Visual Management System and Timber Management Application[1]

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Abstract: This paper includes an illustration of a planning process to guide vegetation management throughout a travel route seen area and over the time period of a total management rotation (100-300 years). The process will produce direction on visual characteristics to be created and maintained within the biological potential and coordinated with associated resource objectives. Conceptual treatments to achieve that direction will be shown for a ponderosa pine plant community.

The concept of managing vegetation (visual aspects) through timber harvest is both applied and theoretical. Field examples where it has been applied are included.

INTRODUCTION

The Visual Management System provides an inventory and recommended objective setting process. Its purpose is to provide visual resource input into all levels of planning, design and administration of National Forest lands. The recommended Visual Quality Objectives (VQO's) resulting from the System, except for preservation, each describe a different degree of retention or acceptable alteration of the natural appearing landscape based upon the importance of aesthetics.

The VQO's and the short-term alternatives of enhancement and rehabilitation are more completely defined for immediate visual effects in the USDA Handbook #462. But when applied to the planning and design of timber harvesting over time and space, they require a more detailed definition of design criteria, establishment of a management planning process and development of silvicultural treatments.

It is the purpose of this paper to provide suggested solutions to such planning, landscape design, and silviculture treatment problems. It is assumed that the reader has reviewed the problem statement on ponderosa pine which is part of the simulated field trip on TIMBER.

LANDSCAPE DESIGN AND VQO'S

1. The "desired character" to be retained or created.

2. The "negative elements" creating undesirable contrast such as activity residues, skid roads, skyline cable corridors.

3. The "positive elements" of water forms, rock forms, distinctive vegetation and spaces, which may be introduced or emphasized by removing, thinning, or planting surrounding vegetation.

[1/] Presented at the National Conference on Applied Techniques for Analysis and Management of the Visual Resource, Incline Village, Nevada, April 23-25, 1979. This paper is taken from National Forest Landscape Management, Vol. 2, ch. 5 (Timber). U.S. Dep. Agric., Handbook No. 559, approximately 250 pages, illus. to be printed in the Fall of 1979. The handbook will contain all photographs and diagrams omitted from this paper due to lack of space and color printing restrictions.

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Desired Character

The desired character is the appearance of the landscape to be retained or created over time. A description of desired-character should include the appearance of the stands at regeneration, seedling-sapling stage as well as poles, small and large saw log sizes, the mature stand and, where appropriate, old-growth stand characteristics. The desired-character description may set goals for featured species, scale of stand structure, tree diameters, bark characteristics, textural patterns, and contrasting tree species, shrubs and ground covers. It should also include the distribution and proportion of different successional stages and size classes necessary in a managed state to achieve the mature character in some designed proportion of the viewed area over time.

Any design of the desired character must recognize that a forest is a dynamic and constantly changing community of plants and animals. The manipulation of this dynamic situation to achieve a desired variety of conditions is the essence of a managed forest.

Figure 1--*Before*

This Douglas-fir stand is in an intermediate stage toward the desired character goal of 36" dbh with deep furrowed bark. Since all of the foreground within the corridor is of this size class, only a portion should be thinned to grow on to the desired size.

Figure 2--After shelterwood harvest
The positive elements of vertical line, color and texture of the ground vegetation and low-branched trees have been retained while moving this stand toward replacement of these characteristics in this travel route segment.

Negative Elements

Negative or unnatural-appearing elements of timber harvest should meet VQO definitions.

The next two figures illustrate the extremes of negative element contrast. Each harvest entry is moving its respective foreground landscape toward regeneration of a new stand of trees, but with vastly differing amounts of contrast, consequently meeting different VQO's.

Figure 3--In this shelterwood harvest, contrast is not evident. This entry meets the RETENTION VQO.

Figure 4--This clearcut unit creates a dominant soil color contrast, while the unit is out of scale for a foreground activity. This activity would probably be acceptable only under the MAXIMUM MODIFICATION VQO.

