

Regeneration Harvests Versus Clearcuts: Public Views of the Acceptability and Aesthetics of Northwest Forest Plan Harvests

Abstract

The Northwest Forest Plan, "New Forestry," and the "regeneration harvests" they prescribe offer some potential resolution to long-standing adverse perceptions of clearcut logging. This study investigated prospects for this potential resolution preliminary to more robust findings from a larger social perceptions study in progress. Ratings of acceptability and scenic beauty for depictions of timber harvests with aggregated and dispersed patterns of about 15 percent green-tree retention were acquired from a diverse sample of adults in western Oregon and Washington. Respondents rated actual photographs and simulated scenes showing the two retention patterns as well as clearcuts and uncut forests shown in the same scenes. Respondents rated the green-tree retention scenes with and without information about their "New Forestry" attributes and intentions. Comparisons of the average ratings suggest that 15 percent green-tree retention harvests can be perceived much the same as clearcuts. Public education is needed to improve perceptions of the acceptability of retention harvests. Aggregated green-tree retention patterns within harvests may help to produce more favorable perceptions of scenic beauty.

Introduction

The management of national forests in the Pacific Northwest is becoming more complex and political. The spotted owl controversy (Dietrich 1992) and its current resolution in the Northwest Forest Plan (USDA and USDI 1994) has shifted the technical emphasis of forest planning away from traditional silvicultural goals toward large-scale biodiversity goals. The complex decisions that arise from these often conflicting goals are now mediated through notions of "ecosystem management" (Bengston 1994, Vogt et al. 1997) and "New Forestry" (Gillis 1990, Kohm and Franklin 1997), in response to public demands for more multiple-value, sustainable resource management (Steel et al. 1994, Jones et al. 1995, Durbin 1996). The intensity of conflicts over forest management and of the politics that generated the Northwest Forest Plan indicate that the social acceptability of its prescriptions will likely play a key role in its implementation (Stankey and Clark 1992).

The social acceptability of forest management is complex (Brunson 1993, Gobster 1995). One critical dimension involves how recent timber harvests are visually perceived (Ribe 1989, Gobster 1994). Visual perceptions of acceptability often tend to derive from aesthetic reactions (Nassauer 1992). These perceptions are generally understood to be a primary cause of public reactions to

forest management (Ulrich 1986). Aesthetic perceptions affect acceptability perceptions among more disinterested observers who are thereby disposed mainly to aesthetic responses (Santayana 1896, Zajonc 1980), such as recreational visitors or passers through lacking a strong or active proprietary or ideological interest in national forests (Ulrich 1983). Or, public perceptions of management may be more cognitive, involving conceptual understandings or associations with what is seen, such as ecological impacts, the perceived virtue of forestry practices, or other normative ideas (Brunson 1993, Gobster 1996). These cognitive perceptions are based upon what philosophers and psychologists identify as more interested, as opposed to disinterested, observation which is less conducive of strongly or purely aesthetic responses (Santayana 1896, Izard 1977). Aesthetics is a recurring issue in forest policy (Dana and Fairfax 1980, Wilkenson and Anderson 1987). Much political opposition to national forest management has centered on perceptions of clearcut logging (Hays 1987, Hirt 1994). Photographs of clearcuts have appeared in countless popular media and political advocacy publications affecting national forest policy. Some examples are the Oregonian newspaper (1990), Devall (1994) and Native Forest Council (1987-98). Clearcuts are offered as evidence of excessive resource exploitation or destruction of functioning ecosystems (Wood 1971, Fritz 1989).

New Forestry offers alternatives to clearcuts, and the Northwest Forest Plan (NFP) prescribes one such alternative. It prescribes that living trees be retained within 15 percent of the area within each harvest unit, at least 70 percent of this retention be left in clumps, and that down wood be retained according to forest types (USDA and USDI 1994, p. C-39-41). These "regeneration harvests" seek to retain "biological legacies" (live and dead vegetative structures) to aid recovery and stability of biodiversity and ecosystem function following harvests (Perry and Amaranthus 1997). They will likely be the most visually noticeable manifestation of the NFP in the landscape, and a centerpiece for public perception of the acceptability of Forest Service management guided by that plan. The prospective nature of those perceptions is the focus of the social perceptions component of the Demonstration of Ecosystem Management Options (DEMO) study. DEMO is a replicated, long-term experiment that investigates many ecological and social consequences of several amounts and patterns of green-tree retention during harvests in western Washington and Oregon.

A Prospective Study

The social perceptions component of the DEMO study is yet to be completed. It will investigate perceptions of photographs of pre-harvest forests and of the different magnitudes and distributions of green-tree retention in the DEMO experimental harvests. Photographs of clearcuts with various volumes of woody debris retention from the Long Term Ecosystem Productivity (LTEP) study and various thinnings from the Young Stands Study (YSS) will also be included in this upcoming study. Perceptions of management acceptability and scenic beauty will be explored as influenced by information about how the harvests are conducted and the long-term management intentions they might achieve. Such informed perceptions may prove more reliable indicators of eventual public opinions of New Forestry (Davidson et al. 1985). Some perceptions will be modeled against the corresponding vegetation structure of the pre- and post-harvest forests (Halpern et al. 1999), as has been done for forest types and management practices elsewhere in the U. S. (Ribe 1989). A diverse sample of respondents from Oregon and Washington will judge the photographs.

