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Contemporary computerized methods for logging planning

Chris B. Ledoux

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Abstract

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Contemporary harvest planning graphic software is highlighted with practical applications. Planning results from a production study of the Clearwater Cable Yarder are summarized. Application of the planning methods to evaluation of proposed silvicultural treatments is included. Results show that 3-dimensional graphic analysis of proposed harvesting or silvicultural treatments can provide insight toward arriving at visually and aesthetically acceptable management plans for highly visible and sensitive areas. Most importantly, use of contemporary graphic planning software can avoid visually undesirable features and eliminate or minimize adverse legal actions.

Keywords: Harvest planning, graphic planning software, aesthetic considerations.

Utdrag

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Det er gitt en oversikt over nye grafiske programmer for mikromaskiner som kan benyttes til planlegging av drifter. Resultatene fra en drift som er gjennomført med Clearwater Cable Yarder er brukt som eksempel. Det er også belyst hvorledes planleggingsmetoden kan benyttes til å vurdere foreslåtte skogskjøtselsmetoder. Resultatene viser at tredimensjonal grafisk analyse av foreslåtte metoder for drift og skogskjøtsel kan gi innsikt som kan bidra til å oppnå visuelle og estetiske løsninger som kan godtas i områder som synes godt og hvor inngrep lett fører til konflikt. Det er av stor betydning at de nye grafiske programmene for planlegging kan forhindre at det settes i gang tiltak som innebærer sterke visuelle reaksjoner og forhindre eller redusere restriktive administrative og juridiske inngrep.

Nøkkelord: Avvirknings planlegging, programvare for grafisk planlegging, estetiske hensyn.

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Chris B. Ledoux, Dr.
Industrial Engineer and Project Leader
USDA Forest Service
Northeastern Forest Experiment Station
180 Canfiled Street
P.O. Box 4360
Morgantown, West Virgina 26505
USA

Introduction

Planning harvest operations is a major challenge to the forest manager. The manager must insure that site volumes and values are consistent with an economical operation. Consideration must be given to any visual or environmental impacts of the proposed venture. The harvesting equipment must be carefully chosen and matched to terrain to maximize profit and minimize logging costs and site impacts.

The desire to conduct harvest operations that are economical, technically feasible, and environmentally and visually acceptable requires a substantial effort in data gathering and analysis. Contemporary computer harvest planning software can aid the planner in data analysis. In this paper, a versatile package of computer routines for the visual modeling of land management activities is highlighted. Practical applications of said computer routines are briefly summarized.

Perspective plot

PERSPECTIVE PLOT is a versatile package of computer routines for the visual modeling of land management activities (NICKERSON, 1980). Managers interested in the actual appearance of planned activities may use PERSPECTIVE PLOT to model the proposed activity and view the end product results. The 3-dimensional plotting capabilities allow the manager to view planned activities to detect visual impacts that do not maintain acceptable levels of scenic quality. PERSPECTIVE PLOT is not limited to timber harvesting activities. The program can be used to model utility corridors, ski areas, dams, roads, and other structures.

The program initially inputs or digitizes the desired feature or harvest block from topographic or orthophotographic base maps. This information is stored in the computer for future analysis or viewing. The manager or analyst next identifies a point or points from which to view the proposed feature. The select point or points are generally areas such as major highways, vistas, or municipalities from which the proposed feature would likely be highly visible and the resulting feature may represent an eye sore or visually unacceptable impact or result in adverse legal actions.

The PERSPECTIVE PLOT program next provides a 3-dimensional plot or graphic of the proposed feature as seen from a straight line view from the select vista point or points. Managers and planners can use these graphics to isolate, define, and modify any undesirable visual impacts by simply making additional computer runs and studying the resulting graphics. Once a desirable graphic is agreed upon, a field reconnaissance followed by an artists detailed drawing of the proposed feature results in an acceptable feature plan. The major advantage is that managers and planners can gain substan-

tial insight into proposed features without and prior to any actual work on the ground, thus avoiding potentially undesirable results. The emphasis of this article is to show practical application of PERSPECTIVE PLOT and not to discuss the details behind the PERSPECTIVE PLOT methods or data input and program operations.