Positive Elements

Generally, considerable change can take place in the positive or natural-appearing elements even under RETENTION VQO if the change achieves desirable variety and follows the principles of landscape design. Here is an example of short-term enhancement for a retention landscape by manipulation of positive elements.

Figure 5--<u>Before</u> - This foreground stand is a combination of lodgepole and ponderosa pine. The lodgepole has formed a very dense dog-haired thicket near the road's edge. The visual effect lacks diversity of vegetative character and visual depth into the stand.

Figure 6--<u>After</u> - Removal of the stagnant lodgepole stand has added visual depth into the stand as well as releasing the more interesting ponderosa pine saplings to grow and develop to maturity. Stress has also been lessened on the few mature yellow bark trees adding their character to the scene for a longer period of time.

<u>Planning the Corridor Viewshed</u>

A corridor viewshed is defined as the total landscape seen or potentially seen from all or a logical part of a travel route, use area, or water body. The purpose of corridor viewshed planning is to provide the management direction for retaining or creating the desired forest character in an attractive sequential arrangement over time and space. This planning should provide the necessary supporting size classes and successional stages to maintain that desired character indefinitely.

In land management planning, corridor viewsheds are those areas selected for intensive visual management.

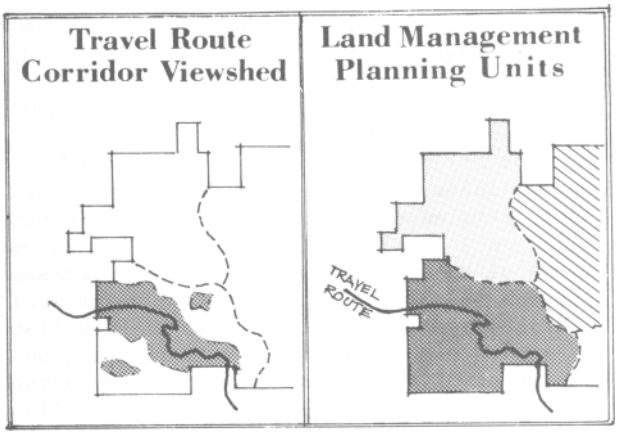

Figure 7--Travel route corridor viewshed and land management units.

A corridor viewshed should include foreground, middleground, and background distance zones.

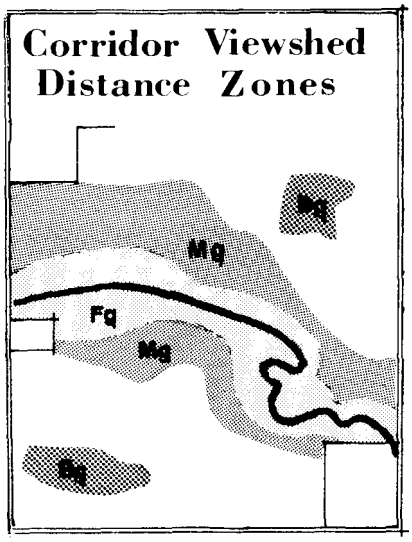

Figure 8--Corridor viewshed distance zones.

Process

Possible planning processes to establish management direction for corridor viewsheds are of necessity quite varied in both character and intensity. The flow diagram and procedural steps are intended to show the general relationship of inventory, analysis, and direction elements which are necessary in most cases.

