ESTHETIC CONSIDERATIONS IN MANAGEMENT OF SHORTLEAF PINE

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ABSTRACT

Application of esthetic concerns in the management of Shortleaf Pine or any species should be predicated on a systematic approach. Many mitigation techniques are available, but those selected will need to be carefully tailored to the specific situation and to the unique characteristics of plant communities and landforms involved. Some additional costs should be anticipated by forest managers who are commited to manage all natural resources. The growing use of computer technology will lead to increasingly sophisticated application of computer graphics to resolve resource conflicts.

INTRODUCTION

Historically, esthetics in forestry has not been a very relevant factor. Undoubtedly, many of those who pioneered in the early days of the timber industry in this country had an underlying recognition of and a concern for the natural beauty in which they labored. While this concern has only attained a status approaching that established for commodity forest resources in recent years, there is evidence that forest esthetics easily qualifies as an octogenarion.

Our earliest reference dates from 1903, in which the following is quoted from the Bureau of Forestry Departmental Reports - Report of the Forester:

> Southern Appalachian Hardwoods - "The tract of the Linville Improvement Company, comprising 16,000 acres in Mitchell, Caldwell, and Watauga counties in North Carolina, offered a somewhat unusual problem in the preparation of a working plan. . . . The present owners desire to cut the mature trees in such a way that the beauty of the forest will not be impaired, while its condition will be improved. . . . The problem of lumbering at a profit in such a way as to improve the condition of

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the forest without impairing its beauty was carefully studied. . . . The working plan contains detailed instructions for the location and execution of the cuttings, so planned as not to injure standing trees and young growth, and to provide for reproduction."

Thirteen years later, an early textbook authored by Yale University Professor James W. Toumey included the following paragraph under a section entitled "Species Selected for Their Esthetic Qualities":

> "When the object in establishing a forest by seeding or planting is its pleasing appearance in the landscape, the choice of species is less restricted. It depends upon the personal taste of the owner and the esthetic qualities of the species. The effect produced is governed primarily by the grouping of the species and how well they fit into the general landscape. For instance, the form and foliar effects of species that are effective along water courses are usually inappropriate on high ridges. In most instances, a mixed uneven-aged forest in which the stand is not too dense is more pleasing to the eye and affords greater variety in form, color, and foliage than an even-aged stand of a single species. In the selection of species for esthetic purposes, therefore, special attention should be given to their form, color, foliage, and grouping. As a rule, the native species should be the basis of all planting for esthetic purposes, as they fit better into the general landscape. Exotic species and indigenous species from more or less remote regions, if adapted to the site, can be used in order to give variety or attain some particular effect."

Over 70 years later, we have finally turned the corner in accepting visual resource values as something that can be measured and evaluated and is worthy of management, along with timber and other more tangible forest resources. Yet it has been a most painful process. Consider the following House Resolution which was introduced in March 1985, by State Representative Ode Maddox and was passed by a large majority of the State of Arkansas General Assembly:

HOUSE RESOLUTION

> REQUESTING THE UNITED STATES FOREST SERVICE AND THE SEVERAL TIMBER COMPANIES TO LEAVE BUFFER ZONES ALONG U.S. HIGHWAYS, ARKANSAS SCENIC HIGHWAYS AND ALONG THE SHORES OF LAKES IN THIS STATE WHEN THEY CLEARCUT THE TIMBER ON LAND ADJOINING THE HIGHWAYS AND LAKES.
>
> WHEREAS, the clearcutting of timber is an unsightly operation; and WHEREAS, the majority of tourists coming into and passing through this State travel upon the U.S. highways and Arkansas scenic highways within this State and visit the beautiful lakes in the State; and
>
> WHEREAS, the General Assembly exercises its best efforts to promote tourism in Arkansas; and
>
> WHEREAS, in keeping with this goal it is necessary that buffer zones be maintained along the U.S. highways and Arkansas' scenic

highways and along the shores of lakes in the State when the timber is being clearcut on the land adjoining those highways,

NOW THERFORE, BE IT RESOLVED BY THE HOUSE OF REPRESENTATIVES OF THE SEVENTY-FIFTH GENERAL ASSEMBLY OF THE STATE OF ARKANSAS:

That the United States Forest Service and the timber companies within this State are requested to leave buffer zones along U.S. highways and Arkansas' scenic highways and along the shores of lakes in the State when they clearcut the timber from lands adjoining these highways and lakes.

