FOREST DEVELOPMENT

VISUAL IMPACTS OF PARTIAL CUTTING

Summary Report

A Technical Analysis and Public Perception Study

BRITISH COLUMBIA
Ministry of Forests

VISUAL IMPACTS OF PARTIAL CUTTING

Summary Report

A Technical Analysis and Public Perception Study

by
B.C. Ministry of Forests
Forest Development Section
Forest Practices Branch

August 1997

Canadian Cataloguing in Publication Data
Main entry under title:
Visual impacts of partial cutting : summary report

ISBN 0-7726-3311-8

1. Forest landscape management – British Columbia. 2. Forest landscape management – British Columbia – Planning. 3. Forest landscape design – British Columbia. 4. Forest landscape design – British Columbia – Planning. I. Ministry of Forests. Forest Development Section.

SD387.L35V57 1997 719.33'09711 C97-960207-6

For further copies or information contact:

Forest Practices Branch
1450 Government St.
Victoria, B.C.
V8W 3E7

Phone: (250) 387-6656

Executive Summary

The visual quality of forested scenes is becoming an increasingly important issue as competition intensifies for limited forest resources in British Columbia.

The choice of silvicultural system is an important consideration when addressing visual quality. Although clearcutting is widely used in B.C., it is often difficult to meet more restrictive Visual Quality Objectives (VQOs) using this system. There has been a growing interest in using partial cutting methods to maintain visual quality and minimize affects on timber supply.

In this study, research was undertaken to determine if there are any site or stand variables that could be used to predict the impacts of partial cutting on the visual quality of a scene. A second goal was to determine the public response to scenes that have been logged using partial cutting.

"Percent volume removed" or "percent stems removed" by the "average height of residual trees" was found to be the best predictor of visual quality (where a uniform leave-tree partial cutting system was used) (see Section 4.1).

During the public perception survey respondents showed no clear preference for partial cuts over clear cuts. However, partial cuts were preferred slightly more often than clearcuts in slides with visual classifications of Partial Retention or Modification. Respondents preferred the appearance of clearcuts over partial cuts in scenes classified as Maximum Modification (see Section 4.3).

The age of respondents appears to have significantly influenced public preferences regarding partial cutting versus clearcutting and preference for preserved landscapes over modified ones. Income and education also influenced people's perceptions (see Section 4.4.1).

As one practical result of this study, a prediction table has been developed so the practitioner can evaluate the visual quality to be expected after partial cutting a stand, given a specific volume removal in a particular tree height class (see Section 6.1.1).

Acknowledgements

This research project exemplifies the term team work. No particular person is wholly responsible for its success. A number of individuals and organisations have collectively contributed to this study. The Forest Development Section would like to thank the many individuals and organisations listed below.

We would especially like to thank those members of the public in Cranbrook, Kamloops, Prince George, Terrace, Nelson, Williams Lake, Vernon, and Victoria who volunteered their time to participate in the public perception portion of this study.

Silvatech Consulting Ltd, Sharp and Diamond Landscape Architecture, and Simons Reid Collins carried out the pre- and post-harvest data collection and post-harvest photography for this study. Sharp and Diamond Landscape Architecture also carried out the public perception study and a portion of the statistical analysis.

Amanda Nemec (International Statistics and Research Corporation) completed the statistical analyses on the final data set and validated the public perception study results.

Vera Sit, Lynn Husted and Gerrard Olivotto of the MOF Research Branch reviewed earlier drafts of the technical report to ensure the appropriateness of analysis methodology and the accuracy of technical content.

Region and District staff were very helpful in providing the location of partial cut stands used in this study. Regional Visual Landscape Management staff assisted by rating photographs and by providing comments on earlier drafts of this summary report.

George Sranko (Quantum Communications) prepared and coordinated the published version of this work.

We also wish to acknowledge the funding provided by the Canada – British Columbia Partnership agreement on Forest Resource Development: FRDA II for carrying out this research project.

Finally, Peter Rennie, Visual Landscape Specialist in the Kamloops Region was instrumental in initiating this study. He has a been a co-sponsor and key supporter of this project over its 3 year duration.

Jacques Marc
Senior Visual Resource Specialist
Ministry of Forests
August 1997

Table of Contents

Please note: this report makes extensive use of the following acronyms (see the glossary, Section 7.0, for definitions).

EVC – Existing Visual Condition

VQO – Visual Quality Objective

VQR – Visual Quality Rating

1.0 Introduction

1.1 Objectives of the Study

There were two fundamental goals in undertaking this study:

A. to investigate the relationship between the biophysical characteristics of a site and the visual impacts of partial cutting; and,

B. to compare public perceptions about the visual impact of partial cutting with evaluations and ratings made by visual landscape management specialists.

Partial cutting is a general term referring to silvicultural systems other than clearcutting, in which only selected trees are harvested. As it is used in this study, partial cutting refers to a silvicultural system that retains sufficient basal area or volume to meet given VQOs (see the glossary for further definitions).

The specific objectives of the study were to:

1. Determine the relationship between Existing Visual Condition (EVC) and site and stand variables.
2. Determine the relationship between public preference (Visual Quality Rating) and EVC (assessment by visual landscape management specialists).
3. Determine public preferences (as far as visual quality is concerned) regarding partial cutting versus clearcutting.
4. Determine the relationship between public preferences (re: visual quality) and socio-demographic/economic variables.
5. Determine the relationship between public preferences (re: visual quality) and site and stand variables.

2.0 Methodology

2.1 Overview

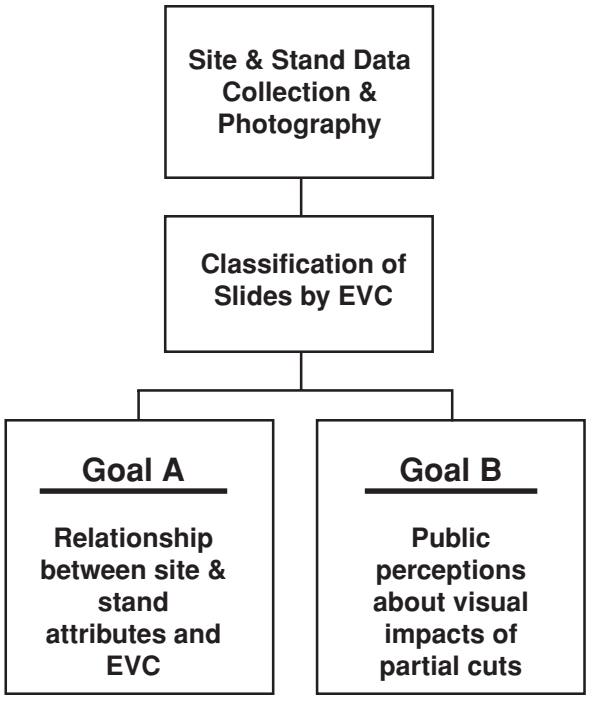
This was a complex study involving a number of elements and steps, including: the collecting of pre- and post-harvest field data, photographing sites, classifying their visual quality, analyzing the data, conducting a public perception survey, and analyzing the survey results.

Initial field work for the study involved collecting site and stand data and taking photographs. The scenes in each photograph were then classified by existing visual condition (EVC).

The remainder of the study was broken into two separate components designed to address the two fundamental goals:

1. To meet Goal A, an analysis of the raw data was undertaken to determine the relationship between site and stand variables and EVC.
2. To meet Goal B, a public perception survey was carried out and the results compared with assessments of visual quality made by visual landscape management specialists.

The relationship between the various components that make up the study can be shown as follows:



Collection of field data and photography

- Pre- and post-harvest site and stand data (such as basal area, volume, stems per hectare) was collected over three years for 80 partial cut stands.
- At the same time, photographic slides were taken of each site, both within the stand and from outside (stand level and landscape level).

Classification by EVC

- The scenes depicted in the slides were classified according to visual quality by a team of visual landscape management specialists (MoF and consultants).

Analysis of site and stand variables & EVC

- The relationship between site and stand variables and visual quality was analyzed, to address Goal A.
- The aim was to determine if there were any specific variables that could be used for predicting the visual quality of partial cuts (defined in terms of visual quality classes).

Public perception survey

A public survey was conducted to address Goal B.

- A sampling of slides was shown to several audiences to determine public perceptions about the visual quality of partial cuts. Standard procedures for conducting public perception studies were used.
- Participants were asked to "rate" the visual quality of each photograph on an eleven point Likert scale according to "*the appearance of the scenery as it would affect their enjoyment of it*."
- Each rating was recorded on scorecards and the results were analyzed using a variety of statistical procedures designed to address the objectives of the study.
- Participants were also asked to fill out a questionnaire (after viewing the slides) providing demographic information about themselves and their views on scenic quality and forest management.