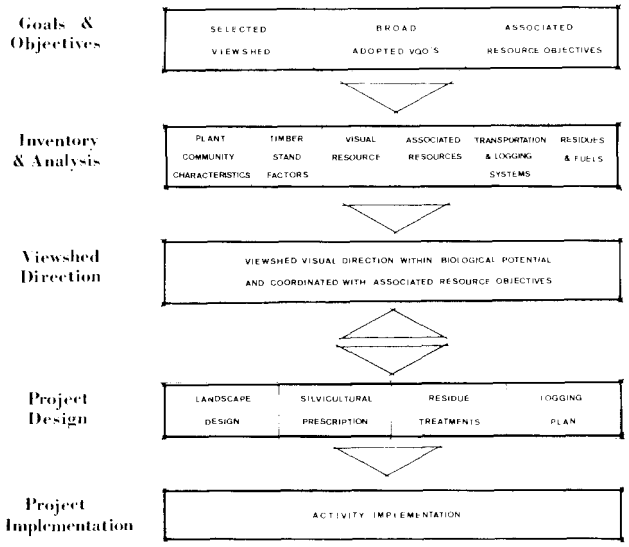

Figure 9--Process.

Step 1

First identify goals and objectives. Assuming viewshed boundaries have been established, list land use allocation objectives established in land management plans as they relate to corridor viewshed such as a Timber-Visual Allocation which states "manage for timber production in meeting adopted Visual Quality Objectives" or Roaded Recreation allocation which states "timber harvest should be done primarily to enhance the visual resource."

Step 2

List Visual Quality Objectives adopted for the viewshed:

(a) RETENTION for foregrounds,

(b) PARTIAL RETENTION for middleground, background, and unseen class A features.

Step 3

Next, an interdisciplinary team should inventory the factors that will affect establishment of viewshed direction. Some of the data may be available from previous functional and land use studies.

This community of factors is extremely complex, since most of its parts are such that an interdisciplinary team should establish biological units which will react the same or nearly the same to vegetative manipulation. In this case a segment of the

corridor viewshed was chosen which contained both climax ponderosa pine and aspen plant communities.

Step 5

Identify and record areas where for visual, recreation, or associated resource reasons, management will be significantly different.

Step 6

The interdisciplinary team should then combine these two inventories to establish management response units. A management response unit is defined as a homogenous vegetative unit from biological, social and management standpoints.

Other situations which might constitute separate management response units include such things as:

Calving Areas
Winter Sports Areas
Cultural Features
Utility Corridors
Fuel Breaks
Watersheds (water supply)

The climax ponderosa pine foreground management response unit will be used as the example throughout the rest of the process.

Step 7

Analyze existing foreground stand character particularly if significantly different from that desired or that can be maintained over time. In this example it is primarily, "open park-like stands of old-growth, deep-furrowed, yellow-bark pine ranging in diameter from 24-48 inches."

Step 8

Determine the desired visual character from conditions which currently exist, historically are known to have existed or conditions that are known to be biologically possible. Adjust desired character to reasonable biological constraints and management limitations. If we are always to have old growth open-park-like stands somewhere within the Foreground, we must have a balance of all site classes; each class will predictably move into the next larger size class until old growth tree character is reached. Then these trees, in turn, either die naturally or are harvested. An identified range of desired characteristics offers the opportunity to create both biological and design diversity in an attractive sequence as one moves down the corridor.

Figure 10 illustrates schematically existing foreground vegetative characteristics and biological capabilities as the basis for determining desired visual character. The desired quantity of each size class is based on the proportion of each necessary to maintain 20 per cent of the foreground in old-growth character indefinitely. The exact quantities will vary on a case-by-case basis.

Figure 11 shows not only existing character (year 0) and desired character (year 200 and year 300) but also the intermediate steps and time periods necessary to achieve the balance of size and age class over time.

The conversion of a viewshed foreground to a managed state may start with a total old-growth stand situation as illustrated or a mixture of any of the other combinations.

Corridor viewshed planning may end at this point if scale of planning is broad. More detailed and site specific planning could utilize the following steps 9 through 11.

Step 9

Map the existing stands by size class.

The drawing is a plan view showing a segment of existing character at year O. This same segment appears in the right side drawing to show its relationship to a management response unit (fig. 12).

