

EFFECTS OF ALTERNATIVE SILVICULTURAL METHODS ON SCENIC AND RECREATIONAL QUALITY

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Timber stands harvested using different silvicultural regimes were evaluated for acceptability as places for hiking, camping, and scenic viewing. "New Forestry" stands were more acceptable than stands managed using traditional practices. Stands were rated differently for different uses, with camping quality judged lower than hiking or scenic quality.

Introduction

Managers of America's forests increasingly must address concerns over the impacts of prevailing forestry practices. Questions have been raised from within and outside the forestry profession as to whether traditional methods constitute proper land stewardship (Clark and Stankey 1991). Among foresters, much debate has focused on the effects of common forest practices on biodiversity and longterm site productivity. Many foresters advocate a "New Forestry" that augments traditional methods with non-traditional silviculture based on new scientific findings about natural disturbances (Franklin 1989).

The USDA Forest Service has made New Forestry a cornerstone of its "New Perspectives" initiative, an integrated approach to forestry that encompasses ecosystem components beyond those associated with dominant tree species, and values beyond those associated with commodity extraction (Salwasser 1990). Yet distrust of scientific solutions is an important contributor to public skepticism about forestry. New methods cannot gain acceptance if they fail to address social concerns along with scientific ones (Clark and Stankey 1991). Integrated management strategies, especially those to be used on public lands, must therefore address social values.

Among the more significant social values are those related to public enjoyment of forests, especially scenic viewing and outdoor recreation. If the non-traditional New Forestry practices are perceived as detracting from public enjoyment as much or more than current methods, widespread acceptance is unlikely no matter how much those methods benefit biodiversity or site productivity.

This paper describes a pilot study of the scenic and recreational impacts of New Forestry practices. Two questions are addressed:

- 1) How do judgments of the scenic and recreational quality of New Forestry stands in the Pacific Northwest compare to judgments of uncut stands and of stands managed using traditional methods?
- 2) Do judgments of a stand's scenic quality differ from judgments of the same stand as a recreation setting?

Previous Research

Scenic Quality in Managed Forests

Studies of the scenic impacts of forest management have been conducted in the U.S. since the 1960s. One line of inquiry, dominated by researchers trained in landscape architecture, has examined aesthetic quality at the landscape level. One product of this research is the USDA Forest Service's (1974) Visual Management System.

Stand-level studies like the one described in this paper have been conducted largely by social scientists interested in features of forests that influence perceived scenic quality. These "near-view" studies have been conducted in most major U.S. forest types, including eastern hardwoods (Vodak et al. 1985), Southern pines (Hull and Buhyoff 1986), northern hardwoods (Ribe 1990), and Rocky Mountain ponderosa pines (Brown and Daniel 1986), as well as in Europe (Savolainen and Kellomäki 1981). The one major timber-growing region where such research has not been done is the Pacific Northwest.

Many stand-level studies have looked for attributes of managed and unmanaged forests that are linked to scenic quality, often focusing on inventory data could be fit into regression equations resembling growth and yield models (Hull and Buhyoff 1986). A few researchers have examined harvest methods and other practices such as slash piling and burning (Benson and Ullrich 1981; Brown and Daniel 1986). No research has yet examined the recently developed "New Forestry" practices.

Ribe (1989) synthesized stand-level findings in a review of aesthetic research in forests. He found high scenic beauty to be associated with large trees, low stand densities, grass/herb cover, high visual penetrability, and multiple tree species. Low scenic beauty is associated with small stems, dense shrub cover, bare ground, large amounts of woody debris, and evidence of mechanical disturbance (logging, road-building). Partial harvests are preferred over clearcuts, and scenic quality tends to recover quickly in the first few years after logging is completed.

Recreational Quality in Managed Forests

A fundamental premise of outdoor recreation management is that the quality of recreation experiences is linked to setting attributes. The Recreation Opportunity Spectrum (Clark and Stankey 1979), a primary tool in recreation planning, stems from landscape-level research showing that recreationists tend to seek settings with attributes that can help them achieve experience goals.

At the stand level, Scandinavian scientists have analyzed forest attributes to predict their quality for generalized recreation (Hultman 1983; Pukkala et al. 1988). The resulting models are better predictors for some activities than for others, and the distinction between recreational and scenic quality is not always clear.

Research on campsite preferences has identified features of settings that may enhance or reduce camping quality (Brunson and Shelby 1990). In one study, Clark et al. (1984) found that former timber harvest sites are sought out by some campers. These studies generally have not compared impacts of harvest techniques, although Foster and Jackson (1979) did evaluate preferences for various densities of vegetative screening between sites.