BE IT FUTHER RESOLVED that upon the adoption of this Resolution the Chief Clerk of the House shall forward a copy hereof to the United States Forest Service at Hot Springs and various timber companies in this State.

U.S. Forest Service recognition of such a plea is supported by a number of acts, regulations, objectives, and policies, with the National Forest Management Act of 1976 perhaps being one of the most significant. However, continuing diligence is necessary to realize the essence and the spirit of such concern. Thus, once an agency, company, or individual has established a commitment to acknowledge and manage the visual resource, the question tends to be reduced to "how," and "at what cost?"

SYSTEMATIC APPROACH

Time will not permit us to address the point in depth; there is, however, a need to discuss, at least briefly, the basis for much of the systematic analysis of scenic quality used both in this country and abroad today--the Forest Service Visual Management System (VMS). In a nutshell, the Forest Service-VMS, developed primarily in the early 1970's, identifies: basic concepts (characteristic landscape, variety, and deviations); dominance elements (form, line, color, texture); dominance principles (contrast, sequence, axis, conver- gence, codominance, and enframement); and a range of variable environmental factors (motion, light, atmospheric conditions, season, distance, observer position, scale and time).

Interestingly enough, several key factors such as variety, form, color, and foliar texture can be traced directly to the early text reference of Professor Toumey.

These factors interact with each other and three primary evaluation criteria:

1) Distance Zones, or divisions of a particular landscape being viewed;
2) Sensitivity Levels, or a measure of the number of viewers and their concern for scenic quality;

3) Variety Class, a stratification of scenery, or inherent scenic quality based on the degree of variety or diversity when related to a "local" physiographic frame of reference.

These criteria are in turn combined to establish a hierarchy of achievable management objectives called Visual Quality Objectives (VQO's):

Preservation - A VQO that allows for natural changes only.

Retention - A VQO which, in general, means man's activities are not evident to the casual forest visitor.

Partial Retention - A VQO which, in general, means man's activities may be evident but must remain subordinate to the characteristic landscape.

Modification - A VQO which, in general, means man's activity may dominate the characteristic landscape, but, must, at the same time, utilize naturally established form, line, color, and texture, so that its visual characteristics are those of natural occurrence with the surrounding landscape.

Maximum Modification - A VQO, which, in general, means man's activity may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area.

Once a visual objective has been determined for an area, silvicultural practices can be modified to achieve the desired visual result. However, it should be pointed out that not all standard silvicultural practices are automatically detrimental to forest esthetics. In fact, the visual values we enjoy today may not persist in many, if not most, timber types without some degree of management. For example, thinning in some areas may be necessary to even see into the forest. In many parts of the Eastern United States, travelers by both road and trail are denied outstanding views of the distant countryside because of the vegetative enclosure that characterizes the landscape. Increased variety of vegetative pattern or rehabilitation of visually disastrous earlier impacts may often be tempered by increased cutting rather than reduced cutting.

Still another facet of the art and science of visual resource management deals with the relative ability of land to withstand management manipulation without a significant effect on its visual character. This Visual Absorption Capability addresses certain environmental factors such as complexity of the landscape, slope, vegetative screening potential, soil or rock color contrasts, and vegetative regeneration potential, together with observer position factors of relation to focal points, visual magnitude or aspect relative to distance, and the frequency an activity may be seen. These factors should be considered when coordinating silvicultural practices to meet esthetic objectives.

As is often the case, the ounce-of-prevention vs. the-pound-of-cure adage is valid in visual resource management also. The better the early planning and analysis, the less remedial mitigation that may be required. However, the best overall approach generally is the result of adequate advance planning, effective implementation of prescribed mitigation, and follow-up monitoring to assure compliance.

One additional observation emerges with the acceptance of a systematic analysis of scenic values: the need for schools of forestry to include forest esthetics in their curriculum. While this concern is not based on any specific research, it is apparent that most forestry graduates in recent years have had little or no academic exposure to such concepts. In an era where social concerns are having an increasing influence on commodity-oriented management decisions, young foresters should be better equiped to deal with this added dimension of professional forestry.