Note: This study deals only with perspective view of alterations or, in other words, the view a person would have from a ground level viewpoint. It does not deal with plan (aerial) or map view.

2.2 Detailed methodology

2.2.1 Collection of Field Data and Photography of Sites

A list of candidate partial cut sites in four forest regions – Vancouver, Kamloops, Nelson, and Prince George – was compiled with the assistance of region and forest district staff. A total of 80 sites were selected based on three criteria:

1. accessible by road,
2. easily photographed from a distance of two to five kilometers, and
3. even-aged stand with a uniform distribution of residual trees.

Prior to the field-work, pre-harvest information on each site was collected from pre-harvest silviculture prescription forms, and recorded on data collection forms.

In the field, both stand level and landscape level photographs and slides were taken of each sample stand.

For landscape level photographs, all sites were photographed from a suitable viewpoint with the cut block located in the midground (see Glossary) of the picture.

- photographs were taken from a distance of approximately 2 to 5 kilometers;
- all photographs were taken from a level camera angle in a horizontal format;
- a telephoto lens was used to minimize distracting features such as roads, power lines, and adjacent cut blocks;
- the field of view was adjusted so that the partially cut area occupied approximately one third of the total forested area.

Interior, stand level photographs were also taken.

After a site had been satisfactorily photographed, a minimum of three variable radius cruise plots were established in each block to determine post-harvest stand variables. The locations of the plots were recorded on a map of each site.

Where a plot fell in an unrepresentative portion of the stand it was moved along the same bearing to a more representative location.

Pre- and post-harvest site data was entered on a data-collection form. (See Table 1 for definitions of the site and stand variables.)

Table 1. *Definitions for Site and Stand Variables*

VARIABLE	DEFINITION
SLIDE	Slide identification number for partial cut
AREA	Area of stand (ha)
SLOPE	Slope (%) of land within cutblock
DBH	Average diameter (cm)
HT	Average height (m)
LCR	Live crown (%)
CRNWDTH	Crown width (m)
VOLUME1	Pre-harvest volume (m^3/ha)
VOLUME2	Volume (m^3/ha)
VOLRMV	Volume removed (m^3/ha) = VOLUME1–VOLUME2
PCVOLRMV	Volume Removed (%) = 100 × VOLRMV/VOLUME1 (%)
BA1	Pre-Harvest Basal Area (m^2/ha)
BA2	Basal Area (m^2/ha)
BARMV	Basal Area Removed (m^2/ha) = BA1–BA2
PCBARMV	Basal Area Removed (%) = 100 x BARMV/BA1
STEMS1	Pre-Harvest Stems (no./ha)
STEMS2	Stems (no./ha)
STEMSRMV	Stems Removed (no./ha) = STEMS1–STEMS2
PCSTMRMV	Stems Removed (%) = 100 × STEMSRMV/STEMS1
EVC	Existing visual conditions (MM, M, PR, R, P)

2.2.2 Classification of visual quality

Each of the 80 landscape level photographs was evaluated by a group of visual landscape management specialists (consultants and MoF staff) and grouped into one of five existing visual quality classes based on visual appearance and biophysical attributes.

The visual quality classes are Preservation (P), Retention (R), Partial Retention (PR), Modification (M), and Maximum Modification (MM). Each class is defined according to the degree of alteration to a forest landscape as a result of logging or other human activities (see Glossary for definitions).

2.2.3 Analysis of site and stand variables

Of the 80 sites sampled, a total of 66 slides were analyzed for site and stand variables (see Appendix 1 for detailed data). These sites were chosen to ensure adequate coverage of the Vancouver, Kamloops, Nelson and Prince George forest regions. 14 of the 80 sites were not used because the slides did not meet adequate standards based on consistency in the camera angles, consistency in the quality of the photographs, and completeness of site and stand data. The analyses are presented in Section 4.0.

2.2.4 Public Perception Survey

The public perception survey portion of the study was conducted part way through the multi-year study. At the time, there were 36 slides available for partial cut scenes, plus 29 clearcut and non-harvest scenes (for a total of 65 slides used in the survey). See Table 2 for a detailed breakdown.

This survey was conducted using standard procedures for public perception studies. All participants listened to the same introduction and looked at 5 practice slides before viewing and rating the 65 survey slides. Slides were presented to participants in as consistent a manner as possible.

The survey was conducted in November of 1993. Participants were asked to view and rate the appearance ("visual quality") of each of the 65 slides listed in Appendix 3. Respondents recorded their ratings on an 11-point Likert-type scale with -5 corresponding to "Very Low" and +5 corresponding to "Very High" visual quality. Written instructions indicated that "*visual quality can be considered as the appearance of the scenery as it would affect your enjoyment of it*."

Table 2. *Number of slides used in public perception survey by type of scene and amount of visible alteration*

	Visible Alteration (EVC)					
Type of Scene	P	R	PR	M	MM	Total
Partial Cut	—	14	12	9	1	36
Clear Cut	—	5	8	7	4	24
Natural	5	—	—	—	—	5
Total	5	19	20	16	5	65

The slides were numbered 1 through 65 in random order for presentation. The scene types (CC = clear cut, PC = partial cut or N = natural), EVC classes, and other noteworthy features are summarized in Appendix 1.

The presentation order of the slides (given by the slide number) was fixed throughout the survey and was used for approximately half of the groups. The remaining groups were shown the slides in reverse order, to reduce any possible effects from slide order.

Meetings were conducted in eight communities throughout British Columbia:

1. Terrace (Prince Rupert Forest Region) – pop. 11,330
2. Prince George (Prince George Forest Region) – pop. 69,315
3. Williams Lake (Cariboo Forest Region) – pop. 10,270
4. Kamloops (Kamloops Forest Region) – pop. 66,335
5. Vernon (Kamloops Forest Region) – pop. 22,960
6. Cranbrook (Nelson Forest Region) – pop. 16,245
7. Nelson (Nelson Forest Region) – pop. 8,625
8. Victoria Capital Regional District (Vancouver Forest Region) – pop. 280,430.

These communities were selected so the survey would include respondents from each of the six forest regions of the province.

Approximately 150 organizations were contacted by phone and invited to participate in the survey. The organizations were selected to represent a cross-section of each community. Neither forestry nor environmental groups were targeted. Of the 150 organizations, 54 agreed to participate in the survey, resulting in a total of 465 respondents.

The organizations included aquatic centres, RCMP or city police, employment centres, government agents, provincial ministries, community centres, social services offices, community colleges, service clubs, as well as arts and other special interest groups. Participants were surveyed either as individuals or in groups of about 10, although two larger groups (of 23 and 26 individuals) were also surveyed. The number of groups, group sizes, and total number of respondents from each community are summarized in Table 3.

After viewing the slides, participants were also asked to complete a brief questionnaire providing demographic information about themselves and some of their views on scenic quality and forest management.

Table 3. *Sample sizes for public perception survey*

Community	# of Groups	Min Group Size	Max Group Size	Average Group Size	# of Respondents
Terrace	7	2	23	8.6	60
Pr. George	9	5	13	8.6	77
Williams L	9	2	9	6.6	59
Kamloops	7	2	15	7.4	52
Vernon	6	1	26	11.0	66
Cranbrook	5	3	13	8.0	40
Nelson	7	3	15	9.9	69
Victoria	4	8	15	10.5	42
All Communities	54	1	26	8.6	465

3.0 Results

3.1 Demographic statistics

This section presents the demographic statistics collected from the respondents, and in some cases, compares these with socio-demographic characteristics for the provincial population taken from Statistics Canada's *1994 Summary Census for British Columbia* (data from 1991).

In general, the study sample was reasonably close to the general population, although participants were somewhat younger (more individuals in the 30–49 age group and fewer over 49), slightly better educated and earning higher incomes than the province as a whole.

Gender: Sample vs Provincial Population

Gender	Sample	BC
Female	51.7%%	50.6%
Male	48.3%	49.4%

Age Distribution: Sample vs Provincial Population

Age	Sample	BC
<20	8.3%	8.1 %
20–29	17.3%	19.5%
30–49	52.8%	39.5%
50–69	13.4%	22.3%
>69	8.1%	10.6%

Education: Sample vs Provincial Population

Highest level attained	Sample	BC
Grades 1 – 8	4.7%	8.7%
Grades 9 – 13	32.8%	39.2%
Post-Secondary	62.5%	52.1%

Income: Sample vs Provincial Population

Total Income	Sample	BC
<$20,000	17.7%	23.1%
$20–39,000	18.3%	26.9%
$40–59,000	29.1%	14.1%
$60–79,000	21.6%	14.1%
>$79,000	13.3%	12.9%

Forestry Income: Sample vs Provincial Population

Income directly dependent on forest industry?		
	Sample	**BC**
Yes	23.7%	5.5%
No	76.3%	94.5%

Residence: Sample vs Provincial Population

Length of residence	Sample		BC
1 to 5 years	32.8%	<5 yr	56.2%
6 to 10 years	14.2%	>5 yr	43.8%
Over 10 years	53%		

*Place of Origin***

Location	% of sample
BC	57.4
Prairie Province	17.9
Rest of Canada	13.0
Other	11.7

*** City or town where the respondent grew up*

3.2 Site and stand data for partial cuts

See Appendix 1 *Data for Partial Cut Sites*, for the complete set of site and stand data for 66 partial cuts with stands grouped by EVC class.