This Preliminary Study

As of this writing, the DEMO harvest treatments are not yet complete and are not photographed for inclusion in the main DEMO social perception study sketched above. This paper instead reports a preliminary study using photo-simulations to explore perceptions of forest landscapes that can inform the prospective main DEMO social perceptions study. This preliminary study focused on the minimum 15 percent green-tree retention harvests currently prescribed by the NFP rather than the broader range of retention levels in the DEMO study. Results from the larger DEMO study, including the social perceptions component, may affect current NFP retention standards (Franklin et al. 1997). It is timely to investigate the current NFP standard applied to national forest harvests, and this paper will focus on that.

Little research has considered the perceptions of New Forestry harvests or regeneration harvests prescribed by the NFP. The negative aesthetics of intensive harvests and clearcuts are well established (Ribe 1989). Studies indicate that less intense harvests, such as shelterwood cuts, thinnings, seed-tree retention cuts, smaller cuts, and patchy harvest patterns, can reduce the magnitude of adverse aesthetic reactions (Rutherford and Shafer 1969, Kenner and McCool 1985, McCool et al. 1986, Brunson and Shelby 1992, Schroeder et al. 1993, Palmer et al. 1995). Investigations that focus on the perceived acceptability of various intensities of harvest indicate that acceptability perceptions are complex, nuanced and probably more subject to the effects of information and respondents' attitudes than are more purely aesthetic perceptions (Vining 1992, Hansis 1995, Brunson and Reiter 1996). To the extent that perceptions of acceptability are more cognitive, i.e. involve thinking as well as reacting, they may conflict with aesthetic perceptions because ecologically functional attributes of forests, such as downed wood, dead trees, an understory, and burns, are often not viewed as beautiful (Benson and Ullrich 1981, Taylor and Daniel 1985, Ruddell et al. 1989, Nassauer 1992, Gobster 1996). The studies of perception of New Forestry harvests by Brunson and Shelby (1992) employed field visits by a small sample of respondents consisting mostly of university students. A larger, more diverse sample is needed to better investigate perceptions that might affect the politics

of public land management in the Pacific Northwest. This preliminary study (as well as the prospective main DEMO social perceptions study) employed such an improved sample.

This study investigated perceptions of aggregated versus dispersed 15 percent green-tree retention harvests. Simulated depictions of these two forms of regeneration harvest were shown to a sample of respondents along with corresponding depictions of clearcut and uncut forests. Respondents rated these scenes either for scenic beauty or acceptability. Half of the ratings of the 15 percent retention scenes were made with information about such harvests that might affect the ratings (henceforth, "informed ratings or scenes"). The other half were made without information ("uninformed ratings or scenes"). The average ratings for these informed versus uninformed regeneration harvest scenes were then compared to each other and to average uninformed ratings for uncut and clearcut versions of the same scenes.

The questions investigated were: (1) Are simple, uninformed perceptions of scenic beauty and acceptability of the green-tree retention harvest patterns different from those of conventional clearcuts? (2) How does information about the regeneration harvests affect perceptions of them? (3) Are dispersed retention harvests perceived as more acceptable than aggregated retention harvests, and do such differences change when ratings are made with information? (4) Are dispersed retention harvests perceived to be more scenically beautiful than aggregated retention harvests, and do such differences change when ratings are made with information? (5) Might differences in the scenic conditions of the harvests and their landscape context affect answers to any of these questions?

Methods

Scenery Sample

Two photographs of hillsides within the Mount Hood National Forest were used in the study, as shown at the top of Figures 1 and 2. These scenes were selected because they enabled production of high-quality simulations shown in the middle and bottom of Figures 1 and 2. Each occurred near similar views with recent harvests of known green-tree retention characteristics. Photographs of these nearby views, taken at nearly the same

time of day and direction, were then used as imagery to make simulations that represented the 15 percent green-tree retention patterns as accurately as possible. Using only one photograph to simulate both dispersed and aggregated retention patterns would have better enabled comparing the ratings of the two patterns with no other confounding differences, such as other harvests or roads. However, the production of more valid simulations was judged more advantageous for this pilot study. Using two photographs also had the advantage of preventing respondents from detecting the same scene with different harvests. This detection might have affected their responses by causing them to guess what comparisons were the subject of the research. This might then have affected their responses differently than if they simply encountered the scenes in the field. Seeing different scenes with different harvests would be expected and more likely to produce judgments unaffected by survey procedures.

The simulation of an aggregated retention harvest minimally meeting NFP green-tree retention standards is depicted as the center image in Figure 1. It includes an aggregated patch of trees straddling an ephemeral stream channel. In the source imagery for the simulation that patch included about 15 percent of the timber volume that stood within the timber-sale area prior to harvest; the rest of the area was clearcut. Dispersed retention of trees was also simulated in the rest of the harvested area, consistent with NFP guidelines. These retention elements within the harvest unit were then simulated out of the image to produce the corresponding clearcut image at the bottom of Figure 1.