PRIVATE SECTOR APPLICATION

Although this systematic evaluation and analysis was pioneered by the U.S. Forest Service and subsequently was adopted in various forms by others, the private sector generally has not seen the need to embrace systematic consideration of visual resource management. An early exception, however, was the Georgia Kraft Company. Their Woodlands Division, headquartered in Rome, Georgia, developed a Forest Landscape Management Plan in 1975 that was essentially based on the Forest Service Visual Management System. The stated objective for their plan was: "to apply the concepts of Forest Landscape Management on Georgia Kraft Company forest lands to the extent necessary and compatible with the basic objective of maximum wood fiber production by recognizing visually vulnerable landscapes and treating these areas with alternate management options to reduce the undesirable visual impacts of some standard management practices." Today, over 10 years later, although their plan receives somewhat less emphasis than when it was first established, Georgia Kraft has not abandoned the plan but still follows its procedures and standards.

Although the private sector has not been particularly enthusiastic about visual resource management, there are indications of a high level of concern for esthetics. In a paper presented by William D. Ticknor at the National Meeting of the American Forestry Association in Traverse City, Michigan last October, he reported the findings of a recent survey of private timberland owners published in the September 1985 Northern Journal of Applied Forestry. Land owners, asked to characterize the importance of nine ownership objectives, responded with the following priority and percentage of those indicating the factors were "very" or "somewhat" important ownership considerations:

Provide shelter for Wildlife	87.2%
Preserve natural beauty	81.1%
Heritage for future generations	80.3%
Provide own firewood and timber needs	65.6%
Family recreation	60.3%
A place to hunt	55.4%
Future investment	51.1%
Homesite	43.6%
Produce income from sale of wood products	16.2%

While such findings are in no way conclusive or universally applicable, they do reflect an often latent but real concern for esthetics.

VISUAL FACTORS OF SHORTLEAF PINE

This general overview of systematic visual resource analysis is relevant to management of any forest species anywhere, as has been proven many times in recent years where the principles, theory, and implementation of visual resource management have been applied not only throughout the U.S. but in several foreign countries. Thus, this discussion is equally applicable to Shortleaf Pine (SLP).

The adaptability of SLP has made it the most widespread of any pine species in the southeastern United States (Lawson and Kitchen, 1983). The inherent diversity resulting from its inclination to occur naturally in mixed stands of many forest cover types, constitutes a significant esthetic factor. This characteristic becomes a substantial plus when the forest manager is faced with designing a pleasing shaped clearcut in a highly sensitive visual area.

SLP growth throughout the interior highlands of the southeast in both pure and mixed stands is another major visually significant characteristic of the species. Because visibility of harvested stands increases considerably with terrain change, particularly in the most vulnerable middleground distance, forest managers need to include visual objective considerations that might otherwise be unnecessary in the flatlands of the Coastal Plains. Thus, the irregular boundary of a naturally occuring SLP stand lends itself to the build-in mitigation technique of an undulating and irregular edge that blends well with the terrain and adjacent stands of hardwoods.

In considering foreground views, the characteristics of individual trees becomes a more significant factor. Since some of the best SLP growth sites include the fine sandy loams or siltloams characteristic of flood plains of small streams (Fowells, Et al, 1965), the more spectacular sized trees could be expected to thrive here. Such locations similarly often lie in proximity to roads and highways from which examples of exceptional SLP individuals can be easily seen and appreciated. A forest manager's awareness of this phenomenon, whether based on either casual observation or a more detailed inventory, could lead to at least an interim protection of selected groups of SLP whose visual value to the traveling public may well exceed their commodity value.

Another aspect of foreground management along visually sensitive road corridors relates to the contrived, unnatural appearance often evident in pine plantations where mechnical tree planting was done at right angles to the observer. With a little forethought, this negative effect can be avoided by planting the first several rows adjacent to the travel corridor parallel to the observer, or, preferably, in small random groups. Subsequent management to encourage these naturalized margins, enhanced perhaps with hardwood inclusions, all contribute to an uneven-age appearance along these roads which will improve the esthetics considerably.

Because SLP is generally fire resistant (Fowells, Et al, 1965), use of prescribed burns can often expand visible depth into the stand; however, associated species, especially understory hardwoods, if not protected may be eliminated, thus leading to a loss of stand diversity.