The partial cut stands were classified by EVC as shown below in Table 4.

Table 4. *Distribution of stands by EVC class.*

EVC class	Number of stands
P	4
R	22
PR	26
M	13
MM	1
Total	66

3.3 Data from the public perception survey

See Appendix 3 for detailed results showing the average public rating received by each of the 65* slides used in the public perception survey.

The slides depicted the following scene types:

- 36 slides showed partial cuts,
- 24 slides showed a range of clear cuts, and
- 5 slides showed natural scenes.

** Please note that only 36 of these slides were taken at partial cut sites. The 65 public perception* **slides** *should not be confused with the 66 partial cut* **sites**.

4.0 Analysis

This section reports on the analysis of the results, organized according to the study objectives (see the specific objectives in Section 1.0 Introduction).

4.1 Objective I: Relationship between EVC and site and stand variables

This section reports on the analysis of the relationship between site and stand variables, and visual quality as defined in terms of EVC. This is in keeping with Objective 1: *to determine the relationship between EVC and site and stand variables*.

The analysis was restricted to the EVC classes Modification, Partial Retention, and Retention (61 out of 66 partial cuts) because of lack of data in the Preservation and Maximum Modification classes (5 sites).

Appendix 2 summarizes this relationship by showing the results of fitting univariate logistic models to the data.

"Volume," " basal area," and "stems removed" all showed a significant correlation with EVC (see Table 1 for list of variables and Appendix 2 for the techniques used.)

Only 21 of the 61 partial cuts in EVC classes M, PR, and R had a complete set of measurements – two thirds of the stands were missing the variables BA1, BARMV, and PCBARMV. Thus stepwise logistic regression analysis of the 18 variables in Appendix 2 was limited to the 21 stands with no missing data. Analysis of this severely reduced data set suggested that "percent basal area removed" (PCBARMV) was the best predictor of EVC.

The variable "percent basal area removed" can be a useful predictor of EVC.

When the list of variables was restricted to DBH, HT, VOLUME1, VOLUME2, VOLRMV, PCVOLRMV, BA2, STEMS1, STEMS2, STEMSRMV, and PCSTMRMV the sample size increased from 21 to 48 stands with no missing values.

Stepwise logistic regression analysis of this second set of variables identified "percent volume removed," "percent stems removed," and "average height of the residual trees" used together as the best predictors of EVC (see Appendix 2).

The combination of variables, "percent volume removed," "percent stems removed," and "average height of the residual trees," can also be useful predictors of EVC.

Elimination of apparent statistical outliers and stands with inconsistent values (e.g., Slides 42, 46, 49, 59, and 78) had no effect on the selected variables in either case.

The following section, 4.1.1 *Probability Analysis for EVC,* presents a practical application of these results to help determine the probability that a partial cut would reach a specified EVC class (also see Table 10 in Section 6.1.1).

4.1.1 Probability Analysis for EVC

Further analysis of the data provided some estimates of the probability that a randomly selected partial cut site would be classified within a particular EVC class based on specific site and stand data.

Table 5 gives the probability by EVC class based on the "basal area removed" (%).

Table 6 gives the probability by EVC class based on the *combination* of "volume removed" (%), "stems removed" (%), and "average height of residual trees" (m).

Using Table 5:

For example: For a partial cut with 20% of the Basal Area removed, there is a 1.6% probability that the EVC class of Partial Retention would be achieved, and a 98.4% probability that Retention would be achieved. Therefore, the most probable EVC would be Retention.

Table 5. *Estimated probabilities of EVC classes for selected "basal area removed" (%). Probabilities are given as percentages.*

Basal Area Removed	M (%)	PR (%)	R (%)	Most Probable EVC	Maximum Probability (%)
5	0	0.3	99.7	R	99.7
10	0	0.5	99.5	R	99.5
15	0	0.9	99.1	R	99.1
20	0	1.6	98.4	R	98.4
25	0.1	2.9	97.1	R	97.1
30	0.1	5.2	94.7	R	94.7
35	0.3	9.2	90.6	R	90.6
40	0.5	15.6	83.9	R	83.9
45	0.9	25.4	73.8	R	73.8
50	1.6	38.1	60.3	R	60.3
55	2.9	52.0	45.1	PR	52.0
60	5.3	63.9	30.8	PR	63.9
65	9.4	71.3	19.4	PR	71.3
70	16.0	72.5	11.5	PR	72.5
75	26.1	67.3	6.6	PR	67.3
80	39.5	56.8	3.7	PR	56.8
85	54.7	43.3	2.0	M	54.7
90	69.1	29.8	1.1	M	69.1
95	80.5	18.9	0.6	M	80.5

Using Table 6:

To determine the probable EVC for a partial cut, determine the volume to be removed (%), the stems to be removed (%), and average height of residual trees (m). For example, consider a partial cut where 30% of the volume is to be removed, 40% of the stems are to be removed, and the average height of residual trees is 20 meters. In Table 6 below you will find that the most probable EVC would be Retention with a probability of 85.2%.

Table 6. *Estimated most probable EVC class for selected combinations of volume removed (%), stems removed (%), and average height of residual trees (m). Probabilities are given as a percentage.*

		Average Height of Residual Trees (m)									
		10		20		30		40		50	
Volume Removed (%)	Stems Removed (%)	EVC	%	EVC	%	EVC	%	EVC	%	EVC	%
10	10	R	99.2	R	97.8	R	94.1	R	84.8	R	66.2
	20	R	98.9	R	97.0	R	91.8	R	79.7	R	58.0
	30	R	98.5	R	95.7	R	88.8	R	73.5	R	49.3
	40	R	97.8	R	94.1	R	84.8	R	66.1	PR	54.7
	50	R	97.0	R	91.8	R	79.7	R	57.9	PR	60.9
	60	R	95.7	R	88.7	R	73.4	R	49.2	PR	65.6
	70	R	94.1	R	84.7	R	66.1	PR	54.7	PR	68.3
	80	R	91.8	R	79.6	R	57.9	PR	61.0	PR	68.9
	90	R	88.7	R	73.4	R	49.2	PR	65.6	PR	67.3
20	10	R	98.7	R	96.5	R	90.5	R	77.0	R	54.1
	20	R	98.2	R	95.1	R	87.1	R	70.3	PR	50.8
	30	R	97.5	R	93.1	R	82.6	R	62.5	PR	57.7
	40	R	96.5	R	90.5	R	77.0	R	54.0	PR	63.3
	50	R	95.0	R	87.1	R	70.2	PR	50.8	PR	67.1
	60	R	93.1	R	82.6	R	62.4	PR	57.7	PR	68.9
	70	R	90.5	R	77.0	R	53.9	PR	63.3	PR	68.5
	80	R	87.0	R	70.2	PR	50.9	PR	67.1	PR	65.9
	90	R	82.5	R	62.4	PR	57.8	PR	68.9	PR	61.3
30	10	R	97.9	R	94.3	R	85.2	R	66.9	PR	54.0
	20	R	97.1	R	92.0	R	80.2	R	58.7	PR	60.4
	30	R	95.9	R	89.1	R	74.1	R	50.1	PR	65.2
	40	R	94.2	R	85.2	R	66.8	PR	54.1	PR	68.2
	50	R	92.0	R	80.2	R	58.7	PR	60.4	PR	69.0
	60	R	89.0	R	74.0	R	50.0	PR	65.3	PR	67.5
	70	R	85.1	R	66.8	PR	54.1	PR	68.2	PR	64.0
	80	R	80.1	R	58.6	PR	60.5	PR	69.0	PR	58.7
	90	R	74.0	R	49.9	PR	65.3	PR	67.5	PR	52.0
40	10	R	96.6	R	90.8	R	77.6	R	54.8	PR	62.8
	20	R	95.2	R	87.4	R	70.9	PR	50.1	PR	66.8
	30	R	93.3	R	83.1	R	63.2	PR	57.1	PR	68.8
	40	R	90.8	R	77.5	R	54.8	PR	62.8	PR	68.6
	50	R	87.4	R	70.9	PR	50.2	PR	66.9	PR	66.2
	60	R	83.0	R	63.2	PR	57.1	PR	68.8	PR	61.8
	70	R	77.5	R	54.7	PR	62.9	PR	68.6	PR	55.8
	80	R	70.8	P	50.2	PR	66.9	PR	66.2	PR	48.6
	90	R	63.1	P	57.2	PR	68.8	PR	61.8	M	56.6

Continued on following page...