The image simulating a dispersed retention harvest is shown as the center image in Figure 2. This simulation was derived from imagery from a similar slope on which a dispersed retention harvest had recently been completed, retaining ten percent of the trees inside the harvest area. The simulation involved adding half-again as many retained trees within the harvested area. Then, to produce the corresponding clearcut image at the bottom of Figure 2, nearly all of these retained trees were simulated out of the image. The few trees left resembled recent clearcutting practices in the Mount Hood National Forest where a few trees are retained to anchor guy-wires for log-yarding equipment.



Figure 1. Aggregated retention scene set with uncut forest (top), simulated 15 percent green-tree retention harvest (middle), and conventional clearcut (bottom).

The two sets of images in Figure 1 versus 2 depict harvests of different size and stage of regeneration, different scenic contexts, and the presence (Figure 2) or absence (Figure 1) of other harvests. This difference allowed a preliminary exploration of potential confounding effects upon respondents' ratings of harvest size and stage of regeneration, as well as of other harvests in a scene. It was useful to explore the magnitude of these effects as they may influence perceptions of the diverse set of DEMO, YSS and LTEP harvests to be photographed for the main social perceptions study. (A more definitive analysis of these effects should occur through an analysis of covariance in this prospective, main study.) These scenic-contextual differences produced two scenic conditions as follows: One scenic condition, that might be expected to favorably affect scenic ratings, corresponded to the aggregated retention scenes (Figure 1). It included a smaller harvested area, early forest regeneration evident therein, and no other harvests in view. A second scenic condition, that might be expected to more adversely affect scenic ratings, corresponded to the dispersed retention scenes (Figure 2). It included a larger harvest, no forest regeneration evident therein, and two other harvests in view.

Preparation of Scene Surveys

The six study images (Figures 1 and 2) were made into color slides to be rated by respondents. They were placed among 54 other slides from the Cascade Mountains in Oregon and Washington as part of a larger "experience" of forest scenes for the respondents to simply see and judge. These included a wide variety of national forest scenes of various scales that depicted a diversity of landscapes from wilderness to heavily managed vistas. This approach sought to elicit ratings indicative of judgments that might be made upon encountering the scenes during trips through the forest, as opposed to the more intentional judgments that might be made if attention were focused on just the subject scenes with their obvious comparative content. The 15 percent retention slides were rated both with and without information, so second copies were placed among other sets of slides that were shown to respondents with corresponding one-sentence information statements. Together, these formed a shorter, 15-slide "guided-tour experience" of diverse national forest scenery that

followed the first, uninformed "experience" during the rating sessions.

The study slides were placed into two slide trays as illustrated in Figure 3. (Two trays were needed to include all the slides for this and another study.) Each tray was shown to different respondents, roughly half of whom rated its slides for scenic beauty and half for acceptability (Figure 3). The 15 percent retention slides were placed into the trays so that each respondent rated one retention pattern without information and the other pattern with information (Figure 3), without having his/her rating affected by an awareness of a repeated scene with information the second time. The 15 percent retention slides involved in this designed allocation were randomly placed within the required sections of the two trays. The other study slides were randomly placed within the slide trays' uninformed sections (Figure 3).

When the informed slides were shown to the respondents, one and the same information statement accompanied both the aggregated and dispersed retention simulation slides for rating both acceptability and scenic beauty. It was: "This harvest left 15 percent of the living trees standing as future habitat and a way of helping the ecosystem reestablish itself as a new forest grows back there." This statement was constructed to be simple but indicative of how the harvests might be perceived differently from commonplace clearcuts. It sought to capture the essence of New Forestry and the harvesting prescriptions found in the NFP, particularly regarding retention of biological legacies. At the same time, it sought to be relatively objective to reduce the extent to which it would produce its own affect independent of the appearance of the scenes (Brunson and Reiter 1996). The words "harvest," "ecosystem" and "habitat" do have such affective tendencies (Kellert 1983), but were used anyway, after deliberation, as necessary to express the needed content.

Respondent Sample

Members of a variety of organizations rated the slides as a special activity during their regular meetings. They filled in a questionnaire and rated slides privately, anonymously and independently on individual rating forms, as described below. Groups were recruited to capture a diversity of people with active interests in preservation versus