Hiking quality has gotten less attention. Axelsson-Lindgren and Sorte (1987) showed that stand heterogeneity increased the quality of hiking trips, but they examined no other stand attributes. Haakenstad (1972) found that hikers and skiers preferred open, forested terrain such as that found in shelterwood stands over the patchy forests produced by group selection systems.

Methods

Quality was evaluated using on-site surveys administered at the Oregon State University research forest in September-October 1990. Study sites included an old-growth Douglas-fir stand with diverse hardwood/softwood understory, and five Douglas-fir stands that had been logged within the past two years.

Representing traditional methods were a 45-acre clearcut logged in 1988, burned, and replanted; and a 16-acre stand of 30- to 40-year old trees thinned in spring 1990. The New Forestry stands, cut from a tract of 100-year-old trees in winter 1989-90, included a "patch cut" stand where one-third of the volume was removed in half-acre units; a 17-acre "snag-retention clearcut" from which the entire volume was removed except for wildlife trees; and a "two-story stand" from which two-thirds of the volume was removed, leaving a residual of 8-10 trees per acre.

In all three stands, wildlife habitat was enhanced by topping 1.5 scattered live trees per acre. Logging debris was left *in situ* except where removal was necessary for replanting. Hiking and/or skid trails crossed all sites except the snag-retention clearcut.

Surveys were completed by 77 student volunteers (forest management, outdoor recreation, and fish and wildlife majors) and 18 non-students from school parents' groups. Respondents rated each stand for scenic quality, as a place to hike, and as a place to camp. Ratings were made by circling the best response on a nine-point scale ranging from -4 (most unacceptable) through 0 (neutral) to 4 (most acceptable).

Based on previous research outside the Northwest, we expected scenic quality to be highest for the old growth stand; moderate for the patch cut and thinned stands; and lowest for the two-story, clearcut, and snag-retention clearcut. Because New Forestry calls for retaining or creating snags and woody debris, we expected those stands to be rated less acceptable than "cleaner"-looking traditionally managed stands having comparable residual volumes.

We did not attempt to predict recreational quality, as prior studies offered little basis for such predictions. However, we did expect ratings to be influenced by non-scenic aspects of stands that could affect one's ability to participate in an activity (e.g., flat ground for camping quality, or trail conditions for hiking quality).

Results

Mean acceptability for each site is shown in Table 1. A positive rating means that, on average, the site is considered acceptable. The old-growth stand was rated most acceptable for

all three uses (scenic viewing, hiking, camping), though the difference in camping quality ratings between the old-growth and patch cut stands was not significant. In general, the New Forestry treatments were judged more favorably than either the thinned or clearcut area, except that the thinned stand was judged more acceptable for hiking than the snag-retention clearcut.

Table 1. Mean quality ratings for different stands

Scenic quality	Mean	Hiking quality	Mean	Camping quality	Mean
Old growth	3.1 ^a	Old growth	3.4 ^a	Old growth	0.4 ^a
Patch cut	1.4 ^b	Patch cut	1.8 ^b	Patch cut	-0.0 ^a
Two-story	0.6 ^c	Two-story	0.5 ^c	Two-story	-0.7 ^b
Snag retention	0.4 ^c	Thinned	0.1 ^{cd}	Snag retention	1.4 ^{bc}
Thinned	-0.4 ^d	Snag retention	-0.1 ^d	Thinned	-1.5 ^c
Clearcut	-1.2 ^e	Clearcut	-1.1 ^e	Clearcut	-2.7 ^d

a,b,c,d,e Ratings with same subscript are not significantly different within uses (Kruskal-Wallis multiple comparison test)

All ratings of scenic and hiking quality were significantly higher those of the same sites for camping ($p < .05$, Wilcoxon signed rank test). The old growth, thinned, and patch cut stands were rated more acceptable as places to hike than as places for scenic viewing, while the snag-retention clearcut was rated more acceptable for scenic viewing than for hiking. Hiking and scenic quality ratings were not significantly different for the traditional clearcut and the two-story stand.

Discussion

Scenic Quality

This study is the first to assess scenic quality at the stand level in the Douglas-fir region of the Pacific Northwest, but the results were not unlike those from other parts of the U.S. and Europe. Acceptability ratings reflect a preference for mature forests over young ones, "natural-looking" stands over ones where human impacts are obvious, and partial-cutting techniques over clearcuts. The old-growth stand was judged most acceptable, the traditional clearcut least acceptable, and partial cutting methods somewhere in-between. Among the latter, the stand with the most residual volume (patch cut) was also the most acceptable. The two-story stand, with its residual of 100-year-old trees, was more acceptable than the thinned 30- to 40-year-old stand.