Table 6 (continued)

		Average Height of Residual Trees (m)									
		10		20		30		40		50	
Volume Removed (%)	Stems Removed (%)	EVC	%	EVC	%	EVC	%	EVC	%	EVC	%
50	10	R	94.4	R	85.6	R	67.5	PR	53.4	PR	68.0
	20	R	92.3	R	80.7	R	59.5	PR	59.9	PR	69.0
	30	R	89.4	R	74.7	R	50.8	PR	64.9	PR	67.8
	40	R	85.6	R	67.5	PR	53.4	PR	68.0	PR	64.5
	50	R	80.7	R	59.4	PR	59.9	PR	69.0	PR	59.3
	60	R	74.6	R	50.8	PR	64.9	PR	67.8	PR	52.7
	70	R	67.4	PR	53.5	PR	68.0	PR	64.4	M	51.8
	80	R	59.3	PR	60.0	PR	69.0	PR	59.2	M	60.4
	90	R	50.7	PR	64.9	PR	67.7	PR	52.6	M	68.4
60	10	R	91.1	R	78.1	R	55.6	PR	62.4	PR	68.7
	20	R	87.8	R	71.6	PR	49.5	PR	66.6	PR	66.5
	30	R	83.5	R	63.9	PR	56.5	PR	68.7	PR	62.3
	40	R	78.1	R	55.5	PR	62.4	PR	68.7	PR	56.4
	50	R	71.5	PR	49.5	PR	66.6	PR	66.5	PR	49.3
	60	R	63.9	PR	56.6	PR	68.7	PR	62.3	M	55.7
	70	R	55.5	PR	62.4	PR	68.7	PR	56.4	M	64.1
	80	PR	49.6	PR	66.6	PR	66.5	PR	49.3	M	71.7
	90	PR	56.6	PR	68.7	PR	62.2	M	55.8	M	78.3
70	10	R	86.0	R	68.2	PR	52.8	PR	67.8	PR	64.9
	20	R	81.2	R	60.2	PR	59.4	PR	69.0	PR	59.8
	30	R	75.2	R	51.6	PR	64.5	PR	68.0	PR	53.3
	40	R	68.2	PR	52.8	PR	67.8	PR	64.8	M	51.0
	50	R	60.1	PR	59.4	PR	69.0	PR	59.8	M	59.6
	60	R	51.5	PR	64.6	PR	68.0	PR	53.3	M	67.7
	70	PR	52.9	PR	67.8	PR	64.8	M	51.0	M	74.8
	80	PR	59.4	PR	69.0	PR	59.8	M	59.7	M	80.8
	90	PR	64.6	PR	67.9	PR	53.2	M	67.7	M	85.7
80	10	R	78.6	R	56.4	PR	61.9	PR	68.8	PR	57.0
	20	R	72.2	PR	48.8	PR	66.3	PR	66.8	PR	50.0
	30	R	64.6	PR	55.9	PR	68.6	PR	62.8	M	54.9
	40	R	56.3	PR	61.9	PR	68.8	PR	57.0	M	63.3
	50	PR	48.8	PR	66.3	PR	66.8	PR	50.0	M	71.0
	60	PR	56.0	PR	68.6	PR	62.7	M	55.0	M	77.7
	70	PR	62.0	PR	68.8	PR	57.0	M	63.4	M	83.2
	80	PR	66.3	PR	66.8	PR	49.9	M	71.1	M	87.5
	90	PR	68.6	PR	62.7	M	55.0	M	77.7	M	90.9
90	10	R	68.9	PR	52.1	PR	67.6	PR	65.2	M	50.1
	20	R	60.9	PR	58.8	PR	69.0	PR	60.3	M	58.8
	30	R	52.4	PR	64.1	PR	68.1	PR	53.9	M	66.9
	40	PR	52.2	PR	67.6	PR	65.2	M	50.2	M	74.2
	50	PR	58.9	PR	69.0	PR	60.3	M	58.9	M	80.3
	60	PR	64.2	PR	68.1	PR	53.9	M	67.0	M	85.3
	70	PR	67.6	PR	65.2	M	50.3	M	74.2	M	89.1
	80	PR	69.0	PR	60.3	M	58.9	M	80.3	M	92.1
	90	PR	68.1	PR	53.8	M	67.0	M	85.3	M	94.3

4.2 Objective II: Relationship between public preference (VQR) and EVC

This section reports on the analysis of data from the public perception study, in keeping with Objective 2 of the study*: to determine the relationship between public preference and EVC*.

Table 7 shows the average percentage of responses received in each VQR category, by EVC. To use table 7; take for example, the EVC class of Retention: an average of 1.7% of respondents gave these slides a Visual Quality Rating (VQR) of –5; 3.4% gave a VQR of –3; and 17.2% a VQR of 4.

Based on the data for all slides from Appendix 3, Figure 1 below shows a logarithmic analysis of the average frequency of VQR ratings by EVC. In other words, this figure shows the relationship between the percentage of the total response for each VQR rating and the EVC class.

This type of analysis is useful for comparing the relationships between EVC classes (-5 meaning "very low visual quality" and +5 meaning "very high visual quality").

Figure 1 shows that, overall, Maximum Modification scenes received more ratings at the "low visual quality" end of the scale than they did at the "high" end. With Modification scenes there was a shift to a flatter "more neutral" pattern. With Preservation, Retention, and Partial Retention there was a strong shift in ratings to the "high visual quality" end of the scale versus the "low" end.

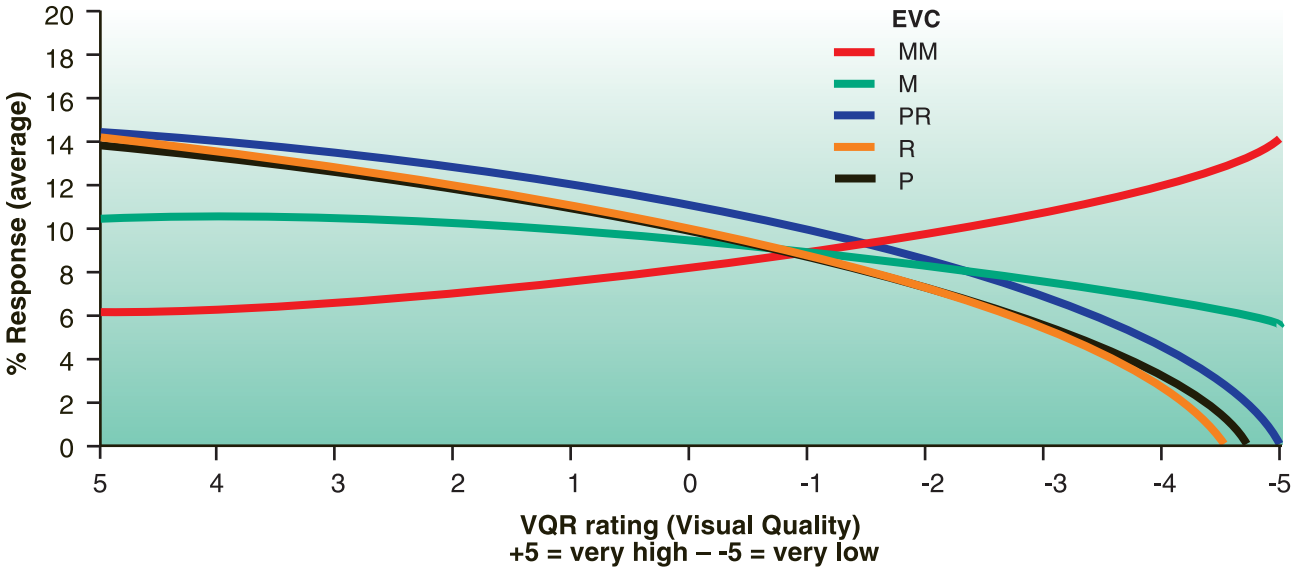
Figure 1 shows that, in general, the public rated all scenes in M or MM classes lower in visual quality than scenes that were classified P, R, or PR. It also shows that there was a correlation between EVC classifications used by visual landscape specialists and public perceptions (i.e. P preferred over R, PR, M & MM in all cases).

The public rated M or MM scenes lower in visual quality than P, R, or PR.