One major problem that should be of concern to forest managers attempting to deal with visual values as well as commodity production, is SLP regeneration competition from hardwoods or other pines (Barrett, 1980). The characteristic slow start of SLP seedlings results in a protractive period of visual impact for a harvest clearcut that may be located in a highly sensitive view area. While a range of mitigation techniques such as block shaping and slash reduction may have already been planned, recognition of this extended residual impact, particularly on poor sites, is also essential. One obvious solution, which in fact is already applied by some forest managers for economic rather than esthetic reasons, is to replant to faster regenerating species such as Loblolly Pine. But where the management objective is to perpetuate a SLP stand, this solution may be unacceptable. Research has shown that with adequate seedbed treatment, some overhead shade is desirable until seedlings become established. However, prolonged overstory competition can be highly detrimental to young reproduction (Fowells, Et al, 1965). This combination of factors suggest that the application of a seedtree or modified seedtree cut may be appropriate to best meet both silvicultural as well as visual objectives. Experience indicates that seedtree or shelterwood cuts, especially those viewed from middleground distances of about one-half to three miles, substantially reduces the visual contrast, the essence of negative impact on the landscape.

On small tracts, uneven-age management of SLP using single tree or group selection and natural regeneration is a viable alternative that would particularly favor stand esthetics.

SPECIFIC MITIGATION TECHNIQUES

In reference to the House Resolution passed by the Arkansas Legislature cited earlier, their recommended solution regarding visual impacts of clearcutting along senic highways and lakeshores was to retain (uncut) buffer zones. It should be understood that buffering or screening of an unpleasant appearing clearcut is only one of many visual mitigation techniques. When used as the sole mitigation tool, it may be construed by some as an attempt to hide impacts and thus appear as a deception. On the contrary, when a well-designed clearcut is brought up to a road and unsightly slash and residue has been reduced, the new opening may often be perceived as a positive element, permitting views into the middleground distance which otherwise would have only been a visually impenetrable wall of trees along the traveler's foreground view.

As with any forest species or stand mix, there are a number of techniques that can be applied as circumstances dictate. Time and space preclude more than the partial listing included here, but these examples will serve as a point of interest and departure for those forest managers searching for an appropriate technique:

- Retain selected flowering trees/shrubs.
- Introduce small scale openings along travel routes.
- Maintain old growth characteristics.
- Utilize natural-appearing shapes for clearcut units rather than geometric configurations.

- Develop natural-appearing clearcut edges by: locating harvest boundaries at existing biological edges; tying several clearcuts together over time; locating unit boundaries below the ridge tops; and feathering, through retention of the existing understory just inside the cutting unit boundary, progressively increasing the height of uncut vegetation away from the unit boundary, or thinning along the unit boundary.

- Consider scale or the relative size of a harvest cut in relation to the surrounding landscape or to the human figure.
- Distribute harvest cuts over time and space relative to critical viewpoints.
- Employ modified silvicultural practices: (standard clearcuts, seedtree cuts, or shelterwood cuts that have the general appearance of the standard silvicultural practice but have been changed to favor esthetics and thus do not conform to the true definition).
- Apply residue and slash reduction.
- Retain residual "leave islands," including understory, to benefit both visual and wildlife values.
- Use seasonal logging restrictions.
- Use logging equipment restrictions.
- Consider road and landing location and design.

The forest manager might also consolidate a range of possible visual impact mitigation techniques into a simple matrix which relates the silvicultural practice to the particular visual quality objective identified for a given stand or area. The specific mitigation techniques coded in the sample matrix (Figure 1) are defined in the listing on the following page. These techniques are not applicable in every area; the intent here is only to convey the utility and convenience of such a reference. Of course, the pitfalls associated with any cookbook interpretation of such a tool should also be readily apparent.

Figure 1. Typical Mitigation Techniques to Meet Established Visual Quality Objectives

Coded Matrix

CULTURAL PRACTICES	MOST CONSTRAINED <----------> LEAST CONSTRAINED VISUAL QUALITY OBJECTIVES (VQO's)			
	RETENTION	PARTIAL RETENTION	MODIFICATION	MAX MODIFICATION
CLEARCUT	ABDFIMU	ABDGJLNU	ADHKLO	AD
SEEDTREE	ABCDFIMTU	ABCDGJLNU	ACDHKLO	AD
SHELTERWOOD	ABCDEFIMTU	ABCDEGJLNUV	ACDHKLO	AD
SALVAGE SANITATION CUT	IMU	JLNU	KLO	
COMMERCIAL THIN	EIMU	EJLNU	KLO	
PRE-COMMERICAL THIN	JU	KLN	KL	
SHEAR SITE PREP	I	J	K	
CHOP SITE PREP				
CHAIN SAW SITE PREP	J	J	K	
PRESCRIBED BURN	Q	Q	R	R
INJECTION SITE PREP	NOT APPROPRIATE	NOT APPROPRIATE		
WINDROW	NOT APPROPRIATE	NOT APPROPRIATE		
CHEMICAL SITE PREP		S	S	
SPECIAL USES	P			
ACCESS ROADS	T			