Preharvesting Planning

PERSPECTIVE PLOT was used in planning the layout of cable logging units for a production study of the Clearwater Yarder[1] in upstate New York (LeDoux and Peters, 1985) (LeDoux, 1987). Computer graphics of the Ticonderoga, New York research site were derived from International Paper Company's topographic maps (Figure 1).

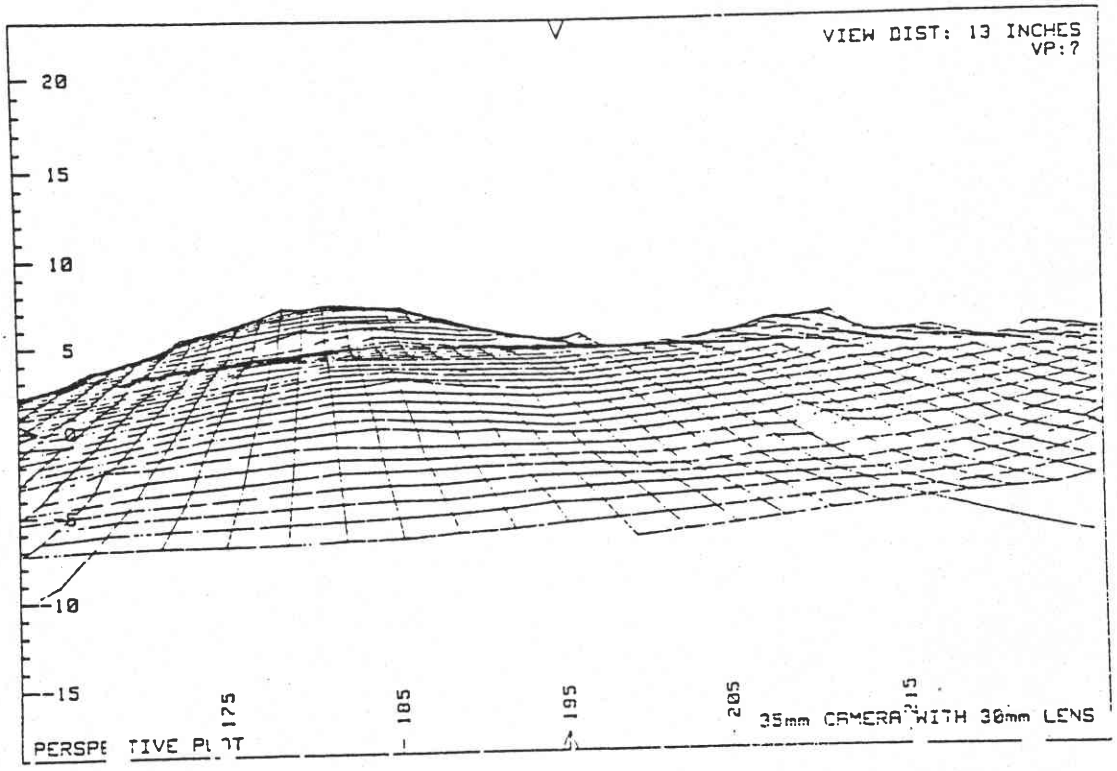

Fig. 1. Computer graphic of the Ticonderoga site.

PERSPECTIVE PLOT was used extensively to evaluate the logging unit layout and to pinpoint major visual impacts from the proposed clearcut block. Numerous PERSPECTIVE PLOT simulations showed that locating the clearcut block between the heavy and light thinning would produce the least visual impact (Figure 2). Additional PERSPECTIVE PLOT simulations showed that the skyline corridor layout (Figure 3) would result in the best layout to facilitate yarding and landing locations.

1 The use of trade, firm, or corporation names in this paper is for the information and convenience of the reader. Such uses does not constitute an official endorsement or approval by the U.S. Department of Agriculture or the Forest Service of any product or service to the exclusion of others that may be suitable.

