public preferences for the stands generated by the site preparation methods. Several students trained in survey techniques and general forestry interviewed 200 people for the Tuskegee site and 255 for the Tallassee site. Interviewees were randomly selected at local schools, gas stations, shopping malls, and streets in Macon, Montgomery, and Lee counties. These counties, ranging from rural to cosmopolitan, are located near the study sites. Respondent selection was guided by factors including age, gender, race, education, and income, with a goal of choosing interviewees to resemble their distributions in the general population of the three counties as much as possible. Face-to-face interviews were used to ensure interviewees understood questions consistently. The questions centered on: (a) recreational behavior and opinion about public and private forest management, (b) ratings and valuation of the stands regenerated by site preparation treatments, and (c) socioeconomic and demographic characteristics of those interviewed.

During the interview, each respondent was shown four enlarged (8 by 10 inch) color photographs of the forest stands resulting from the four treatments at each experimental site (***Figures 1 and 2***). One photo for each treatment was used. This approach sacrificed displaying the variability in treatment outcomes to avoid complexity and potential confusion during the interview, which could have prevented respondents from giving their true preferences. The photos were carefully taken and selected to best represent the average effect of the treatment methods. The color photographs used for the interviews were taken at eye level in early April at the beginning of the fifteenth growing season, during the leaf-out phase. Previous research has shown that values for scenic beauty decrease as

Figure 2d. Tuskegee. Soil-active herbicide.

foliage appears and visual penetration decreases. The respondents were asked to state their preferences by rating the four forest stands using a score ranging from 0 to 10 with 10 for the best. Aesthetics and other non-timber attributes of the forest stands were also included in the survey. Interviewees were not told that herbicides had been used in site preparation or about the economic outcomes of the treatments.

The Public's View

As far as general preferences on forest management, over half of those interviewed (60%) "would like" both public and private forests to be managed for both timber and non-timber benefits. They considered wildlife habitat as the most important non-timber benefit and hunting as the least important. Aesthetics ranked sixth, with no single benefit dominating the others. Not surprising are the findings that the public wants a variety of benefits from forests.

The "no site preparation" stand was the most preferred of the National Forest stands as far as aesthetic value (*Figure 3*). This stand had multiple layers in height with a few large trees, and more visual penetration than those resulting from other treatments. Other research has shown these same stand characteristics improve user's values for forest beauty. Following no site preparation, tree injection came second with chainsaw felling and soil-active herbicide rated third and fourth, respectively. Statistical tests confirmed there were real differences in the respondents' preferences, although the overall average differences were not great. The stand generated without site preparation was rated significantly higher than those produced by the other three methods, which did not differ statistically.

At the industrial forestry site, the stand generated by total control was rated lowest in terms of aesthetics. Rows of pine trees without understory vegetation was considered the least attractive. The respondents perceived no significant difference in aesthetic value among the stands generated by chop-burn, herbaceous control, and woody control. Compared with other stands, the one generated by total control was monotonic or lacked layers, even though it displayed the greatest visual penetration. In general the respondents, when considering forest scenery, liked forests with a diverse stand structure and composition.

Public's View of the Importance of Non-Timber Benefits:

1. Wildlife habitat
2. Hiking/walking/cycling
3. Picnicking
4. Biodiversity
5. Camping
6. Aesthetics
7. Bird Watching
8. Hunting

The two surveys revealed almost identical effects of the respondents' socioeconomic and demographic characteristics on their ratings of aesthetic values. The respondents' outdoor recreational activities, age, education, income, employment, occupation, and living distance from the forest site all had a significant impact on their valuation of the forest stand aesthetics. The respondents who had actively participated in outdoors recreation gave overall higher ratings than those who had not. The respondents aged at 40-60 appreciated the stand aesthetics more than any other age groups. Education was positively related to the ratings—the higher the education grade, the higher the rating. Homemakers and those who were employed valued aesthetics higher than unemployed and

students. The respondents who lived more than 150 miles away from the site rated the stand aesthetics lower than the rest. Interestingly, there was no gender difference between men and women in valuing forest scenery.

Comparisons of two groups of young pine stand from differing silvicultural treatments indicated that the public perceives significant differences in their aesthetic values. In general, the public preferred forest stands with diverse structure and composition when considering aesthetic value. As a result, they seemed to favor stands regenerated using no or minimal site preparation. The forest stand generated by no site preparation after harvest was preferred to those resulting from chainsaw felling, tree injection, and soil-active herbicide. And the forest stand generated by total control was less attractive than those established by no further treatment, woody control, and herbaceous control after burning and chopping. Preferences among no control, woody control, and herbaceous control were small and not significant Thus, site preparation with less thar total control could not readily be detected in stands 15 years later. The respondents' age, education, income, employment status, and living distance from the forests also had a significant effect on their ratings, but gender did not.

It should be remembered that the effect of treatments can vary in other locations due to differences in the amount of natural regeneration and soil, topographic, and climatic conditions. Also, the ratings presented here are only springtime stand-level aesthetics. The respondents considered neither timber value nor site preparation cost. In terms of timber production alone, the soil-active herbicide and woody control methods appeared to be more profitable, particularly in a short rotation period. Landowners should consider and balance all ownership objectives when selecting a site preparation method.

Further Reading:
The following articles have information specifically related to assessing forest scenery:

Brush, R.O. 1979. The attractiveness of woodlands: Perceptions of forest landowners in Massachusetts. For. Sci. 25:495-506.

Buhyoff, C.J., R.B. Hull IV, J.N. Lien, and H . K Cordell. 1986. Prediction of scenic quality for southern pine stands. for. Sci. 32(3):769-778.

Gan, J., S.H. Kolison, J.H. Miller. 2000. Public preferences for nontimber benefits of loblolly pine (Pinus taeda) stands regenerated by different site preparation methods. Southern Journal of Applied Forestry 24: 145-149.

Ribe, R.G. 1989. The aesthetics of forestry: What has empirical preference research taught us? J. Environ. Manage. 13(1):55-74.

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This article is based on research first published in the August 2000 issue of the *Southern Journal of Applied Forestry.*