Figure 1. Typical Mitigation Techniques to Meet Established Visual Quality Objectives (continued)

Matrix Code Definitions

A. Establish irregular stand shape avoiding straight lines or geometric forms except as necessary along land lines (follow natural land features).
B. Feather the edge of cut or adjacent stand by retaining (if present) mid and understory trees in a 25' - 100' zone.
C. Leave flowering and ornamental forms of vegetation where practical to enhance vegetative variety.
D. Reduce openings along road to as narrow as possible (1/4 mile preferred maximum).
E. Vary densities of thinnings.
F. No opening exceeding 10 acres (preferred maximum) will be viewed from any location on a travelway or lake.
G. No opening exceeding 15 acres (preferred maximum) will be viewed from any location on a travelway or lake.
H. No opening exceeding 25 acres (preferred maximum) will be viewed from any location on a travelway or lake.
I. Slash removal 150' from edge of travelway in seen area with slash in remaining seen area lopped and scattered to within 2' of ground.
J. Lop and scatter slash to within 2' of ground within 100' zone beyond ROW edge (in seen area).
K. Lop and scatter slash to within 2' of ground within 50' zone beyond ROW edge (in seen area).
L. Direct felling cuts away from travelway or lake within lop and scatter zone and adjacent trees that may fall into lop and scatter zone.
M. Log landings excluded, unless they can be screened from view and completely restored except where terrain or other resources dictate.
N. Log landings no closer than 300' from edge of travelway except where terrain or other resources dictate.
O. Log landings no closer than 200' from edge of travelway except where terrain or other resources dictate.
P. Exclude all special uses, borrow pits, transmission lines, mining, or oil and gas developments in seen area.
Q. Only late winter burns.
R. Burns carefully controlled in pine types permitted year-round.
S. Vegetative control by spraying permitted with environmental analysis approved by Forest Supervisor.
T. Access roads a minimum of one-fourth mile apart, intersect existing roads at right angles. 150' from edge or existing road, curve alignment right or left to prevent continuous view of new road.
U. Apply marking paint on leave trees so it's not visible from travelway.