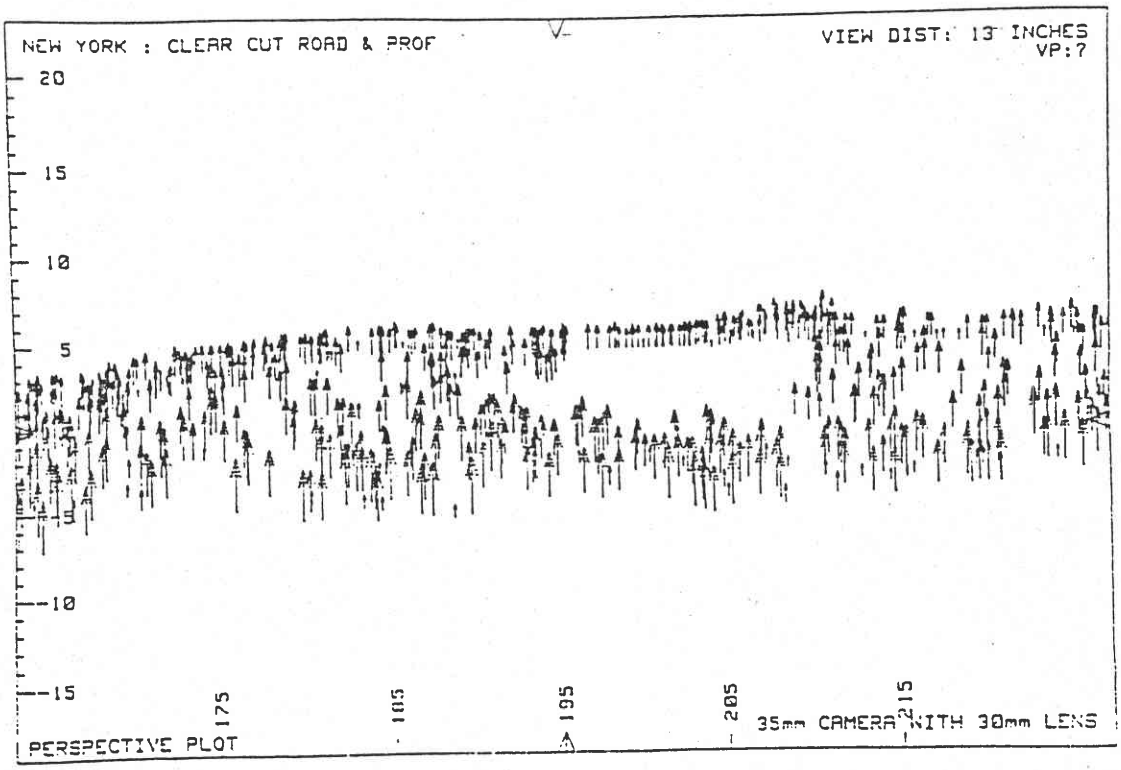

Fig. 2. Simulated clearcut block location.

