The Role of the Landscape Architect in Applied Forest Landscape Management: A Case Study on Process[1]

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Abstract: Land planning allocations are often multi-resource concepts, with visual quality objectives addressing the appropriate level of visual resource management. Current legislation and/or regulations often require interdisciplinary teams to implement planning decisions. A considerable amount of information is currently available on visual assessment techniques both for land planning and project implementation needs. Most literature does not emphasize the interdisciplinary process used to implement multi-resource activities. Processes which are overly complex in analysis or assessment technique commonly lack team commitment and therefore have limited useability. Also, processes in which team members are expected, or choose, to make strong recommendations outside their particular discipline are of questionable value, i.e., landscape architects making silvicultural and logging system recommendations.

INTRODUCTION

The Ant Hill proposed timber sale is on the Kootenai National Forest in northwestern Montana. This project provided an opportunity to bring several disciplines together and establish a successful process. This paper will address the project role of the landscape architect it landscape management. The emphasis is on the type of information a landscape architect can produce, when it is most meaningful and how the data can be appropriately used.

The Ant Hill sale area covered approximately 5000 acres and had a current land management plan. Most of the study area (figure 1) was viewed from Lake Koocanusa, a 98-mile reservoir and both a state highway and forest development road. The principle resources within the study area were timber wildlife, and visual. Key discipline members involved were the silviculturist, wildlife biologist, hydrologist, soil scientist, logging engineers, presale foresters, civil engineers and landscape architects.

Figure 1. Ant Hill Study Area.

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PROJECT PROCESS

The intent of this paper is to address only the more significant landscape management contributions and will therefore greatly abbreviate the intensive study, documentation and recommendations of related resources.

Figure 2 shows the major steps involved in the case study. The interdisciplinary team did not start with this as a predetermined timber sale process. But, when the project was implemented and reviewed, the sequence followed was as illustrated in figure 2.

<u>Step 1</u>--The study area was part of the Warland Planning Unit (U S D A Warland) and contained portions of seven different management units. Each specific management unit had a resources management objective, (fig 3) and contained basic management guidance.

<u>Step 2</u>--Most timber sale activities are guided by a 5 year timber harvest plan. This is a functional resource management plan which is responsive to the land management plan and is updated annually.

<u>Step 3</u>--This involves an intensive inventory and analysis phase. During this step the resources do not interact beyond determining appropriate mapping levels and how the data will be used. Figure 5 displays the optimum logging system as dictated by site conditions. In this study over 150 on-site, slope profile elevations were taken to be later converted into accurate graphic profiles, by using a digitizer, desk top computer and plotter. The profiles allow accurate deflections to be determined and analyzed for logging systems and associated roading.

The stand map, figure 6, shows areas which were inventoried for site data of slope, aspect, elevation, landform, geology, soils, climate, habitat type and relative productivity. The stand data also includes species composition, stand structure by age and size classification, density stand history, successional trend, tree crown condition, growth rates, timber volume. Understory vegetative conditions are also recorded.

Wildlife species to be managed for were identified. In the case study area, the browse and cover conditions for big game winter range was inventoried and mapped.

The landscape architects established visual criteria and support data for the landscape's Visual Absorption Capability (VAC).[3] Slope, observer distance, aspect relative to observer, landscape complexity, frequency viewed, and vegetation condition were inventoried. An overlay for the VAC map was developed showing the prominent features of primary