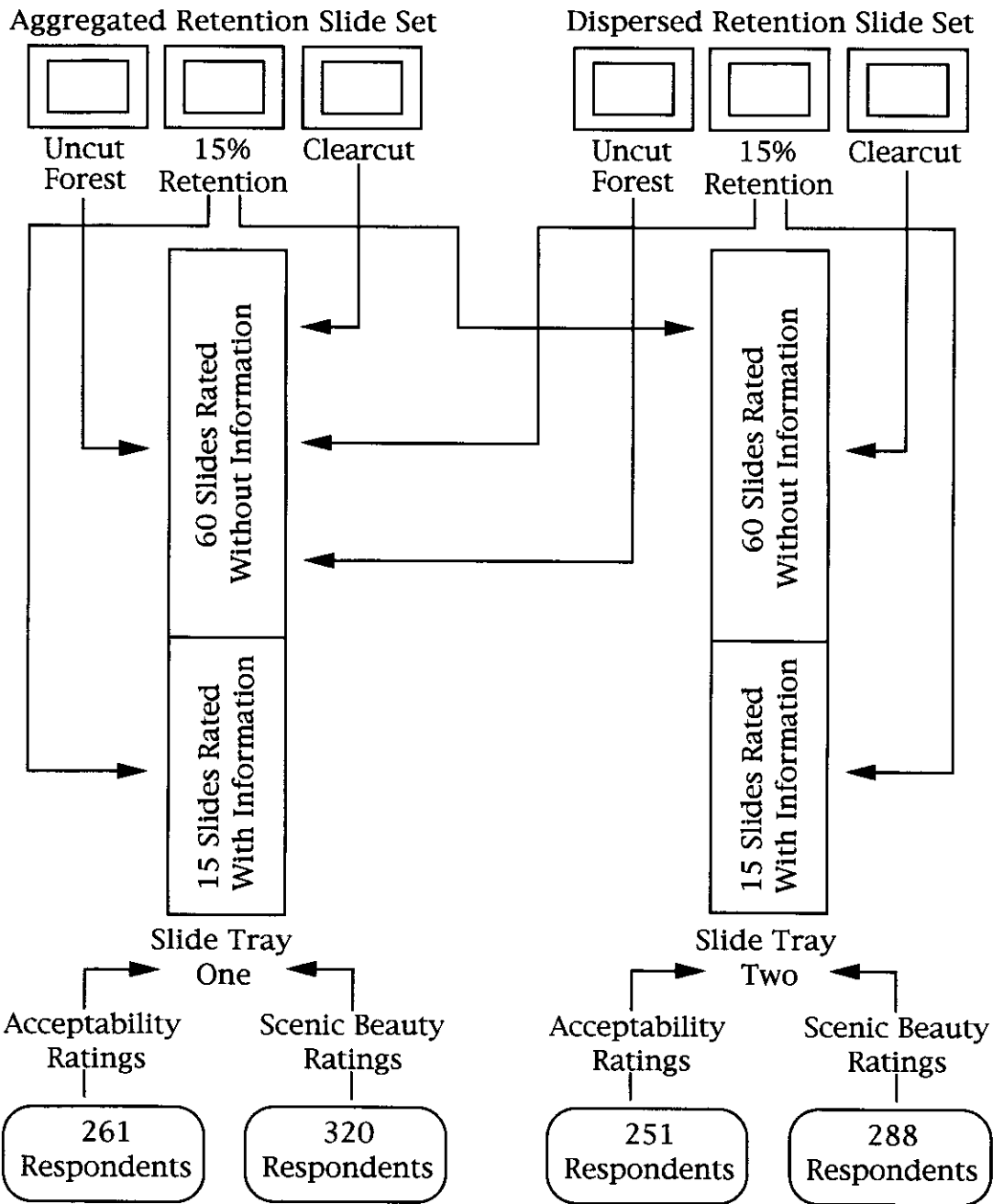


Figure 3. Relationship between the study scenes, whole slide sets that were rated, and respondent sets that rated slides for different qualities.

commodity production on public lands (Chandler and Lee 1994). They were also recruited to include a variety of rural, suburban, and urban respondents throughout western Washington and Oregon to represent the diversity of attitudes toward land management found across such places (Tichenor et al. 1971, Tremblay and Dunlap 1978, Lyons 1983). To a lesser extent, diversity was sought in incomes, ages, educational attainments, relationship to the forest product industry, and recreational preferences. The groups included natural-resource-related organizations such as logging and property rights advocates, environmental groups, civic clubs, social clubs, professional organizations, outdoor recreation groups, higher-education classes, business clubs, corporate offices, granges, and neighborhood associations.

Each group of respondents viewed one of the two slide trays and rated its slides for either acceptability or scenic beauty. The respondent groups needed to be allocated to the judgment of these two qualities. At first, combinations of a slide tray and quality to be judged (scenic beauty or acceptability) were assigned to each group at random until all four combinations had been administered to at least 200 respondents. From that point on groups were assigned intentionally to make the four sets of respondents who rated each of the combinations "similar" to each other to reduce the probability that any one would have a chance over-representation of respondents with a key bias. Groups were judged to be similar if each contained at least one fourth residents of rural areas and cities with populations less than 20,000, and if each contained roughly equal numbers of respondents tending to favor forest production versus forest protection. For this latter purpose, a running tally was kept of responses to two questions about the northern spotted owl controversy. These were questions that asked how much respondents agreed or disagreed with statements. The first statement was that the spotted owl should be saved even at a high economic cost, and the second was that the spotted owl should be saved only if it can be done without infringing on private property rights. This intentional assignment of groups was to continue until at least 1,000 respondents were sampled. It was necessary to exceed that number to achieve the rough similarity sought among the combinations of slide trays and qualities judged. A total of 1,120 respondents from 57 groups were surveyed: 18 groups

(261 respondents) rated the slides in tray one for acceptability, 17 groups (320 respondents) rated tray one for scenic beauty, 8 groups (251 respondents) rated the slides in tray two for acceptability, and 14 groups (288 respondents) rated tray two for scenic beauty (Figure 3).