Table 7. *Average VQR by EVC class and VQR rating*

	VQR										
EVC	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**
P	2.4	3.8	4.0	4.2	4.7	7.4	10.1	13.9	15.4	17.2	16.9
R	1.7	2.1	3.4	4	5.6	7.3	11.8	14	17.6	17.2	14.8
PR	1.7	2.6	3.8	5.7	17.5	10.3	14.7	15.7	15.4	12.8	10.0
M	4.4	5.1	8.3	10.3	12.5	10.4	13.3	12.9	10.8	8.1	4.0
MM	13.9	9.3	13.2	9.2	10.2	7.5	11.6	8.9	9.1	4.9	2.0

Figure 1. *Logarithmic analysis of the average frequency of VQR rating by EVC*



4.2.1 Public Preference by Community

Another way of looking at the relationship between public preference and EVC is by community.

In general, the degree of preference for natural versus altered scenes differed significantly among communities (see Table 8 and Figure 2). Respondents from Williams Lake, Cranbrook, and Victoria were more likely than respondents from Prince George, Kamloops, and Vernon to give natural scenes a higher rating than altered scenes (the preferences of the former three communities exceed those of the latter). Respondents from Terrace and Nelson were intermediate in their preferences for natural over altered scenes.

Table 8 summarizes public preferences for all pairs of EVC classes, by community. It shows that, in all communities surveyed, the public preferred more natural scenes over altered scenes, both partial cut and clearcut.

In all communities surveyed, the public preferred:

- Preservation over R, PR, M, MM;
- Retention over PR, M, MM;
- Partial Retention over M, MM; and
- Modification over MM.

Average preferences are listed by community and for all communities combined.

The overall preferences of the respondents, for all communities combined, were generally consistent with evaluations by visual landscape specialists:

Preference for P over:		# of Slide Pairs
PR	61%	25
M	68%	80
MM	67%	100

Preference for R over:		# of Slide Pairs
PR	62%	95
M	71%	304
MM	70%	380

Preference for PR over:		# of Slide Pairs
M	63%	100
MM	65%	320

Preference for M over:		# of Slide Pairs
MM	56%	80

Respondents showed no preference for P over R (50%, 95 pairs).

Notes on using Table 8:

The figures shown represent the percentage of respondents who preferred the EVC class displayed along the top line. (*In all cases a figure of 50% or less indicates no preference*.)

For example, look under Preservation for the community of Terrace: under the MM column we see that 68% of the respondents in Terrace preferred scenes classified as Preservation over Maximum Modification.

Similarly, look under Partial Retention for the community of Vernon: under the M column we see that 60.7% of the respondents in Vernon preferred scenes classified as Partial Retention over Modification.

In addition, Table 8 shows the preference for Partial Cuts over Clearcuts. For example, look under Partial Retention for the community of Williams Lake; under the PC:CC column we see that 63.3% of respondents in Williams Lake preferred partial cuts over clearcuts in scenes that were classified as Partial Retention.

Similarily, look under Retention for Prince George; under the PC:CC column we see that the figure is 45.6%. This indicates that, for scenes classified as Retention, respondents in Prince George did not prefer partial cuts over clearcuts.

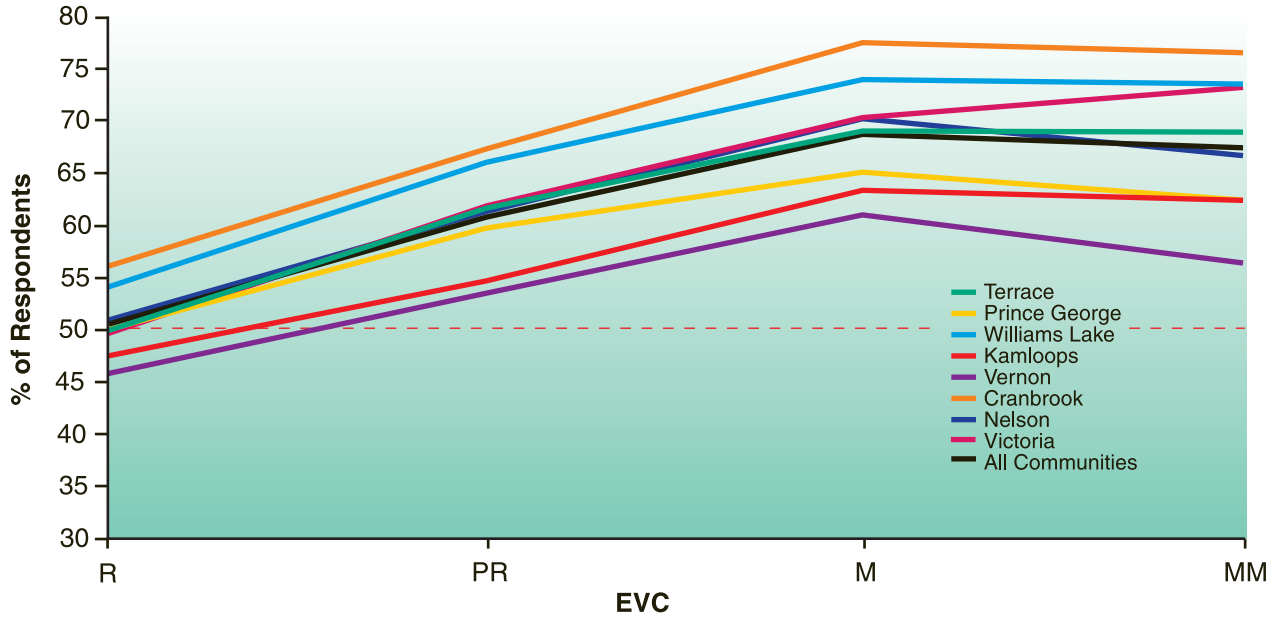
Table 8. *EVC preference by community (by percentage of respondents)***

	Preference for Preservation over:				Pref for Retention over:			
Community	MM	M	PR	R	MM	M	PR	PC:CC
Terrace	68.9	69	61.6	49.7	71.5	71.1	63.4	47.9
Prince George	62.2	64.9	59.5	49.8	65.4	66.6	60.2	45.6
Williams Lake	73.5	73.9	66	54	73.4	74.2	64.1	50.3
Kamloops	62.3	63.3	54.6	47.5	66.1	67.2	58.7	50
Vernon	56.3	60.9	53.4	45.7	61.9	65.9	57.9	48.2
Cranbrook	76.5	77.4	67.3	56	75.3	75.3	62.9	51.2
Nelson	66.6	70.1	61.3	50.8	69.1	72.2	62.1	49.7
Victoria	73.1	70.3	61.8	49.5	79.1	74.5	64.6	45.8
All Communities	67.4	68.7	60.7	50.4	70.2	70.9	61.7	48.6
P-value	0.005	0.008	0.007	0.007	0.011	0.025	0.045	0.316

	Pref for Partial Retention over:			Pref for Modification:		Max Mod
Community	MM	M	PC:CC	MM	PC:CC	PC:CC
Terrace	64.9	61.6	57.8	56.7	52.5	38
Prince George	60.4	58.9	55.1	54.3	46.7	34.9
Williams Lake	67.3	64.7	63.3	57.3	61.1	41
Kamloops	61.9	60.8	58.6	53.8	49.4	34.2
Vernon	59.2	60.7	60.2	50.8	49.4	31.8
Cranbrook	70.5	66.5	60.3	57.7	58.5	37.8
Nelson	66.5	65.3	61.9	55.9	55.7	42.2
Victoria	71.5	63.5	58.1	61.3	58.8	34.2
All Communities	65.3	62.7	59.4	56.0	54.0	36.8
P-value	0.043	0.025	0.006	0.087	0.003	0.499

** *50% average preference and under indicates no preference. Standard errors were calculated, and fell between 0.6 and 4.6. The P-values are based on a one-way ANOVA of the group means (P<0.05 suggests that there are significant differences between communities).*

Figure 2. *Preference by community for Preservation over R, PR, M, and MM*



Note: *Value over 50% of respondents (red line) indicates preference for Preservation over other EVC classes.*

4.3 Objective III: Public preference for silvicultural system

This section reports on the analysis of the data from the public perception study, in keeping with objective 3: *to determine public preferences between partial cutting and clearcutting*.

Table 9 and Figure 3 present the public preferences for silvicultural system [Partial cut (PC) versus Clearcut (CC)] for all VQO classes except Preservation (no visible landscape alteration).

All communities preferred partial cuts over clearcuts in PR and M, except for Prince George. Cranbrook and Williams Lake showed the strongest preference for partial cuts over clearcuts, while Prince George showed the weakest preference over all EVC classes.

- For slides classified as R, respondents showed no preference for partial cuts over clear cuts (48.6%, 96 pairs).
- For PR, partial cuts were preferred more often than clear cuts (59.4%, 96 pairs),
- For M, partial cuts were slightly preferred over clear cuts (54.0%, 63 pairs),
- For MM, partial cuts were not preferred over clearcuts (36.8%). Clearcuts were preferred by 63.2% of respondents.** However, this estimate is based on an extremely small sample of only four comparisons.

For PR and M there was a slight preference for partial cuts over clearcuts, and for R and MM there was no preference.