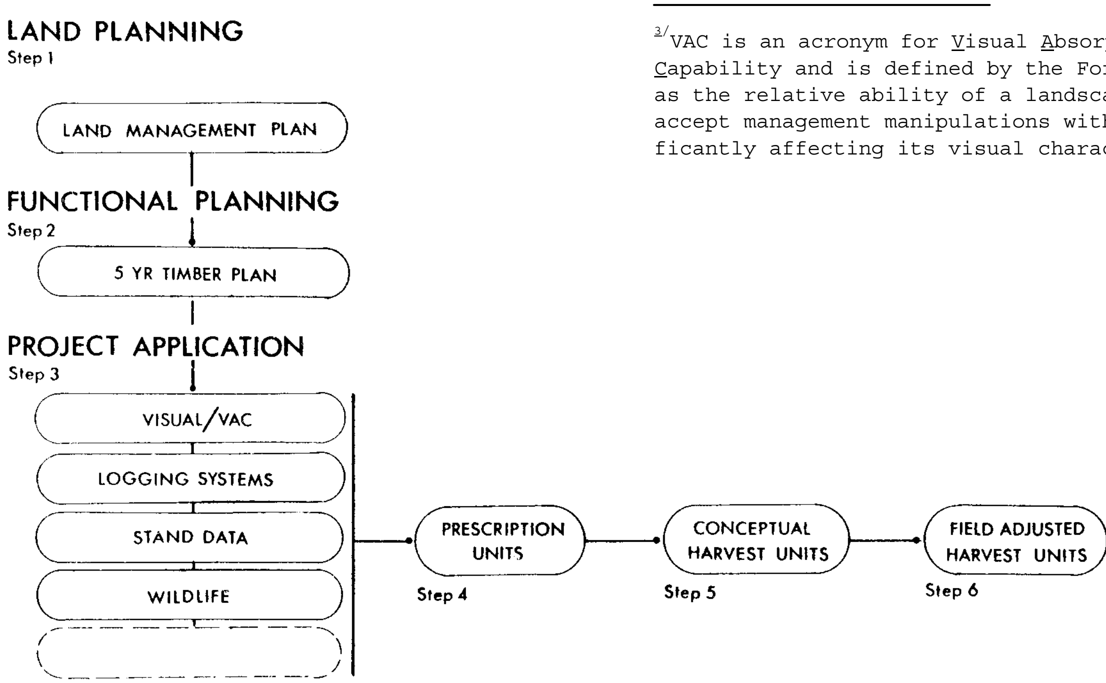

Figure 2-- Schematic of Ant Hill case study process.

[3] VAC is an acronym for <u>V</u>isual <u>A</u>bsorption <u>C</u>apability and is defined by the Forest Service as the relative ability of a landscape to accept management manipulations without significantly affecting its visual character.

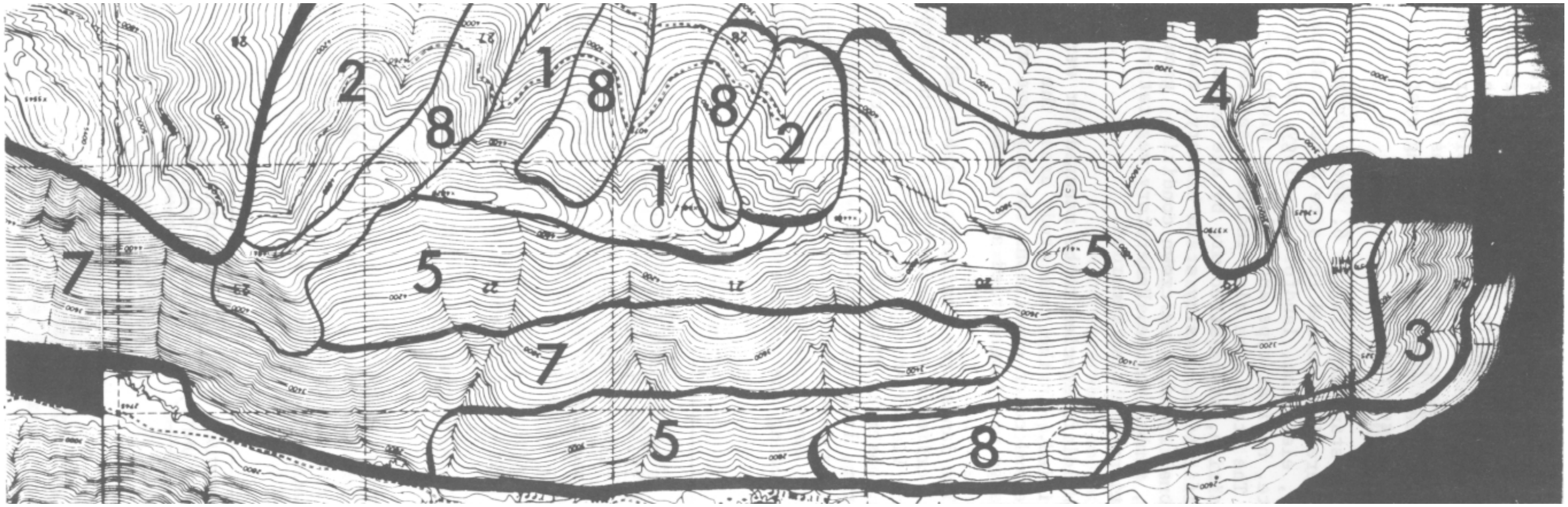

Figure 3   LAND MANAGEMENT PLAN. A portion of the Warland Planning Unit. Land Management units with major management emphasis are: #1 - (no major resource emphasis), #2 - Timber/Visual (Maximum Modification) resources, #3 - Recreation/Visual (Retention) resources, #4 - Wildlife (winter range)/Timber/Visual (Partial Retention) resources, #5 - Timber/Visual (Partial Retention) resources, #7 - Timber (by advanced logging systems/Visual (Partial Retention) resources and #8 - Timber/Visual (Modification) resources.