Step 10

Divide the stands into cells of 10 to 30 acres. Select the cells to be moved to their next size class. The map at year 50 shows 20 per cent of the foreground moved through regeneration seedling-sapling stage in the 10- to 30-acre size cells shown as 1 sh and cc. The cells are distributed throughout the foreground by design but collectively represent the 20 per cent shown in the diagram.

Step 11

Treatment in this illustration to accomplish the year 50 regeneration seedling-sapling character is done each decade in small increments which make up 20 per cent of a cell. An example of one of these increments is shown in white. At year 50, treatment of the total cell will be complete. Management control of the small treatment areas is done by desired percentages of each cell. The 10-to 30-acre cells, however, are mapped and monitored over time.

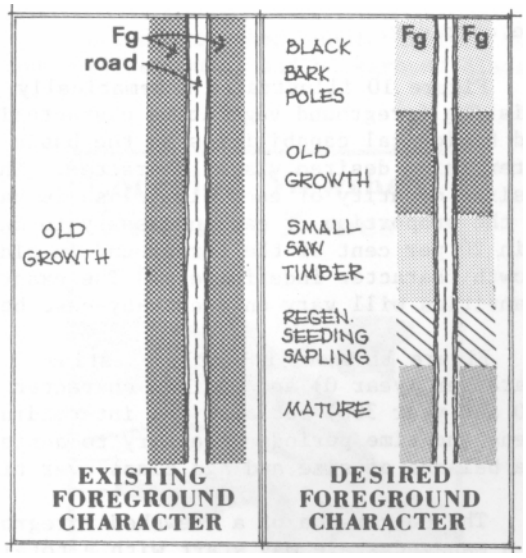

Figure 10--Existing foreground vegetative characteristics.

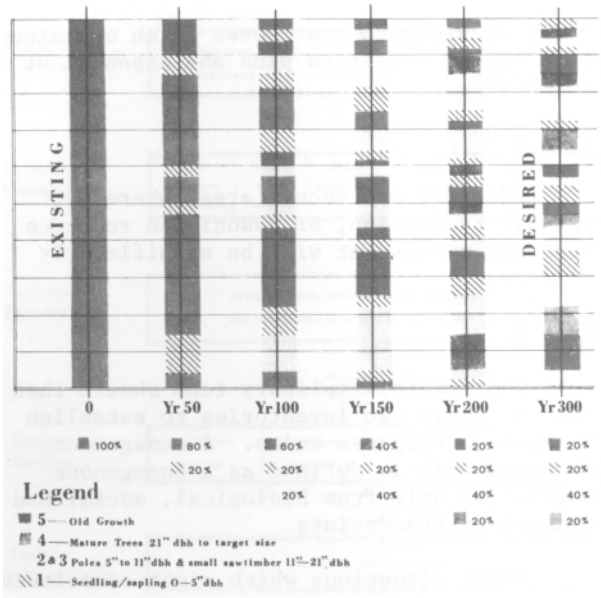

Figure 11--Existing and desired character.