** Discussion:

The result that there was no preference for partial cuts over clearcuts in Maximum Modification scenes may require some explanation.

Maximum Modification EVC is defined as having human-caused alterations that are dominant and out of scale. The results show that respondents preferred the appearance of clearcuts over partial cuts in scenes classified as Maximum Modification. Considering the fact that there are extremely few trees remaining in a Maximum Modification partial cut, given the choice, respondents are indicating a visual preference for a clear cut. Apparently, the few remaining trees in a partial cut of this scale appeared out of place.

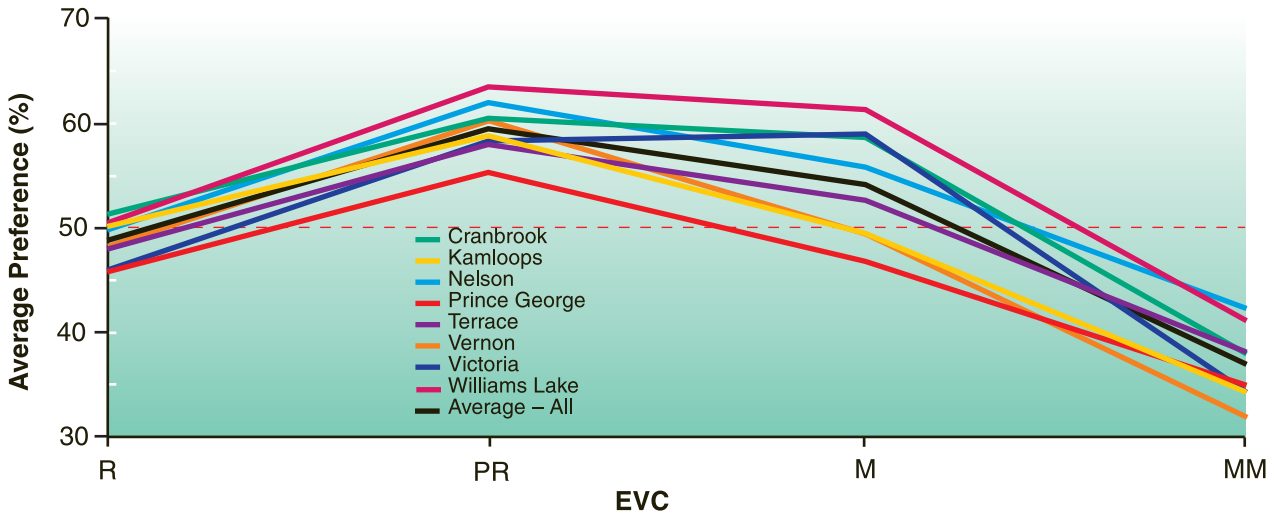
Maximum Modification is not normally considered a VQO under current forest practices.

Table 9. *Preferences for partial cuts versus clearcuts by community and EVC*

Location	Retention	Partial Retention	Modification	Maximum Modification
Cranbrook	51.2	60.3	58.5	37.8
Kamloops	50.0	58.6	49.4	34.2
Nelson	49.7	61.9	55.7	42.2
Prince George	45.6	55.1	46.7	34.9
Terrace	47.9	57.8	52.5	38.0
Vernon	48.2	60.2	49.4	31.8
Victoria	45.8	58.1	58.8	34.2
Williams Lake	50.3	63.3	61.1	41.0
Average All	48.6	59.4	54.0	36.8

Note: 50% average preference indicates no preference. Values over 50% indicate a preference for patial cuts over clearcuts.

Figure 3. *Preference for partial cuts versus clearcuts by community and EVC*



4.4 Objective IV: Relationship between public preference and socio-demographic variables

This section reports on an analysis of the results of the public perception study and study questionnaire; in keeping with Objective 4: *to determine the relationship between public preferences and socio-demographic and economic variables*.

4.4.1 Socio-economic characteristics

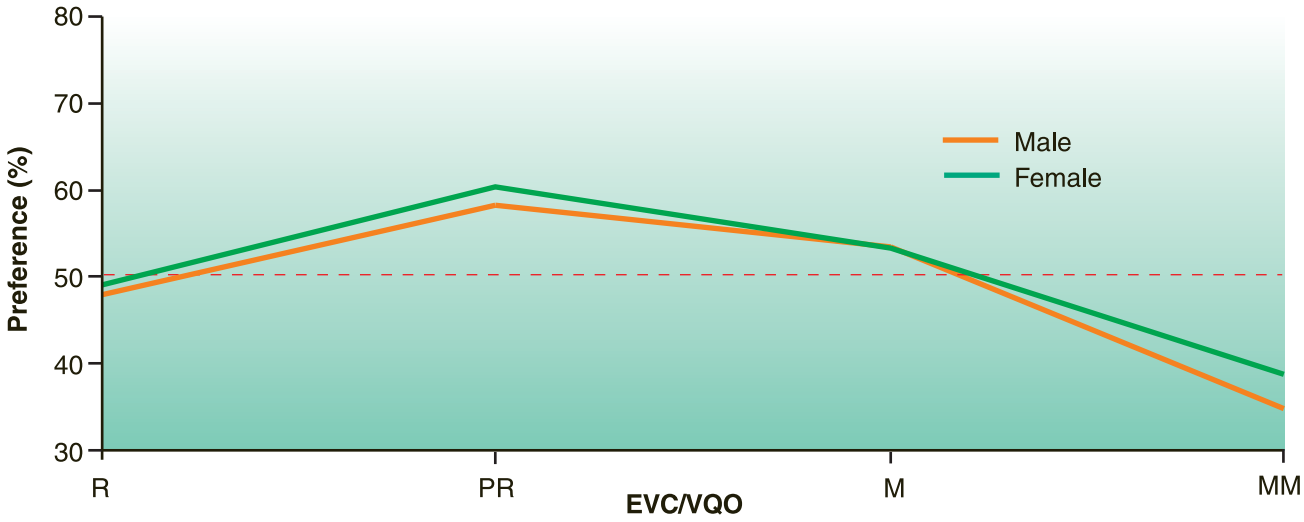
The effects of the socio-economic characteristics of the respondents are summarized in Appendix 4.

Neither gender nor origin (location of hometown, type of neighbourhood – rural, urban, or both) appears to have influenced preference to any large extent (see Figure 4 and 5). In contrast, age, level of education, and income were highly correlated with preference.

Gender

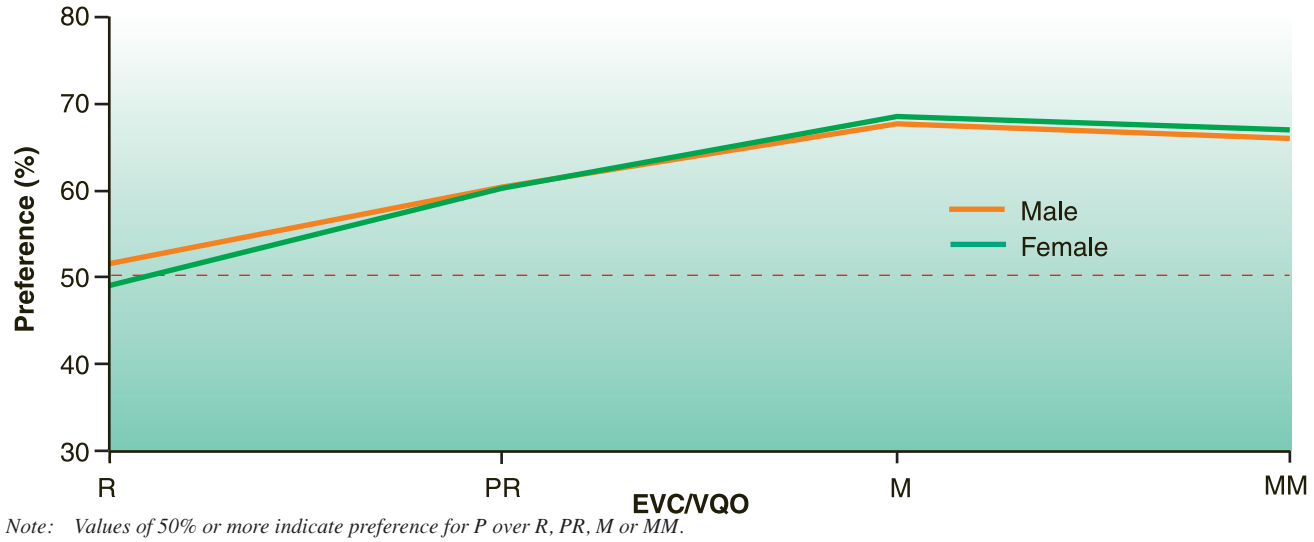
As shown in Figures 4 and 5, there was little difference between male and female preferences for either partial cuts versus clearcuts or natural scenes versus harvested scenes.