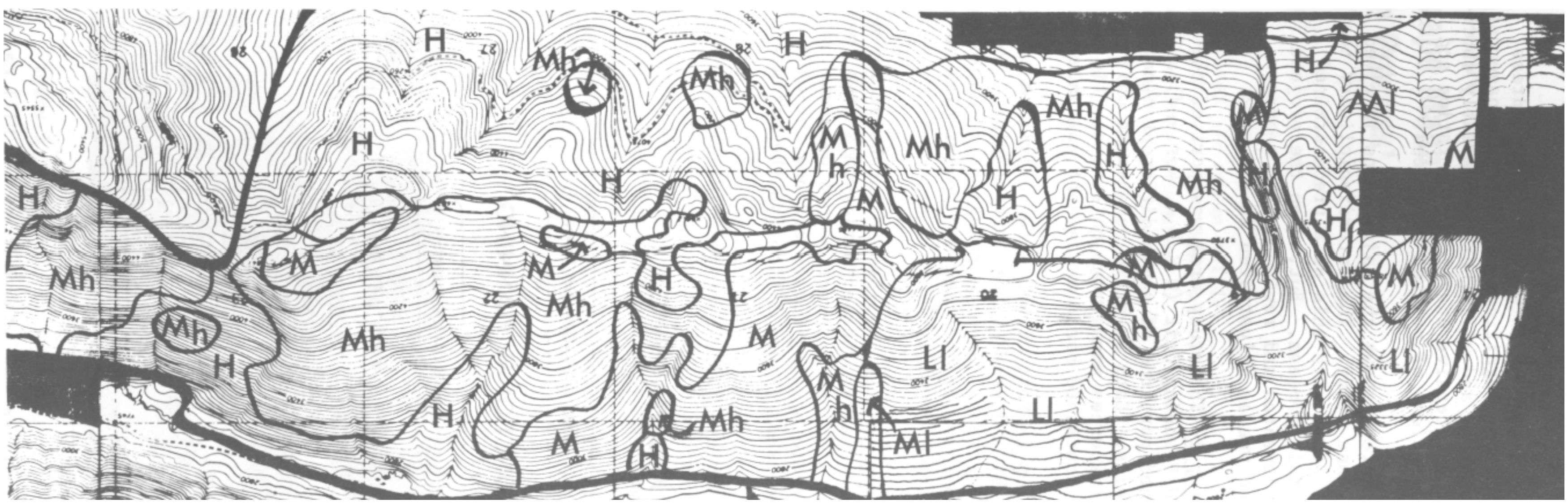

Figure 4 VAC MAP. Using both physical and perceptual factors, the study area was stratified into units based on the relative ability to absorb clearcut logging and associated roading practice. L1 = low and least ability to absorb, impacts, M1 = moderately low ability, M = moderate ability, Mh = moderately high ability, and H = areas which are not seen from significant viewing positions.