Slide Rating Surveys

At the outset of the slide rating sessions, all respondents were instructed to make their uninformed judgments based upon the "knowledge and sensibilities they already had." They were told to view the slides as scenes they might encounter traveling through national forests in the Cascade Mountains "distant from home" and "distant from their favorite place to visit" in those mountains. Those who rated slides for acceptability were instructed to rate the landscape in each slide for the "acceptability of its condition as a publicly owned and managed national forest." They were instructed that they could base these judgments on the appearance of the landscape and/or their awareness of the causes of its condition; the purposes of the management that produced the landscape and/or alternatives to that management; the feasibility of those options and any unknowns and risks involved that they knew of; or anything else they wished (Brunson 1993). They rated each numbered slide on a scale from minus five for very unacceptable to plus five for very acceptable, with zero assigned to slides for which they felt either neutral or undecided.

The respondents participating in scenic beauty sessions were simply instructed to rate the slides for "scenic beauty." Studies indicate that this is the only description needed to instruct ratings of scenic beauty (Zube et al. 1982, Hull et al. 1984). Respondents rated scenic beauty on the same numeric scale as was used for rating acceptability, except that they were instructed that the scale ranged from "very ugly" to "very beautiful," with zero assigned to slides they found neither beautiful nor ugly or for which they were undecided.

Immediately after the respondents rated the 60 slides either for acceptability or scenic beauty, another rating session began for 15 more slides rating the same quality and using the same scale as before. In this new session, each slide was accompanied by a sentence containing information about the landscape it depicted. This sentence was both spoken while the slide was displayed and provided on the response forms in large print

just above the rating scale for the corresponding slide number. Respondents were instructed to wait until after the information sentence had been read before making their ratings.

Data Analysis

Data were analyzed by examining the patterns of average ratings (Schroeder 1984) for one quality at a time and within one scene set at a time, i.e. comparing the scenes in Figure 1 or those in Figure 2. T-tests were used to test for statistically significant differences ($\alpha = .01$) between pairs of average ratings (Table 1). This small alpha value was used to reduce the chance of spuriously identifying a statistically significant result given the numerous comparisons performed. Paired t-tests were used to compare average ratings generated by the same sets of respondents. Unpaired t-tests were used to compare average ratings generated by different respondent sets.

The aggregated versus dispersed retention results came from different slide sets, each with its own scenic context and reference slides depicting uncut and clearcut forests (Figures 1 and 2). This made comparing the average ratings for the two different retention patterns problematic and tentative. However, to facilitate a graphic comparison for this preliminary study, a standardization of these average ratings was made. This was a linear range transformation to a common numeric scale. This transformation set the average rating for the clearcut slide to zero and the average rating for the uncut forest to 100. The transformed average ratings for the green-tree retention harvests then fell proportionally between. This enabled a rough comparison of the average ratings for the two retention patterns versus those for clearcut and uncut forests.

Results

Average rating values and the corresponding transformed values appear in Table 1 with the t-tests used to compare average ratings within the sets of comparisons depicted graphically in Figures 4 and 5. As might be expected, within the scene sets for both the aggregated and dispersed retention patterns, the clearcut scenes exhibited the lowest average ratings and the uncut forest the highest. The average ratings for the green-tree retention harvest scenes fell in between or were statistically equivalent to the clearcut.

There was not a statistically significant difference between the average acceptability ratings of the uninformed clearcut versus the uninformed regeneration harvest in either slide set (Table 1). The same held true in comparing the average scenic beauty ratings for the clearcut and the uninformed dispersed retention harvest (Table 1). In contrast, the average rating of scenic beauty for the uninformed aggregated retention harvest scene was significantly greater than that of the corresponding clearcut scene (Table 1, Figure 4).

The information statement had a significant and substantial positive association with a change in average acceptability ratings for both retention patterns (Table 1, Figures 4 and 5). However, the information statement was evidently much less influential upon average ratings of scenic beauty. Information was not significantly associated with a change in the average scenic beauty rating of the aggregated retention slide (Table 1, Figure 4). Although the average scenic beauty rating of the dispersed retention slide with information was significantly greater than that without information (Table 1, Figure 5), this difference was smaller than that observed for the acceptability ratings (Figures 4 and 5).

The transformed average acceptability ratings at the top of Figure 6 suggest that the aggregated retention harvest was perceived as slightly more acceptable on average than the dispersed retention harvest, with or without information. The comparison of transformed average scenic beauty ratings at the bottom of Figure 6 is much more suggestive of a difference. There, the average ratings for the aggregated retention pattern are higher than those for the dispersed retention pattern. These differences are much greater than those associated with informed versus uninformed scenic beauty ratings within either slide set (Figure 6).

The differences in scenic content between the scene sets in Figures 1 versus 2 may be associated with differences in the average ratings produced from those scene sets. The aggregated retention slide set, with smaller harvest sizes, more sapling regeneration evident within its harvests, and no other harvests in view, produced average ratings greater than zero for both judged qualities (Figure 4). In contrast, the dispersed harvest slide set, with larger simulated harvest size, no sapling regeneration evident, and other harvests in view, produced average ratings across a wider,

TABLE 1. Matrices of t-tests for all comparisons of mean ratings within each combination of retention pattern seen and quality judged. The top row of each matrix indicates mean rating values with corresponding transformed mean rating values in parentheses.