Figure 4. *Average preference for partial cuts versus clear cuts, by gender.*



Note: Values of 50% or more indicate preference for partial cut over clearcut.

Figure 5. *Average preference for Preservation versus other EVC classes, by gender.*

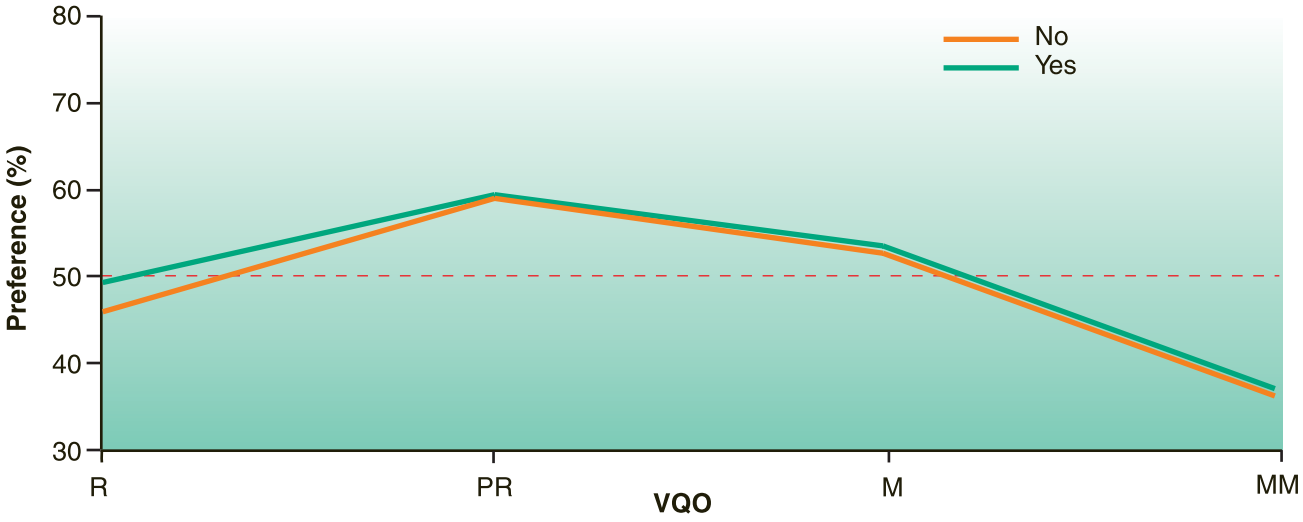


Note: Values of 50% or more indicate preference for P over R, PR, M or MM.

Dependence on forestry income

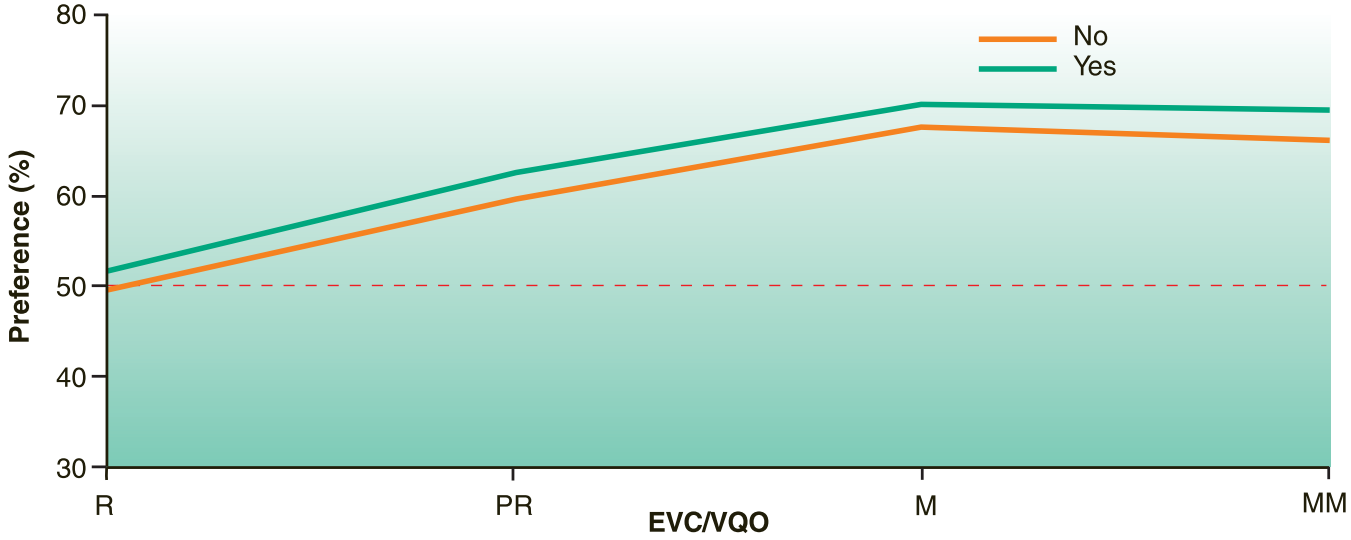
Dependence on the forestry industry had little effect on the relative ratings of the slides, even though it seems to have influenced the respondents' express views of clear cutting (i.e., the communities with the least dependence on forestry had the highest proportions of respondents who stated that clear cuts should not be allowed – see Figure 6 and Appendix 4 and 5).

Figure 6. *Average preference for partial cuts versus clear cuts, by dependence on forestry income ("Yes" indicates dependence on forestry income.)*



Note: Values of 50% or more indicate preference for partial cut over clearcut.

Figure 7. *Average preference for Preservation versus other EVC classes, by forestry income ("Yes" indicates dependence on forestry income.)*

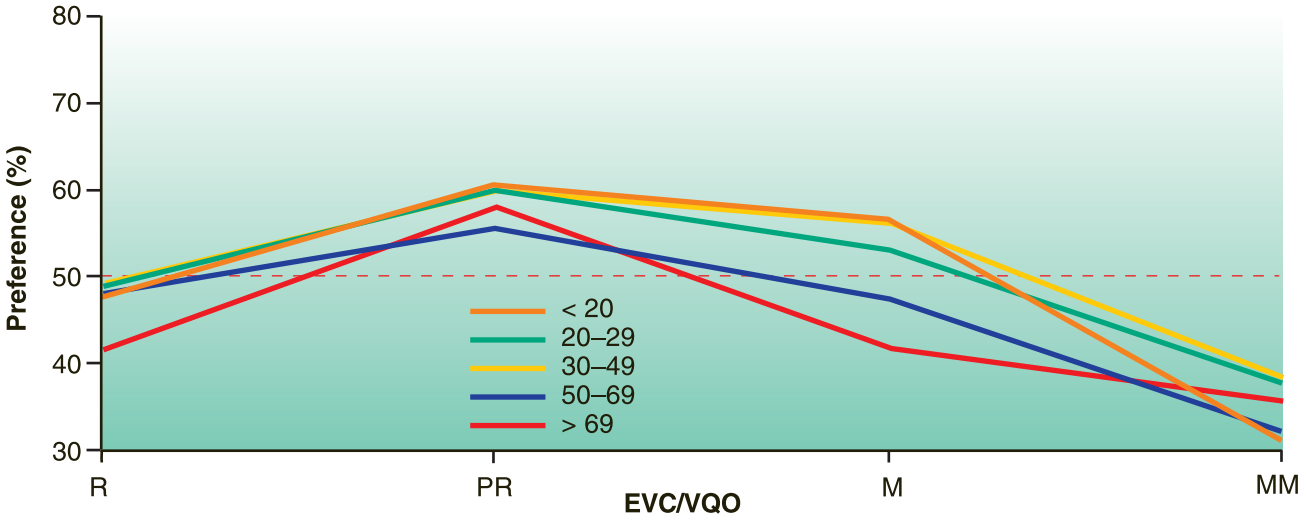


Note: Values of 50% or more indicate preference for P over R, PR, M, or MM.