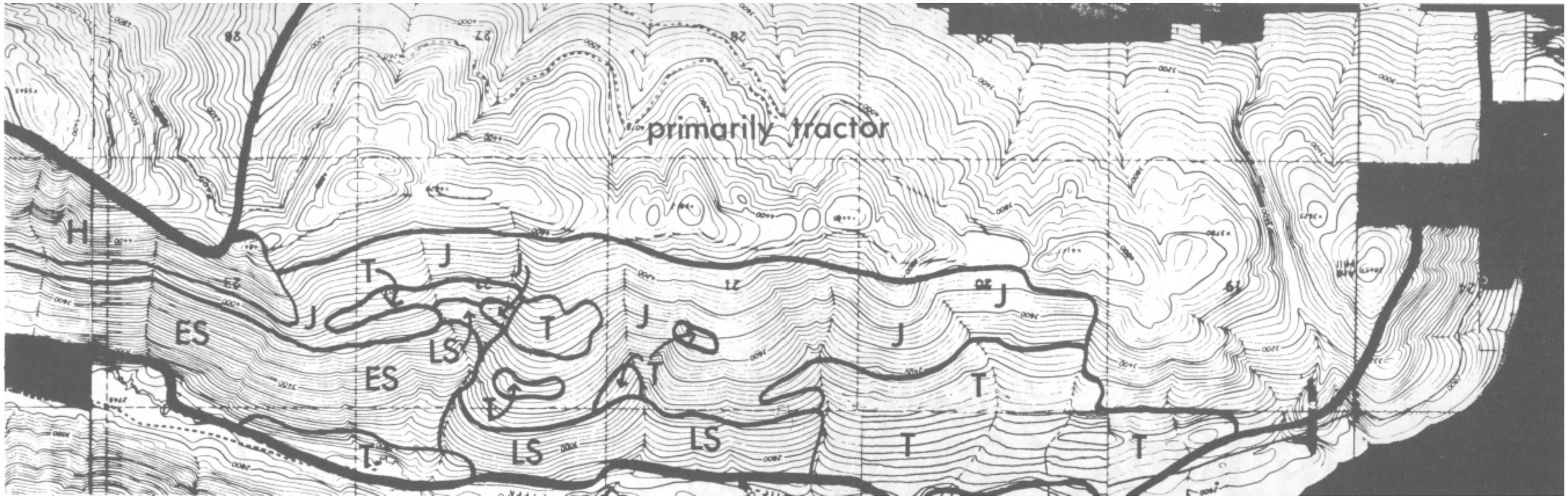

Figure 5 LOGGING SYSTEMS. Proposed logging systems with estimated yarding distances (EYD). T = tractor (EYD=1800'), J = jammer and running skyline (EYD 900'), LS = live skyline (EYD 1500'), ES = European downhill skyline (EYD 5000') and H = helicopter (EYD 6000').

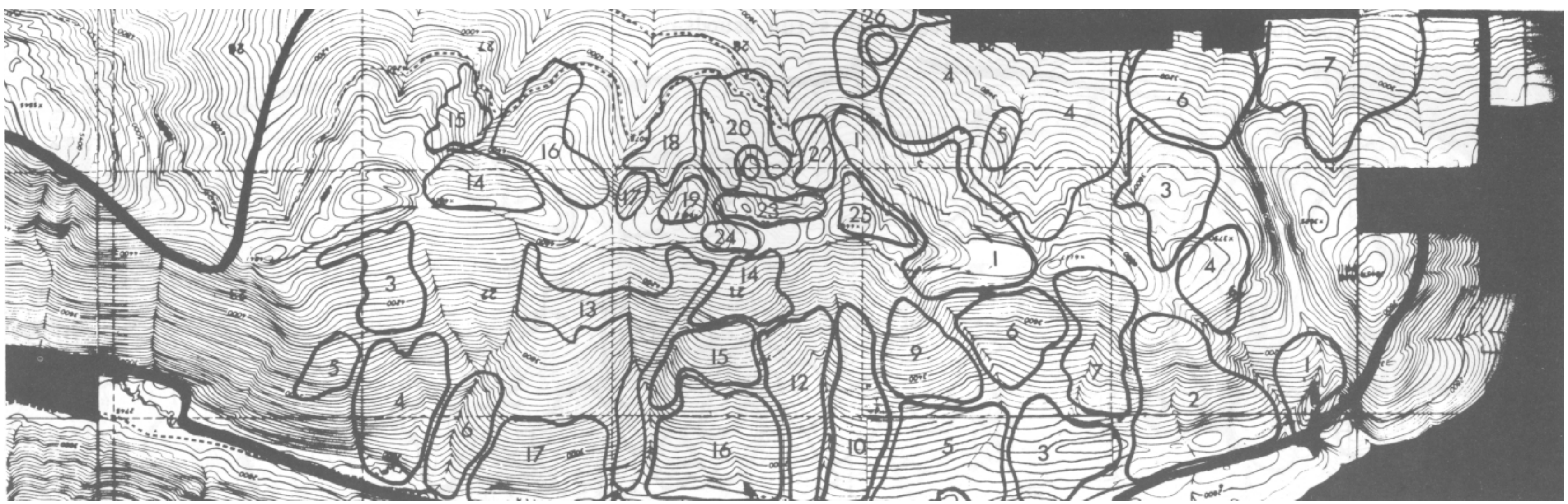

Figure 6 STAND MAP. Areas of similar vegetative condition and site characteristics.