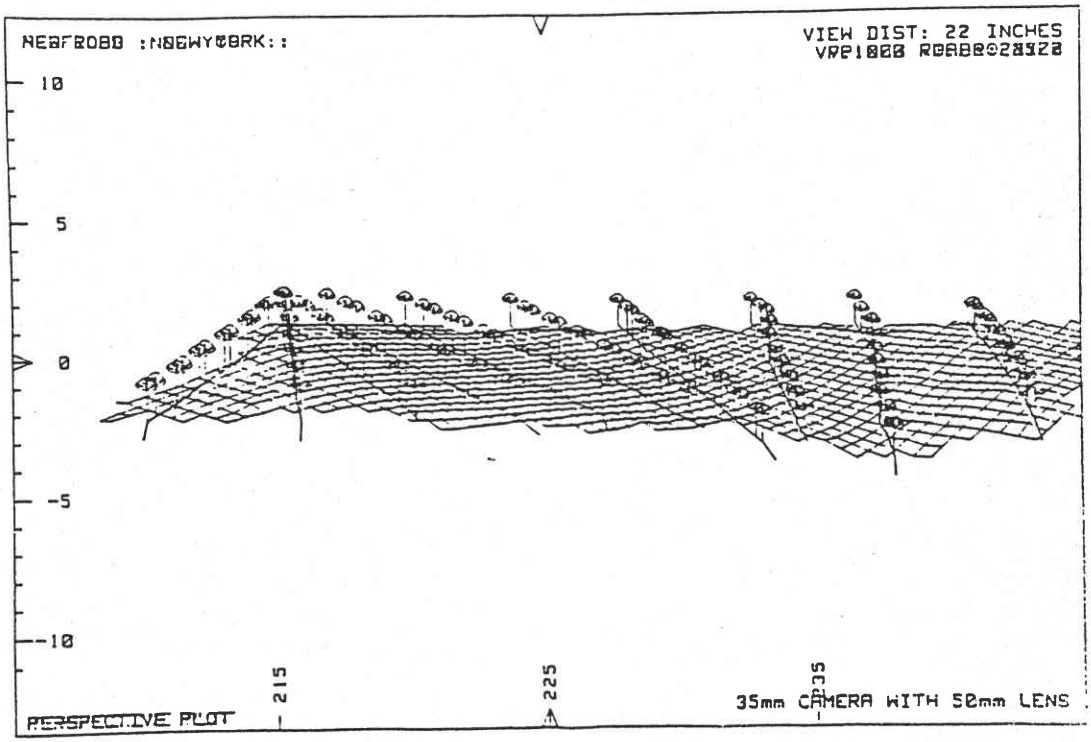

Fig. 3. Simulated skyline corridor location layout.

Several trips were scheduled to the research site to field-verify the proposed logging plan. When the skyline corridors were flagged, the logging unit was covered with a deep snow pack that concealed gullies and numerous huge rocks and boulders throughout the unit. Minimal rearranging of the skyline corridors was required to avoid yarding problems. Contemporary graphic planning software saved much time and money in laying out this research study. The computer software not only helped us layout the logging units but also provided an end product that will be useful and applicable.

Stand Level Planning

PERSPECTIVE PLOT was to evaluate the visual outcomes of a proposed management plan for a hypothetical stand overlooked from a highly visible vantage point. The stand in question is a 40-year old red and white oak stand. Management plans call for some type of thinning treatment at age 40 and final harvest at rotation age of 90 years. Figure 4 shows the stand visual prior to thinning. Figure 5 shows the residual stand immediately after thinning. Graphics such as those shown in Figure 4 and 5 help managers and planners gain insight into visual impacts of proposed silvicultural treatments. The major advantage here is that proposed silvicultural treatment impacts can be visualized and evaluated prior to any on-the-ground events.

The residual stand (Figure 5) tree list and attributes were input to the MANAGE (LeDoux, 1986) complete systems simulation model and projected to a rotation age of 90. MANAGE will grow a select stand of trees and print out individual tree attributes. The individual projected tree list from