	Uninformed Clearcut	Uninformed 15% Retention Harvest	Informed 15% Retention Harvest	Uninformed Unharvested Forest
Acceptability of Aggregated Retention Scene Set				
Mean Ratings	1.08 (0)	0.99 (-6)	2.13 (64)	2.71 (100)
Uninformed Unharvested Forest	t = 11.15 p < 0.001 df = 260	t = 8.68 p < 0.001 df = 250	t = 3.41 p < 0.001 df = 260	
Informed 15% Retention Harvest	t = 6.85 p < 0.001 df = 260	t = 5.51 p < 0.001 df = 250		
Uninformed 15% Retention Harvest	t = 0.78 p = 0.43 df = 250			
Scenic Beauty of Aggregated Retention Scene Set				
Mean Ratings	0.80 (0)	1.68 (67)	1.72 (71)	2.11 (100)
Uninformed Unharvested Forest	t = 11.17 p < 0.001 df = 319	t = 3.08 p = 0.002 df = 287	t = 3.09 p = 0.002 df = 319	
Informed 15% Retention Harvest	t = 7.73 p < 0.001 df = 319	t = 0.34 p = 0.73 df = 287		
Uninformed 15% Retention Harvest	t = 5.04 p < 0.001 df = 287			
Acceptability of Dispersed Retention Scene Set				
Mean Ratings	-1.79 (0)	-1.65 (4)	0.00 (54)	1.53 (100)
Uninformed Unharvested Forest	t = 13.29 p < 0.001 df = 250	t = 17.11 p < 0.001 df = 260	t = 6.26 p < 0.001 df = 250	
Informed 15% Retention Harvest	t = 8.62 p < 0.001 df = 250	t = 5.83 p < 0.001 df = 250		
Uninformed 15% Retention Harvest	t = 0.78 p = 0.43 df = 250			
Scenic Beauty of Dispersed Retention Scene Set				
Mean Ratings	-1.38 (0)	-1.28 (3)	-0.49 (28)	1.77 (100)
Uninformed Unharvested Forest	t = 15.06 p < 0.001 df = 287	t = 20.53 p < 0.001 df = 319	t = 10.43 p < 0.001 df = 287	
Informed 15% Retention Harvest	t = 5.25 p < 0.001 df = 287	t = 3.39 p < 0.001 df = 287		
Uninformed 15% Retention Harvest	t = 0.52 p = 0.60 df = 287			

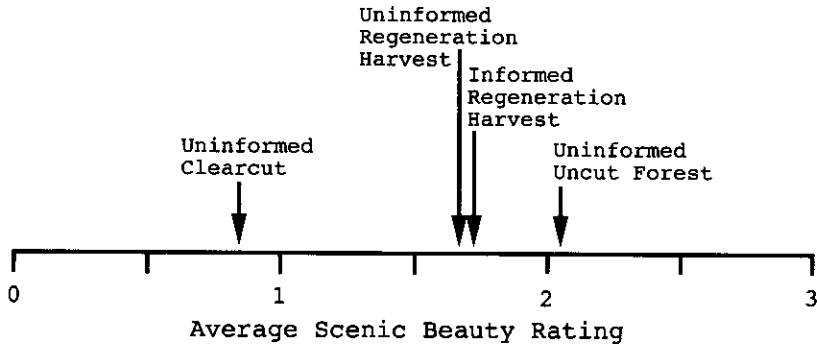
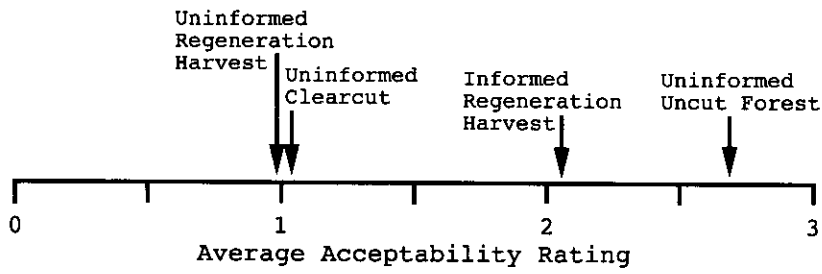


Figure 4. Distribution of the average ratings for aggregated retention scene set.