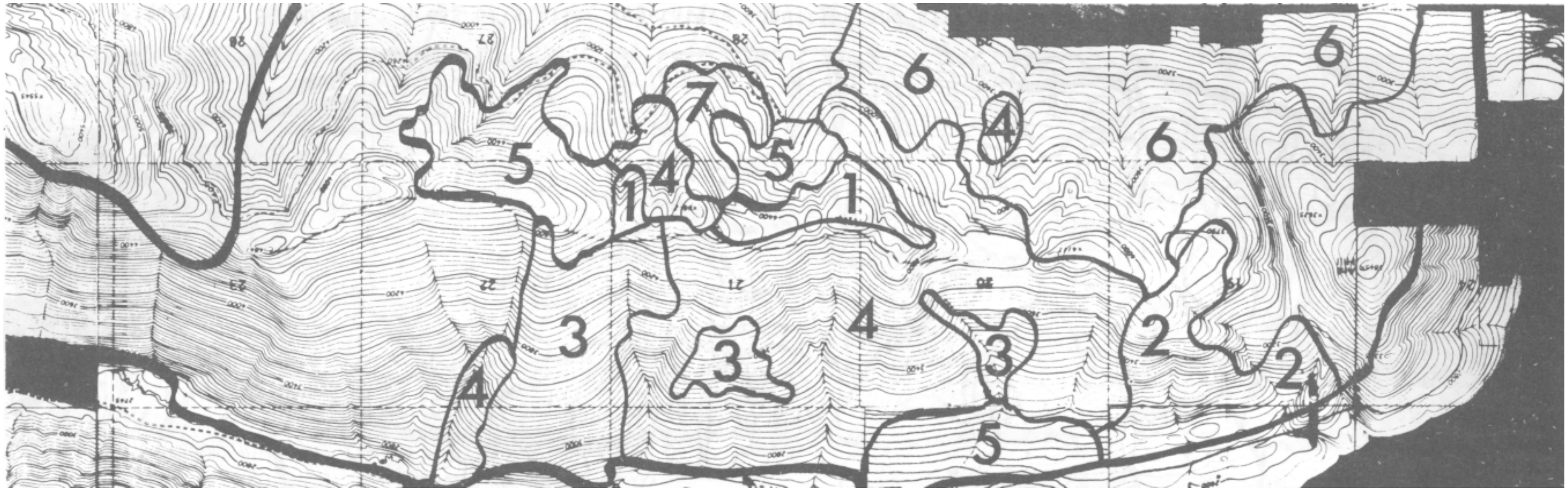

Figure 7 SILVICULTURAL PRESCRIPTION UNITS. Response units which have similar land management objectives and biological conditions. Each unit has a specific vegetative treatment prescribed.