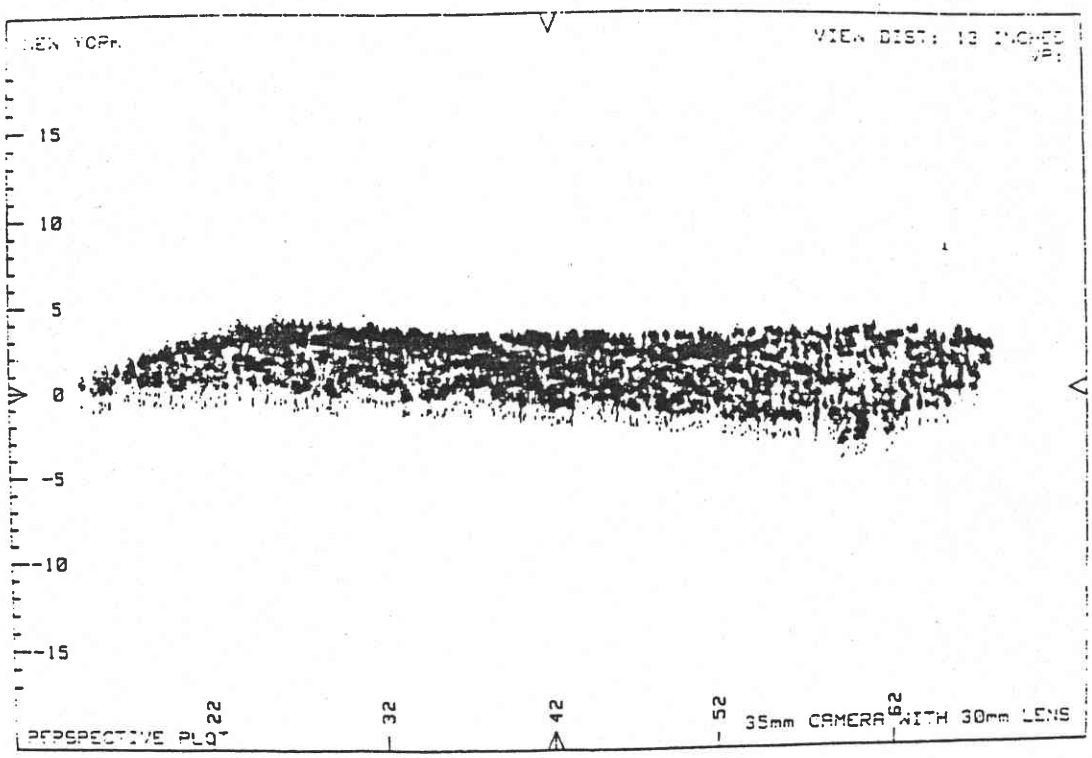

Fig. 4. Simulated 40-year old red and white oak stand – before thinning.

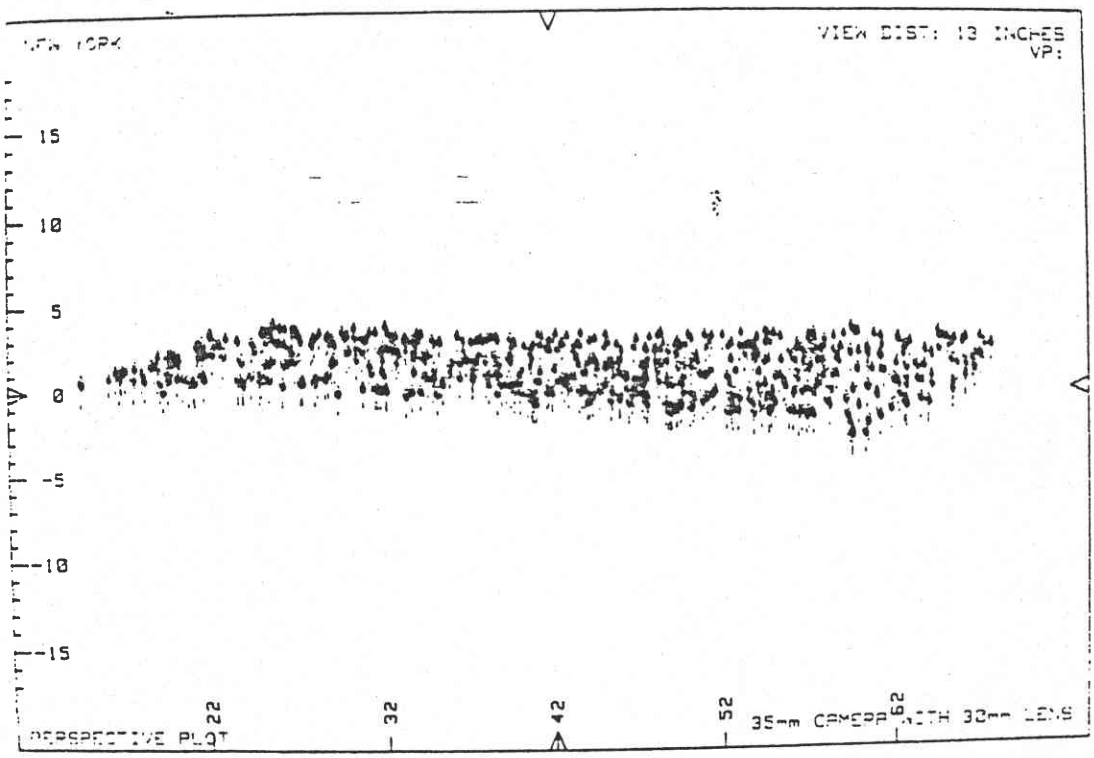

Fig. 5. Simulated 40-year old red and white oak stand – after thiinning.