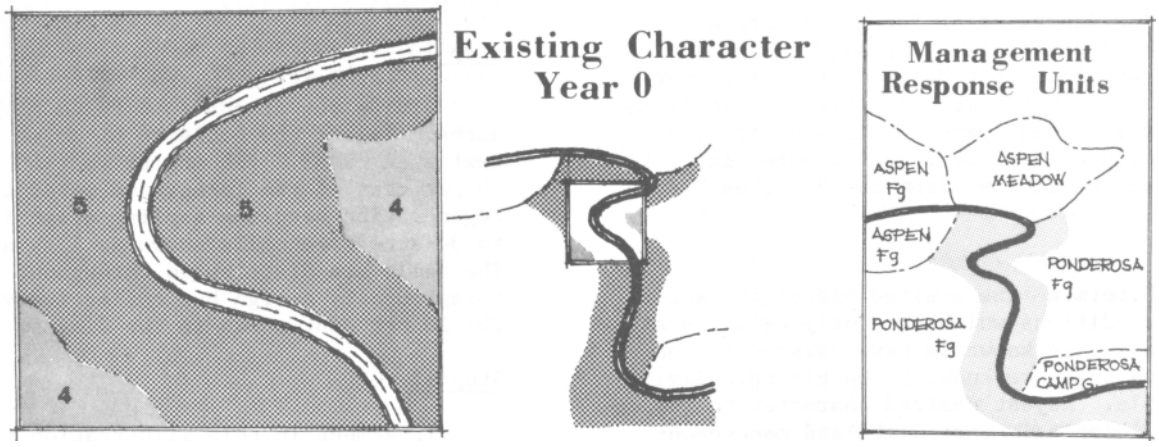

Figure 12-- Plan view showing a segment of existing character at year 0, and its relationship to a management response unit.

Development of such a conceptual silvicultural and visual process is usually about where corridor viewshed planning ends for foreground ponderosa pine and project design begins. The section on ponderosa pine describes development of landscape design criteria and silvicultural treatment concepts to achieve corridor viewshed direction.

SILVICULTURE TREATMENT CONCEPTS

Design Criteria
Ponderosa Pine foreground

Landscape design criteria developed from biological capabilities, desired visual sequence, visual quality objective RETENTION, associated resource objectives and used to guide silviculture treatments include:

1. Maintain large 26- to 36-inch diameter open park-like stands in 20 per cent of foreground.

2. Maintain old-growth characteristics of yellow-plated bark with deep fissures.

3. In regenerated areas maintain a combination of small openings contrasted against areas of dense reproduction irregularly spaced (clumpy) leave trees.

4. Precommercial thinning should he done so that it appears clumpy and irregularly spaced. Avoid leggy appearance of saplings.

5. In the black bark stage, create diversity in density and tree diameter. Contrast against yellow-bark stands and areas of reproduction where possible.

6. On each acre, in each character situation described, maintain three to five trees per acre to grow on to extra large trees and provide a few wildlife snags per acre for cavity nesters.

7. Stumps, debris, skid roads, and other negative visual elements should not be evident as viewed from the highway by a vehicular-oriented observer.

Treatment Concepts

Discussion of treatment concepts to meet design criteria and corridor viewshed direction begins with an enlarged drawing of the treatment increment within the cell drawing previously shown.

RETAIN SIZE CLASS 4 (MATURE STAND) or 5 (OLD GROWTH) The goal may also be to create it. The objective is to retain the desired mature or over-mature character until the cell is ready to be regenerated.

CREATE SIZE CLASS 1 sh (Stands in the process of being regenerated by shelterwood) from size 4 or 5.

The objective is to alter the density of the mature stand sufficiently to start regeneration, yet retain or create special enhancement effects, such as increased visual penetration into the stand at the time of the seed cut. As regeneration becomes established, either naturally or by planting, the open character will he replaced by rather dense but clumpy stands of reproduction. Small clearings sufficient to enframe or feature large trees will he created or retained. Varying densities in the clumps will provide screens to avoid continuous deep visual penetration.

CREATE SIZE CLASS 1 cc (Stands in process of being regenerated by patch clearcut) from size 4 or 5

The objective is to create and maintain natural appearing open spaces. Creating such spaces is accomplished as described below in each Visual Quality Objective. Maintaining open space quality is accomplished by controlling density of planted or natural regeneration to 50 to 70 trees per acre. If this is maintained, commercial thinning should be unnecessary or at least much reduced. The open spaces are most effective when displayed against the areas of reproduction occurring a decade or two after the shelterwood seed cut.

Example Treatment - Retention

Retain 12 to 15 shelter trees per acre, in clusters of 3 to 5 trees within a 50-foot diameter circle. Trees with the yellowest bark should be selected for shelter trees. The area influenced by these clusters should cover 75 percent of the subunit which is being regenerated and achieve a density of 300+ seedlings per acre within a decade.