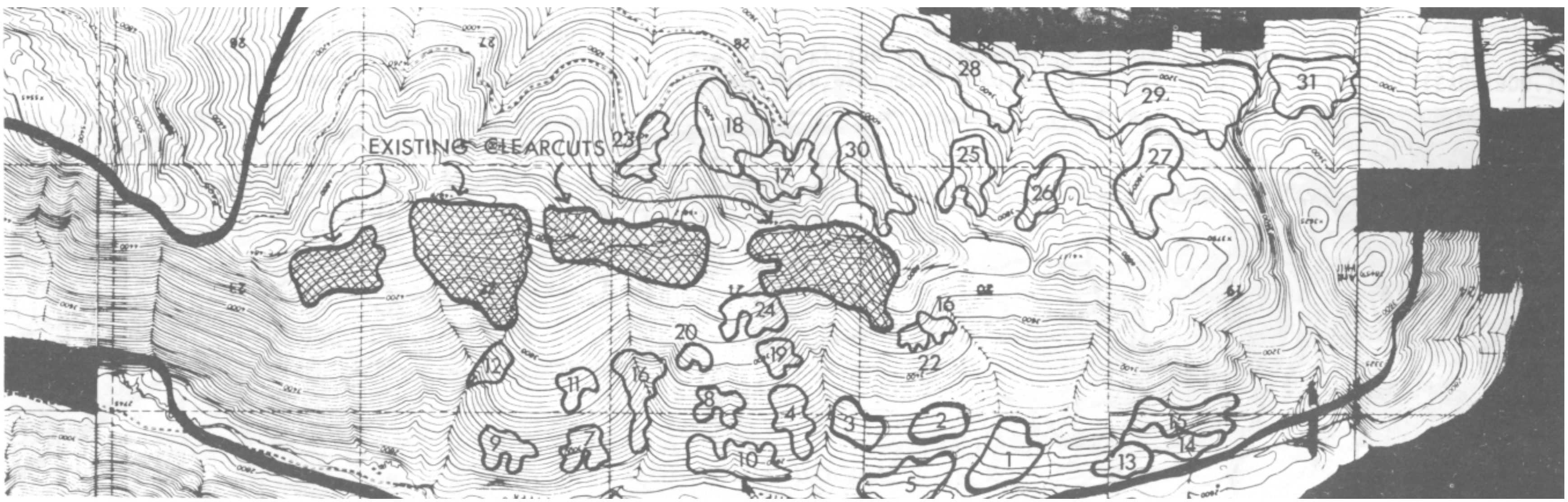

Figure 8 PROPOSED SALE LAYOUT UNITS; WITH TREATMENTS. Units 13, 14, 15 will have single tree selection, Units 7, 9, 11, 12, 16, 25, 26, 27 will be clearcut, Units 28, 29, 31 will have small group selection, Units 1, 2, 5, 17, 18, 30 will have a shelterwood treatment, Units 3, 4, 6, 8, 10, 19, 20, 22, 23 and 24 will have a two-stage shelterwood harvest.

ridges, secondary ridges, focal points, existing clearcuts, natural openings, and areas with critical soil problems(Hilliard *et al*.1977)

The inventory data were analyzed and the criteria were weighted both internally and externally. The study area was stratified into five visual absorptive levels and mapped (fig. 4). The VAC map displayed the relative ability of the landscape to absorb clearcut timber harvest and associated roading. Each of the five absorptive levels had landscape management guidelines (Hilliard *et al*. 1977) developed for: timber harvest and associated roading, management implications and priority and accuracy of field layout control for landscape design techniques. Minimum recommendations were also offered for landscape rehabilitation and establishing desired visual character for the viewshed.

The VAC map, with accompanying guidelines, was used in developing silvicultural response units, silvicultural prescriptions, road location and screening, and conceptual harvest unit size, shape and distribution. It should also be noted that the large land management areas with the visual quality objective of partial retention (fig. 3) show considerable differences in the ability of the landscape to absorb clearcuts.

Step 4--Figure 7 displays seven prescription units. These units were delineated using stand, wildlife, logging system and VAC map composites which relate to the land management objectives. Unit boundaries were established using both biological and visual data. Selected excerpts (Underwood 1977) from four of the prescription units (fig. 5) are included to demonstrate how the visual quality objectives and VAC map information were incorporated into the prescription treatment process.

Prescription Unit-2 (Figure 9)

This unit is unique due to the past management activities leaving the stands with three separate age classes and a variety of size classes. With this in mind and considering the very high viewing considerations, selection regeneration is the objective.

Proposed Treatment: Continue the uneven age stand structure by utilizing the individual tree selection system. This will meet the Visual Quality Objective and Silvicultural objective by maintaining the regeneration process already occurring. Maintaining or increasing the age class components will be the long range goal for this. A marking guide is attached for stand 6.1-02 utilizing Stage 1 stand structure data. This plan develops the marking by diameters class necessary to maintain the present stand structure and develop opportunities for creating additional size classes (Underwood 1977).

Stand 606.1-2
Present BA=134 ft.^{2}
Stand Structure
Residual 70 ft.^{2}
Correction Factor $\frac{70}{134} = .52$

EXISTING TREES

Diameter(Inches)	Number of Trees
1	107
2	43
3	64
4	21
5	64
6	63
7	39
8	19
9	36
10	16
12	15
14	7
16	12
18	5
25	8
25+	3

RESIDUAL TREES

Number of Trees	
56	
22	
33	
11	
33	208 leave trees
33	at 14.5 x 14.5 ft.
20	
10	
19	35 ft. spacing
8	
8	60 ft. spacing
4	
6	70 ft. spacing
3	
4	85 ft. spacing
2	
64 Merchantable per acre leave	

Figure 9--Existing and Proposed Size Classes.

Prescription Unit-3 (Figure 7)

"All stands are in need of regeneration, therefore the regeneration process should-begin utilizing the clearcut or seed tree system.

Proposed Treatment: Begin the regeneration process through the use of clearcutting or the seed tree regeneration system. Clearcuts should be small, 5 to 10 acres, with irregular edges to give the units a more natural appearing shape. One stand had a Visual Absorptive Capability (VAC) mapping class of L1 (low), least able to absorb management activities [first entry]. Harvesting should begin at the top of this stand, working down slope during future entries. A screening effect of the road at the bottom of the cutting unit will occur if harvested in this manner. Other stands had less viewing significance when VAC mapped, therefore clearcuts can be larger, 15 to 20 acres. Irregular edges are also necessary in these units to appear more natural"(Underwood 1977).