These results do not reflect the predicted adverse influence of down wood and artificially created snags. Previous studies had found that slash volume is negatively related to aesthetic quality (Arthur 1977; Brown and Daniel 1986), and skeptics often suggest that New Forestry will fail to gain public acceptance because it "looks sloppy."¹ The scenic impact of slash in the study stands is unclear, however.

Large amounts of woody debris existed in the thinned stand, where slash was in small-diameter pieces, and in the two-story and snag-retention stands, where piled and unpled slash was evident along with the lopped-off tops of created snags and a

¹Brunson, Mark. 1990. Summary of findings: New Forestry field trip survey. Unpublished report.

few trees blown down in a storm shortly after harvest. Although the two-story and snag-retention stands had greater amounts of down woody debris, the thinned stand was rated less acceptable.

Due to the exploratory nature of the research, we discussed preliminary findings with a group of 38 survey respondents. They attributed low ratings for the thinned stand partly to slash volumes, and partly to a perception that the thinning was poorly done, causing too much damage to residual trees. Conversely, they said the scenic quality of the snag-retention clearcut was enhanced by a timbered slope beyond it. Despite specific instructions to rate stands without judging their surroundings, participants said scenic judgments cannot be made totally independent of the broader context in which they occur.

Recreational quality

The quality of recreation experiences depends not only on setting attributes, but also on the psychological, social, physical, and managerial context (Clark and Stankey, 1979). Accordingly, we expected judgments about the forest environment to vary depending on whether the setting were viewed as a scenic backdrop or as a place to hike or camp. Previous research has found that favored scenic backdrops are not necessarily valued as recreation sites (Zube et al. 1975; Pukkala et al. 1988). In the present study, while the order of preference for different stands varied only slightly across activities, there were significant differences in mean acceptability depending on the use for which the site was being evaluated.

Three sites (old growth, patch cut, commercial thin) were more acceptable for hiking than for scenic viewing. Each contained a well-defined trail which appeared to have had no recent use by motorized vehicles. The one stand judged more acceptable for scenic viewing than for hiking (the snag-retention clearcut) was the only one with no trail.

Camping quality was judged uniformly lower than hiking or scenic quality. Previous research (Brunson and Shelby 1990) suggests that campsite preferences often are influenced by factors other than site attributes, such as the distance to water or to other recreation activities. Participants interviewed after their visits reported taking such off-site factors into consideration when judging camping quality.

Management Implications

A key finding of this study is that New Forestry stands were rated higher than those where established practices were used. While the results of this pilot study cannot be used to predict judgments of any other stand, it is clear that New Forestry practices are capable of producing stands whose scenic and recreational quality is superior to that of clearcuts or commercially thinned stands. A more pertinent question for managers might be: Are New Forestry stands "good enough" from a visitor's standpoint, or simply not quite as bad? Re-examination of the results suggests that the New Forestry treatments may indeed meet visitors' standards.

Figure 1 shows the percentage of respondents calling each stand acceptable (i.e., chose a rating above zero) for each use. A stand may be defined as meeting visitors' standards if judged acceptable by a given proportion of the public. Choosing that proportion is a political decision; for purposes of discussion, let us suppose a simple majority would be sufficient.

For scenic viewing, the old-growth stand and all three New Forestry treatments met the standard, even though the latter

were evaluated within a year after harvest, when scenic quality is typically lowest (Hull and Buhyoff 1986). For hiking, all but the snag-retention and traditional clearcuts met the standard, and a trail across the snag-retention site might be enough to make that site acceptable for hiking. Conversely, only the old-growth stand was acceptable for camping, and it just barely cleared the standard. However, it is quite possible that similar treatments on flatter ground could produce satisfactory levels of camping quality, especially in the patch cut units, which made natural campsite-sized openings.

This study has only begun to explore questions that are likely to become increasingly important. We do not know whether New Forestry stands will be generally acceptable to forest visitors. But it does seem possible to develop silvicultural prescriptions that achieve biodiversity objectives while at the same time meeting visitors' standards for scenic and/or recreational quality. The differences in scenic and recreational quality ratings underscore the need to consider in those prescriptions what kinds of experiences visitors may seek at a given location.

The future of forestry may depend on our ability to successfully integrate economic and biological objectives of forest management with social values, including recreation and aesthetics. The results of this study suggest that this can be done if social values receive the same attention in research and planning given to biological objectives.

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