BENEFITS AND COSTS

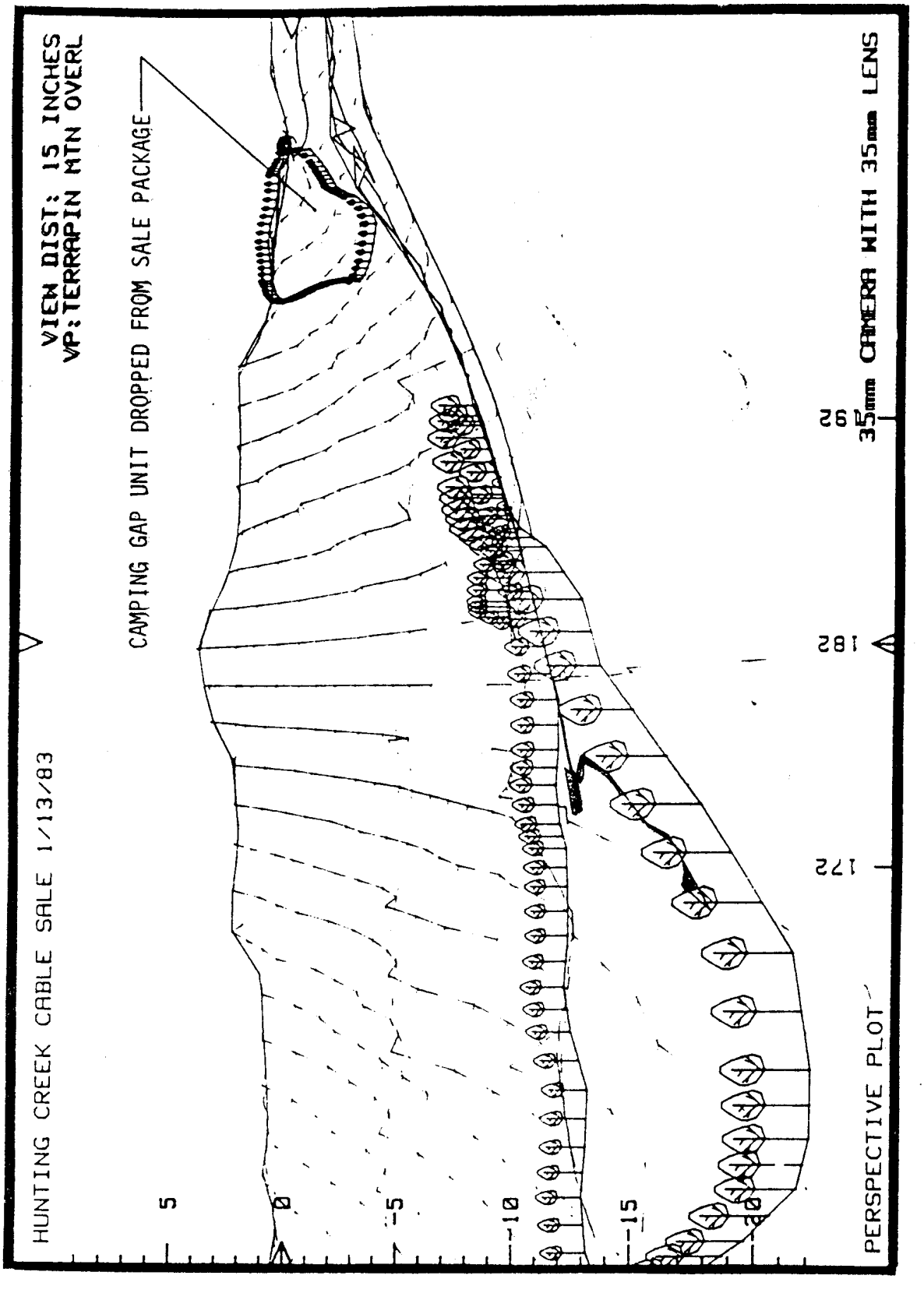
We need to also address, at least briefly, factors of cost. Unfortunately, as with many non-timber outputs, there is not a lot of information available. Generally, increased costs can be tied directly to actions done or not done to favor esthetics, or to reduced timber production, or some combination of both.

Land managers employed by state or federal agencies today almost universally must consider scenic values as a part of their mandate to manage the total forest resource. Agency costs for maintaining a program of non-market resource management are often difficult to isolate for many organizations utilizing an integrated resource management approach. While several efforts have been made by researchers and managers alike to gain a better understanding of how such costs can be determined, the subject remains a high priority for further study. As elusive as the costs have been over the years, so too have been the tracking of the tangible benefits. For a private sector operation, the public relations benefits may be substantial, and the value of political good will benefits is evidently an added dimension which although difficult to measure, still obviously exists. Unquestionably, it must be acknowledged that recognition of visual resource values and its management requirements comes with some added costs, including, in effect, a sub-optimization of the timber resource in certain areas. Yet, an acceptance of this resource, along with the other more tangible commodity resources by private and government land managers alike, must ultimately be considered as a part of the basic land ethic necessary for comprehensive land management and stewardship.

ADVANCE TECHNOLOGY APPLICATIONS

Finally, where is visual resource management heading and what can we expect in the future? Although management of the visual resource is still in its infancy compared to many of the other forest resources, modern technology has already lead to several innovative tools and techniques. An example of the progress in this area is the computer analysis program known as "Perspective Plot." This program, developed by the U.S. Forest Service, provides the design and perspective graphic visualization of a proposed management activity, such as a clearcut unit on the side of a visually sensitive ridge. Examples described in Figures 2 and 3 show the computer printout from an actual sale on the Jefferson National Forest in Virginia. These accurate, simulated three-dimensional oblique views from the critical observer position on the Blue Ridge Parkway helped the Forest analyze the impacts and meet it's restrictive Retention visual quality objectives when seen from this visually sensitive corridor.

The Perspective Plot Program software, designed for the Hewlett-Packard 9020 computer, is currently being upgraded and promises many new features and capabilities. Similar programs are being developed or improved by others in this rapidly expanding technological field. If you or your organization are seriously considering expanding your management of visual values on your forest lands, it would be advantageous to investigate the possible application of computer graphics.