Prescription Unit-4 (Figure 7)

"All stands are in need of regeneration therefore the regeneration process should begin by utilizing the shelterwood system. This regeneration system will meet the variety of land management objectives included in this unit. The shelterwood system, leaving approximately 35 trees per acre and 50 ft. BA/Acre should meet partial retention Visual Quality Objective. This system would introduce new line, color, and texture but should remain subordinate to the landscape.

Proposed Treatment: Begin the regeneration process through the use of a shelterwood regeneration system [first entry]. Leave tree marking should be done with a 35' x 35' to 40' x 40' maximum spacing. Preferred species are: Douglas-fir and western larch on the north aspect and ponderosa pine, Douglas-fir and western larch on the south aspect.

Attempts should be made to feather the edges of cutting units on the north slope rated as L1 (low), on the Visual Absorption Capability mapping. This can he accomplished by marking more leave adjacent to cutting unit boundaries.

Removal of the leave trees [will be] after regeneration is complete and acceptable stocking levels reached of at least 400 desirable stems per acre. [The removal] should be scheduled to meet the VQO and timber production considerations. Areas mapped by the Visual Absorption Capability and having a L1 (low) rating, least able to absorb management, should have a two stage leave tree removal established. Approximately 1/2 of the [thirty-five] leave trees should he removed [in a second entry] approximately 8 to 10 years after regeneration began. This should leave approximately 13 to 17 [trees] per acre. The remaining trees should he removed within 5 to 8 years after the first [shelterwood] removal, [this would be the third entry]. Areas VAC mapped with more ability to absorb management activities should have the leave trees removed in one operation, but should be 10 to 12 years after regeneration began, depending on the site's VAC rating." (Underwood 1977)

Prescription Unit-6 (Figure 7)

"Improve the key winter game range cover/opening ratio through the use of various silvicultural systems such as individual tree selection, group selection, clearcutting, and liberation (overstory removal). While performing these cutting methods, the Visual Quality Objective must be followed.

Proposed Treatment: Areas below 3500' elevation will be managed primarily for white-tail deer. Areas above 3500' to 3800' will be managed for mule deer and elk.

In the white-tail area, develop large cutting units creating a mosaic of openings and marking individual trees for harvest. Small, 1/2 to 3 acre, clearcuts should be marked in areas containing concentrations of larch; preferably high risk concentrations. These small clearcuts should be interspersed with uncut areas of cover providing security and thermal cover. Additional marking should occur outside of the designated small clearcuts. In these areas mark high risk western larch, Douglas-fir and ponderosa pine for cut.

In the mule deer-elk areas, larger clearcuts should be designated in the 20 to 30 acre class, as these animals prefer larger openings interspersed with security and thermal cover areas. Three to four hundred feet of cover should he maintained between clearcuts. By creating irregular boundaries on the clearcuts, the VQO should be met.

The visual absorption capability (VAC) mapping classified the area designated for larger clearcuts as Mh or H. Mh is moderately to moderately high in the ability to absorb management activities and H is not viewed from critical viewpoints. An attempt should be made to locate clearcuts in the H area.

The recommendations set forth in the "Guidelines for Coordinating Timber Sales With Big Game Winter Range,"[4/] Kootenai National Forest, were followed." (Underwood 1977)

The VAC map (figure 4), provided the silviculturist with site specific, visual information. Where biological options allow either shelterwood or clearcut practices, the silviculturist could write a prescription for shelterwood harvest in the units with higher visual quality objectives and low VAC levels. Areas with a shelterwood harvest and in low VAC areas required two entries to remove the shelterwood leave trees. Prescription units with high visual quality objectives and high VAC levels, could have clearcuts prescribed; if the visual portion of the land planning objective could be met. Areas which biologically require clearcut or, seedtree practices and have a high visual quality objective and low ability to absorb could still have these regeneration practices used but with small scale landscape design techniques used to control visual impacts.

The landscape architects used the silvicultural prescription reports, VAC map and visual quality objectives to test prescriptions for visual compliance. Initial landscape design strategies were developed, i.e., size and distribution concepts in clearcut areas, number of leave trees in shelterwood areas, recommended height of regeneration before shelterwood removal, screening requirements for roads, foreground species compositions.

Step 5--Presale personnel used the logging systems map (figure 5), wildlife guides, silvicultural prescriptions (figure 7), and the VAC maps (figure 3) to develop conceptual harvest units. They worked with the landscape architects in the areas with higher visual quality objectives and low VAC ratings. Landscape design techniques along with Perspective Plot (Twito 1978) were used to test and adjust seed-tree and clearcut units.