Example Treatment - Retention

The treatment area or subunit should consist of openings ranging in size from about one quarter acre to about one acre, with natural or planted stock of 50 to 70 trees per acre. Areas with this stocking level should make up the remaining 25 per cent of the selected original mature stand.

CREATE SIZE CLASS 1 ss (Stands in need of pre-commercial thinning derived from the shelterwood regeneration harvest)

The objective is to thin the stands resulting from both the shelterwood and clearcut harvest activities, before the trees' lower branches die. Thinning spacing should vary considerably to give a natural appearance and add visual depth into the treated area. Pre-commercial and initial thinning entries may be completed for the most part during the same 50-year conversion period as the regeneration cutting, and will probably occur in approximately the same order of entry.

Example Treatment - Retention

Precommercial thinning will be required when the live crown ratio of crop trees falls below 85 per cent or the average stand diameter reaches 4-inch DBH.

The initial precommercial thinning entry should reduce the average stand density to 300 stems per acre (note: interplant up to 180 TPA). When the stand reaches a crop tree average of 6-inch DBH, density should be reduced to 180 stems per acre if a market does not exist for 6-inch DBH material. The remaining shelter trees should appear as scattered singles. Of the five remaining shelter trees, three may be converted to snags during the following 150 years, both for aesthetics and wildlife needs. This conversion would be unnecessary if adequate snags are already present. The two remaining shelter trees may be left to die a natural death after filling the need for a few very large trees with old-growth character.

CREATE SIZE CLASS 1 ss (Stands in need of precommercial thinning derived from small clearcuts)

By design, the stocking established in small clearcuts should he much sparser, to retain the open feeling of the unit; spacing should be widely varied to appear natural. flit; tends to produce additional contrast with surrounding, more heavily stocked areas.. Such contrast is desirable.

To meet this objective in the same ponderosa pine stand, the technique described below might be prescribed.

Example Treatment - Retention

Areas from the small clearcut situation should be precommercial thinned 2-inch DBH crop tree size, or fill-in planted, as necessary to provide an approximate density of 50 to 70 trees per acre. Areas treated in this manner will reach conditions described in the mature situation (open and park-like) earlier than the shelterwood treatment. The use of fire or power saws may be necessary to create and continue to mature stand (open and park-like) characteristics.

Necessary planting or thinning should be done to retain the open feeling of these small units. This would he achieved if crowns range from 3- to 12 feet apart in a random pattern.

CREATE SIZE CLASS 2 and 3 (Stand eligible for commercial thinning)

As treatment areas within a stand approach this size class, their appearance tends to become more uniform, with a resulting decrease in contrast and diversity. In ponderosa pine, the predominant visual effect of such a stand is the appearance of line in black hark trees. Visual diversity is caused primarily by the varying densities and diameters of trees. The objectives should be to maintain this diversity as much as possible.

Example Treatment - Retention

These are stands exceeding an average 6-inch DBH, with a density greater than the recommended stocking level. Three or four commercial thinning entries are anticipated to reach a crop tree average of 16-inch DBH. An additional thinning entry will be needed near maturity. Commercial thinning should be accomplished in all portions of the stand before the stand density reaches a level that diameter and height growth is badly restricted.

Commercial thinning should reduce stand density to within ± 10 per cent of the recommended stocking. It should also maintain a diversity of spacing and diameter size. Diameter size diversity can he achieved approximately by varying leave tree diameters to ± 25 per cent of the average stand diameter. Variety of tree size will be achieved by the natural growth rate differences of individual trees. Commercial thinning should he accomplished in varying densities, creating contrast with the nearest similar portion. The last commercial thinning entry will be scheduled at approximate) 26-inch average DBH, as stand enters Group 4

characteristics.

Spacing should vary from 15 to 50. Trees with minimum spacing should have maximum open spaces on at least two sides.