PERSPECTIVE PLOT COMPUTER DEPICTION
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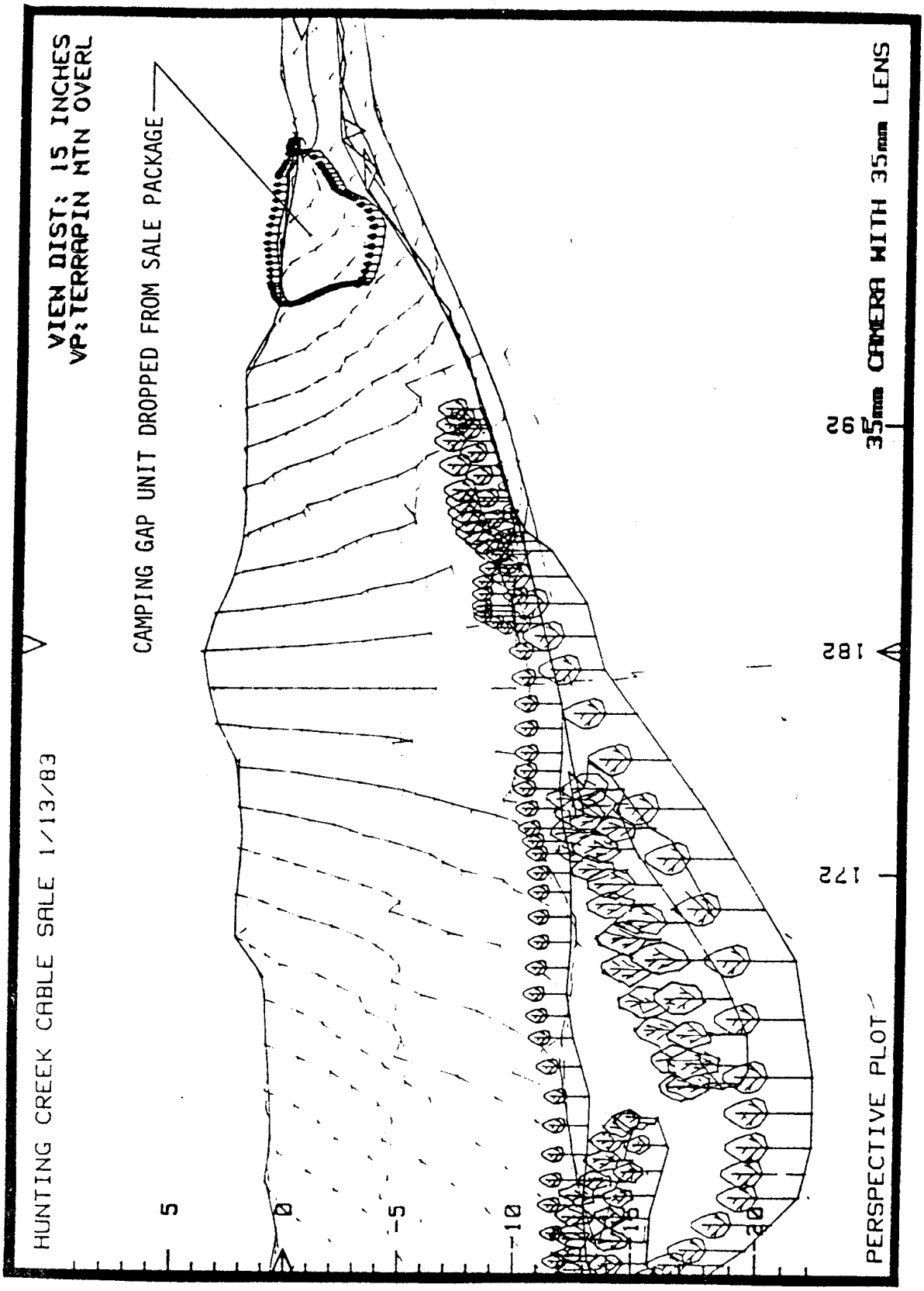

PERSPECTIVE PLOT COMPUTER DEPICTION
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SUMMARY

This paper traces some of the earliest historical references to management of scenic values, up through major state-of-the-art contributions in recent times by the U. S. Forest Service. This background established a basis to discuss the need for a systematic approach to visual resource management, with emphasis on application in the private sector. Esthetics of Shortleaf Pine management was addressed, including a wide range of specific mitigation techniques available to land managers. Problems inherent in the tracking of costs of non-market resources due to their intangible nature were discussed, followed by a brief look at current and future applications in computer graphics technology.

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