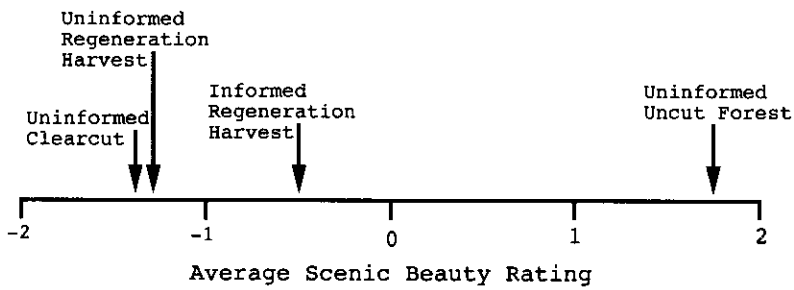
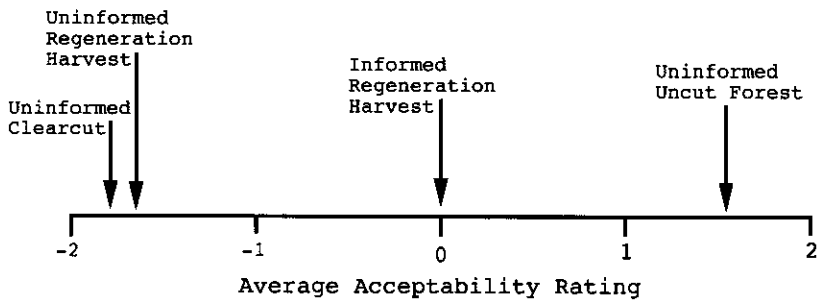


Figure 5. Distribution of the average ratings for dispersed retention scene set.

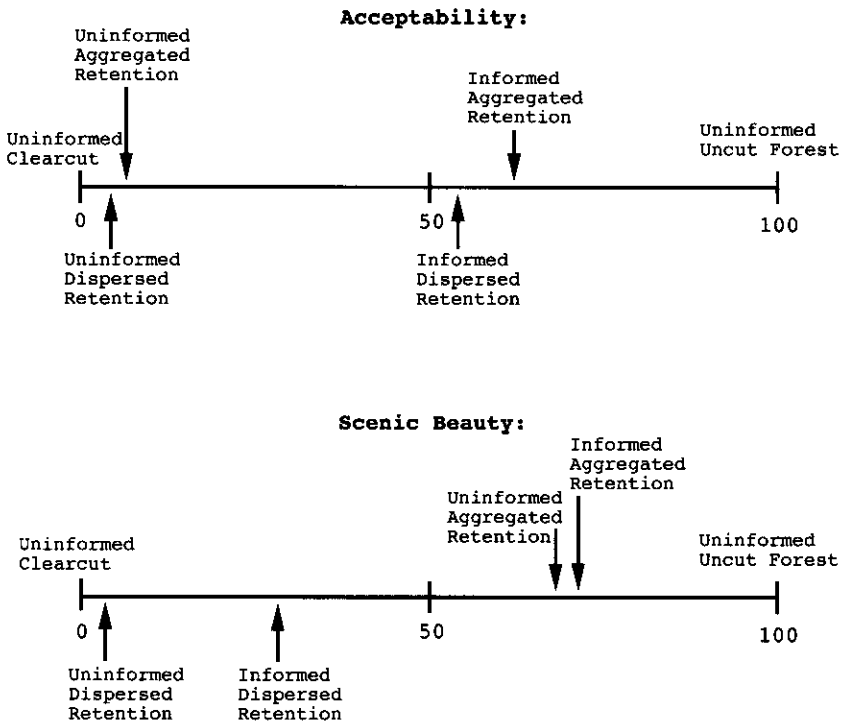


Figure 6. A comparison of transformed average ratings of aggregated versus dispersed green-tree retention harvest scenes.

positive and negative, range. There, the simulated harvest scenes elicited non-positive average ratings for acceptability and scenic beauty, while only the uncut forest scenes' average ratings were positive for both judged qualities (Figure 5).

Discussion

This pilot study used a few scenes comparing different green-tree retention patterns in harvests of different sizes and set in different scenic contexts. It lacked the many replications in controlled visual contexts and the variety of retention levels planned for the main DEMO social perceptions study. These limitations permitted only a simple set of statistical, pairwise comparisons supplemented by graphical analysis. Interpretation should therefore be considered preliminary. Nonetheless, managers and policy makers can make use of these preliminary findings as the best currently available information awaiting larger, more definitive studies.

When perceived simply, with no information or knowledge about New Forestry, 15 percent green-tree retention harvests are not likely to be perceived as any more acceptable than traditional clearcuts. However, information about the nature and intentions of New Forestry evidently can have a positive influence upon perceptions of the acceptability of these NFP-style retention harvests. The perceived acceptability of regeneration harvests is evidently the same between the two patterns of retention compared in this study, whether or not information about New Forestry is provided.

Uninformed perceptions of the scenic beauty of 15 percent green-tree retention harvests evidently may also be similar to those of conventional clearcuts, as in the case of the dispersed retention harvest in this study. An exception occurred when the pattern of retention was aggregated so as to break the harvest unit up into smaller openings that maintain more forest canopy continuity in vista views. Such harvests can be perceived as more beautiful than clearcuts. In this

study, the aggregated retention harvest was viewed in the context of no other harvests, while the dispersed retention harvest's vista included two other, older clearcuts. Further research is needed to see how influential such scenic context factors are upon perceived scenic beauty in relation to the influence of adding retention harvests to landscapes.