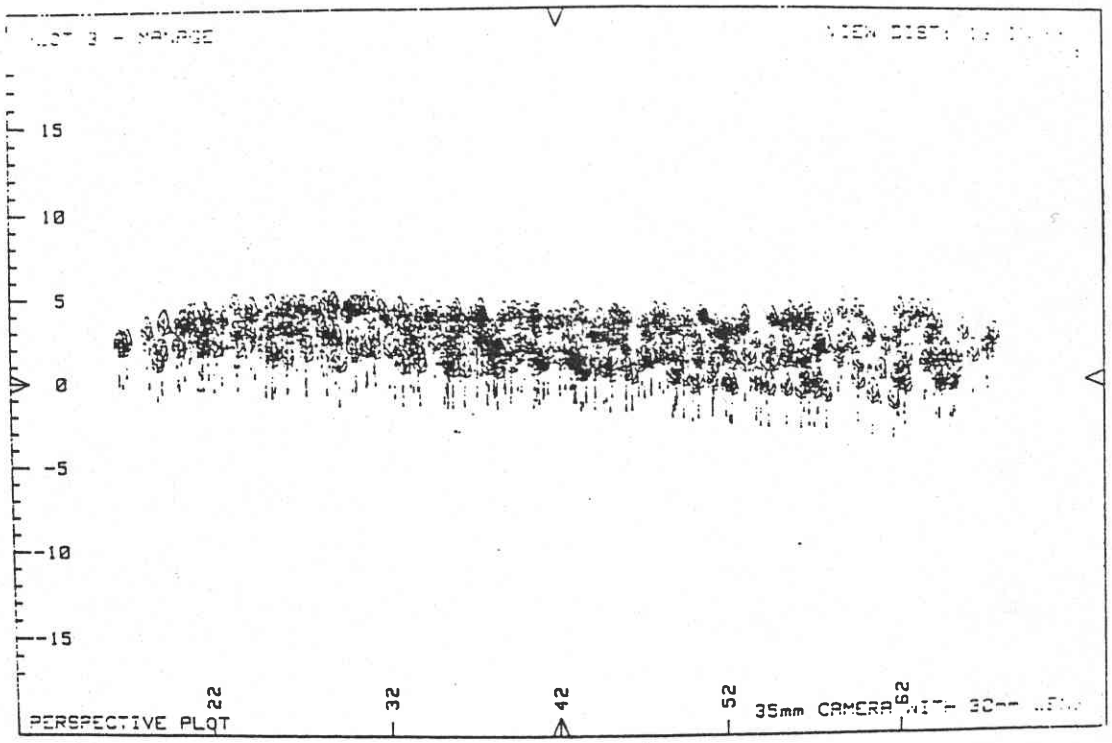

Fig. 6. Simulated 90-year old Red and white oak stand – 50 years after thinning.

MANAGE was input back into PERSPECTIVE PLOT in an attempt to visualize what the 90-year old stand would look like from a select vista. Figure 6 shows what the thinned 40-year old stand (Figure 5) would look like by rotation age 90 years. Graphics of proposed harvesting and silvicultural treatments such as those shown in Figures 4, 5 and 6 help managers and planners identify visually acceptable management alternatives.

Considerations for Planners

Certainly not every proposed harvesting or silvicultural treatment needs detailed visual acceptance evaluations such as those summarized here. However, for those management features and treatments that could produce visual challenges or that will be highly visible from a specific viewing area, methods such as PERSPECTIVE PLOT can be quite useful.

Developing computer graphic such as those shown in this paper does take an investment in time, people, and money. Therefore, only select troublesome areas should be analyzed. Care should be taken to insure that input data from maps or surveys is most accurate and detailed and most importantly, that it accurately represents the area in question.

It is imperative that any graphic planning be coordinated with several field visits to cross verify any proposed feature or analysis. Equally important, is the need for communicating proposed plans with the people or communities that would be impacted. The most well laid plans many times failed because of failure to communicate the final plan.

Methods for logging planning such as those summarized in the paper will clearly not answer all the questions on concerns about logging planning. However, methods such as those summarized can be used to make more visually and aesthetically acceptable decisions.

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