Step 6--Conceptual harvest units were tested in the field. By using the VAC map (figure 4), presale personnel know which units, for visual reasons, require the most accurate layout control. Perspective Plot provided accurate information on the actual size, shape, critical edge, and screening situations. The VAC map also suggested where presale personnel should involve the landscape architects in needed field adjustments to harvest units. Figure 8 shows the final harvest unit configuration.

RESULTS

The following conditions seem to best explain why the Ant Hill project was a successful process; at least in the project application phase.

1. All members were well-qualified and trained in their respective positions, i.e., certified silviculturist, personnel with advanced logging systems training. Well trained personnel provided creativeness and more implementation options rather than resorting to traditional concepts.
2. A high degree of interdisciplinary credibility was present within the team and recognition by team members of the visual resource as a legitimate "resource" to be managed, and not just be mitigated.
3. The VAC map provided direct assistance to the silviculturist and presale foresters.

[4/] Guidelines were developed for the winter range of seven species of big game. Nine topics were addressed which related to vegetative manipulation; this includes silvicultural methods and size of cutting units. The wildlife biologist and landscape architect developed guidelines which would resolve conflict between high visual quality objectives and big game winter range. In areas of retention and partial retention, with low ability to absorb (VAC), the lower size suggested big game vegetative management option of clearcutting or seedtree harvest would be used. As the landscape's ability to absorb increases and/or visual quality objectives become lower, the suggested game harvest sizes increase to the larger recommended sizes.

4. The use of Perspective Plot (Twito 1978) to test layout concepts, offered design credibility through accuracy.
5. Landscape architects were able to provide accurate and meaningful data at various stages of the process.
6. Figure 8 includes several existing clearcuts which are more than 60 acres in size. These units were designed in about 1968. A comparison between the old and new proposed harvest units would suggest there are more biological opportunities to meet a variety of multi-resource needs than formerly displayed.

The process shown in figure 2, could be improved by using current concepts in two areas. Viewshed planning (U S D A Landscape Management) would logically precede the visual recommendations in project timber sale planning. A new computer program, "Scope" (Nickerson 1977), would be used to test concepts of shelterwood harvest. Figure 10 shows an update of the schematic process (fig 2) and could serve as a base from which to develop a local, specific, project process for landscape architects involvement in applied forest landscape management.

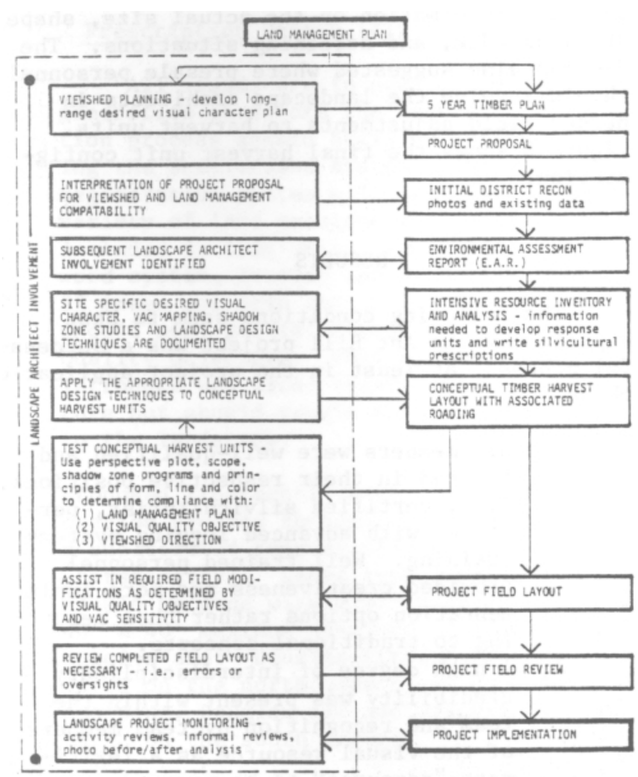

Figure 10--Suggested process for landscape architect involvement. This would be modified to meet specific project impact and sensitivity needs.

SUMMARY

Landscape architects currently have the needed techniques to practice intensive landscape management. They must now develop realistic and meaningful processes, which allow accurate visual impact and enhancement assessments to become fully useable. Professional judgments, which are not defensible, have limited value. The more landscape architects can not only predict, but clearly state desired visual situations, the sooner they will move from the positions of visual critics and/or visual impact mitigators, to areas of more effective visual resource management.

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