Information about New Forestry appears much less associated with changes in perceptions of scenic beauty than was evident for perceptions of acceptability. This is consistent with theoretical suggestions of how such perceptions should differ (Ittelson et al. 1976), and with differences suggested by other studies (Simpson et al. 1976, Russell et al. 1981, Tips and Savasdidara 1986, Pukkala et al. 1988, Dearden 1989). An exception was found for the larger, dispersed-retention harvest in this study. There, information evidently increased perceptions of scenic beauty somewhat, perhaps because of interaction between the content of that scene and the affective words included in the information statement. More research is needed. Information has been found to enhance perceptions of scenic beauty, but usually when it indicates that landscapes are "natural" or "healthy" and/or are of a status that implies scenic or "natural" value (Carls 1974, Hodgson and Thayer 1980, Anderson 1981). But, such effects have not been observed for information identifying different kinds of "unnatural" forest management like harvests. This, and the lack of a substantial, reliable association between information and scenic beauty perceptions in this study and others (Brunson and Reiter 1996), suggests that such perceptions might best be enhanced by improving the appearance of regeneration harvests rather than by education or information.

No differences in average ratings were large enough to suggest that dispersed retention patterns may be perceived as more or less acceptable than aggregated patterns at the 15 percent harvest retention level, whether or not information was provided.

Aggregated retention was evidently perceived, on average, as more scenically beautiful than dispersed retention patterns, irrespective of whether either one or both perceptions of the two retention patterns were informed. Thus, aggregated retention may be the decisively preferable scenic pattern at the 15 percent retention levels studied.

The reasons may be the same as those discussed above regarding the superiority of the aggregated retention pattern compared to clearcuts.

This pilot study did not separate the effect of retention pattern from that of scenic-context conditions. Coincident variation between these two factors suggests some caution in interpreting the results. The aggregated retention pattern was found to be more beautiful, and, the scenic conditions of the aggregated retention slide set elicited a narrower range of only positive ratings of scenic beauty (and acceptability). This suggests two possible interpretations: (1) If the scenic conditions had been identical between the two harvest patterns, the difference in perception of scenic beauty between the aggregated and dispersed patterns may have been smaller, as suggested by the bottom of Figure 6. However, it is likely that the difference would still have been notable given the strong contrast in ratings of scenic beauty and acceptability for the same comparison of scenic conditions (top of Figure 6). (2) The lack of an association between information and differences in perceived scenic beauty for the aggregated retention scene may be due, in part, to the fact that most respondents chose to rate that scene using only the narrower, positive part of the rating scale. This would have compressed the two average ratings, with and without information, for that scene. This compression did not occur for the dispersed retention scene because the respondents rated it using a wider range of positive and negative values. Hence, a difference associated with information could more readily emerge. The strength of the association between levels of perceived scenic beauty and information about New Forestry therefore remains uncertain.

Conclusions

The trade-offs between negative public perceptions and silvicultural benefits of clearcuts is a long-standing dilemma in forest management (Horwitz 1974). This study sheds new light on whether vista views of the 15 percent minimum retention standard now prescribed by the Northwest Forest Plan might offer some resolution. The results are not very encouraging. It appears likely that any pattern of 15 percent retention will not be seen by naive viewers as any more acceptable than clearcuts. If the green-trees retained in harvests are dispersed, then naive viewers will find them no more scenically beautiful than clearcuts.

Some resolution to the perception of timber harvests is offered if observers are educated about the nature and intentions of green-tree retention forestry. This may be particularly true of people who have a vested or ideological interest in forest management and who tend to judge harvests on more than their aesthetic appearance. The more purely aesthetic judgments of recreationists and those just passing through the forest, with little or no vested or ideological interest in forest management, may be less influenced by education.

Scenic beauty perceptions may instead be improved if the aggregated clumps of retained trees are designed to minimize the visual magnitude (Iverson 1985) of openings in the forest canopy. Retention at levels greater than 15 percent may also improve scenic beauty perceptions for either or both aggregated and dispersed retention patterns, and may do likewise for perceptions of acceptability. Future DEMO social perceptions research will investigate this further.

This study suggests that information about forest harvests can influence perceptions of scenes including such harvests. This demonstrates that some perceptions of harvests can assimilate both what is seen and the cognitive content thereof. This suggests that when managers seek to optimize the social acceptability of forest practices they should pay attention to more than appearance. Instead, they should seek to integrate the appearance and content of the landscapes they manipulate. This

could be consistent with ecosystem management decision making where the "appropriateness" of landscapes, as proposed by Gobster (1996) or Tlusty (1992), rather than just their appearance, is the main objective. Such an integrated approach might produce more socially acceptable forest landscapes than the less perceptibly sensible landscapes that arise from traditional, reductionist planning where each resource, including visual quality, is separately understood and competitively sub-optimized (Kimmins 1992, Hirt 1994).

Acknowledgements

The author thanks the members of the DEMO, LTEP, and YSS research teams for their support and advice. Particular thanks go to Paul Gobster, Mike Amaranthus, Jim Palmer, Sally Schauman, Susan Bolton, Charles Halpern and two anonymous reviewers for their valuable assistance. This is a product of the Demonstration of Ecosystem Management Options (DEMO) study, a joint effort of the USDA Forest Service Region 6 and Pacific Northwest Research Station. Research partners include the University of Washington, Oregon State University, University of Oregon, Gifford Pinchot and Umpqua National Forests, and the Washington State Department of Natural Resources. Substantial support has been provided by the USDA Forest Service, North Central Research Station.

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