Age

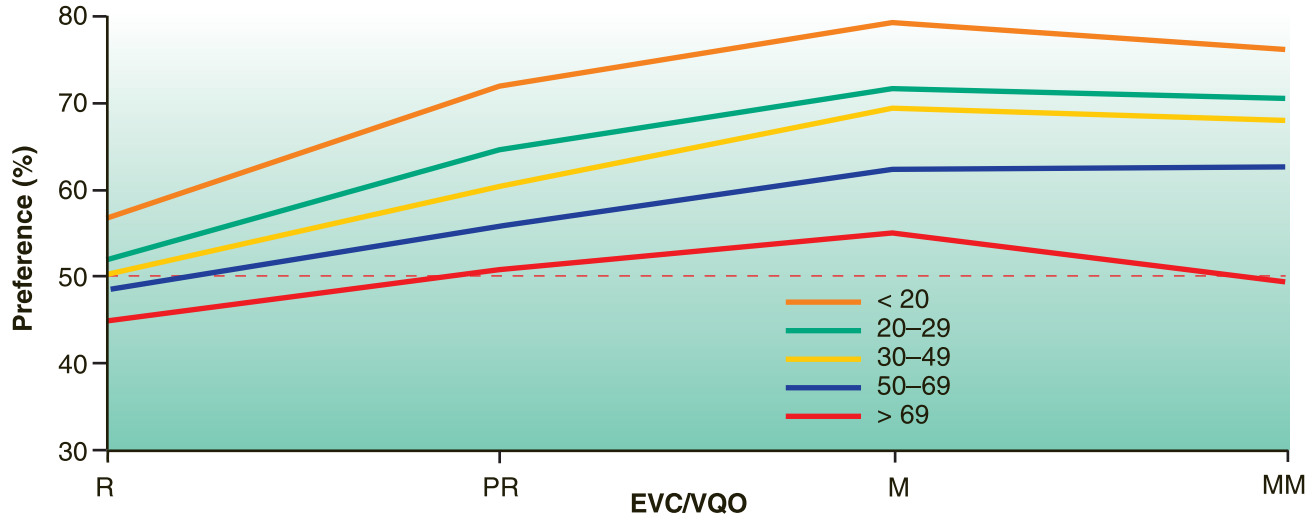
In general, younger people rated natural scenes higher than older people, and also preferred partial cuts over clearcuts.

Figure 8. *Average preference for partial cuts versus clear cuts, by age of respondents.*



Note: Values of 50% or more indicate preference for partial cut over clearcut.

Figure 9. *Average preference for Preservation versus other EVC classes, by age of respondents.*

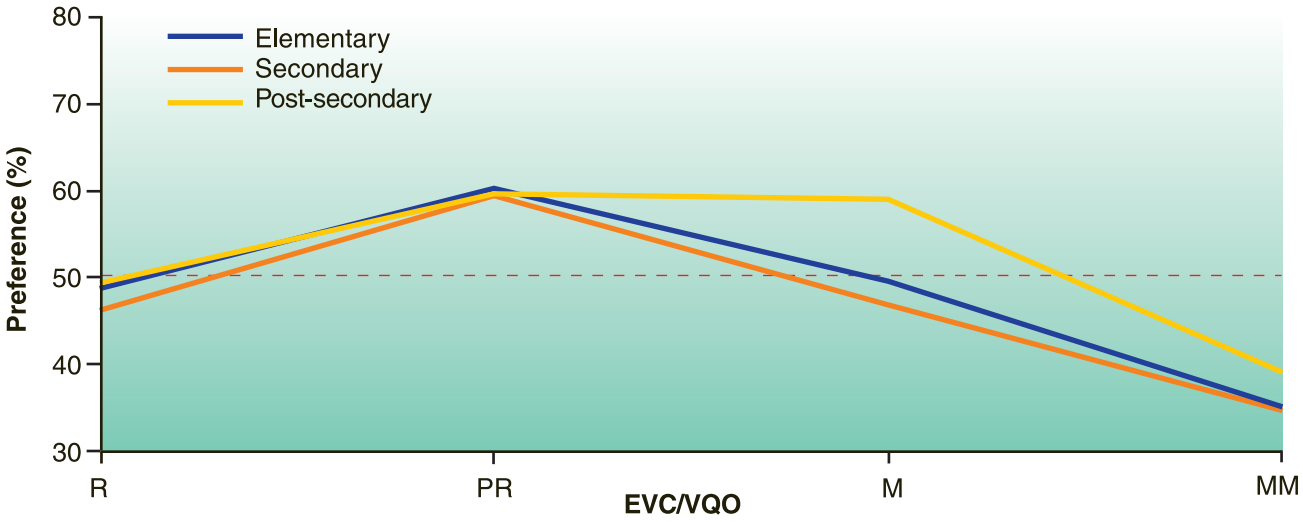


Note: Values of 50% or more indicate preference for P over R, PR, M, or MM.

Education and income

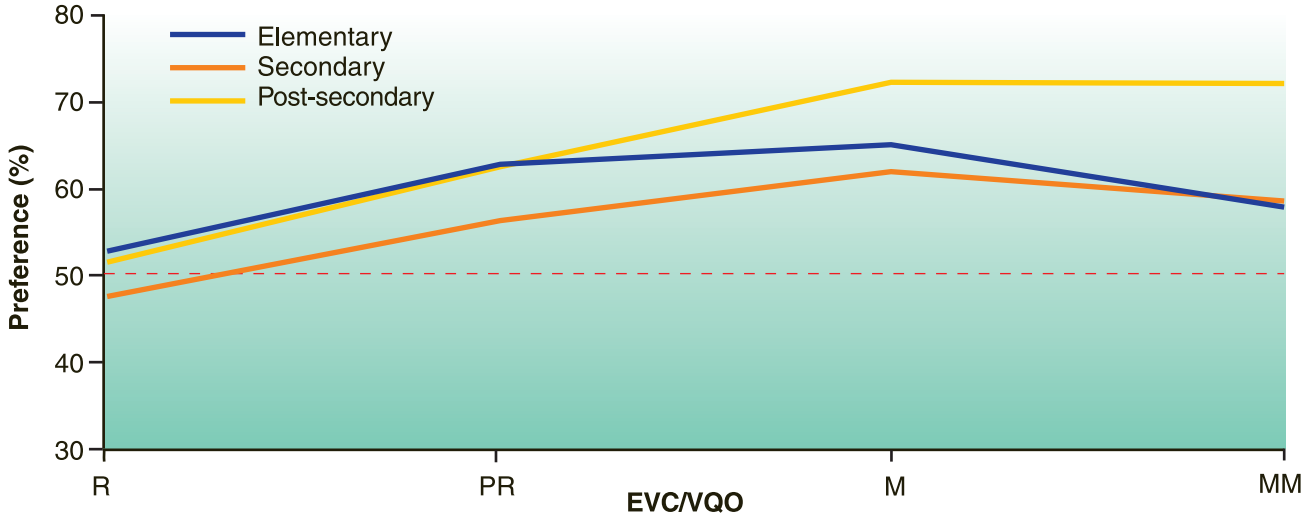
In general, respondents with the highest levels of education or income showed relatively strong preference for natural scenes.

Figure 10. *Average preference for partial cuts versus clear cuts, by education.*



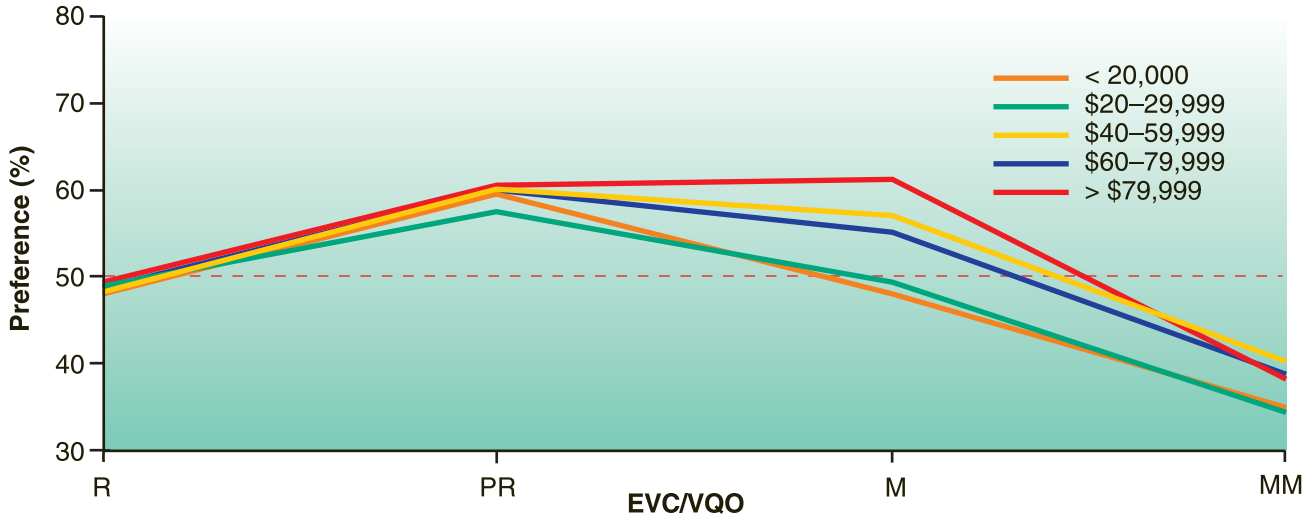
Note: Values of 50% or more indicate preference for partial cut over clearcut.

Figure 11. *Average preference for Preservation versus other EVC classes, by education.*



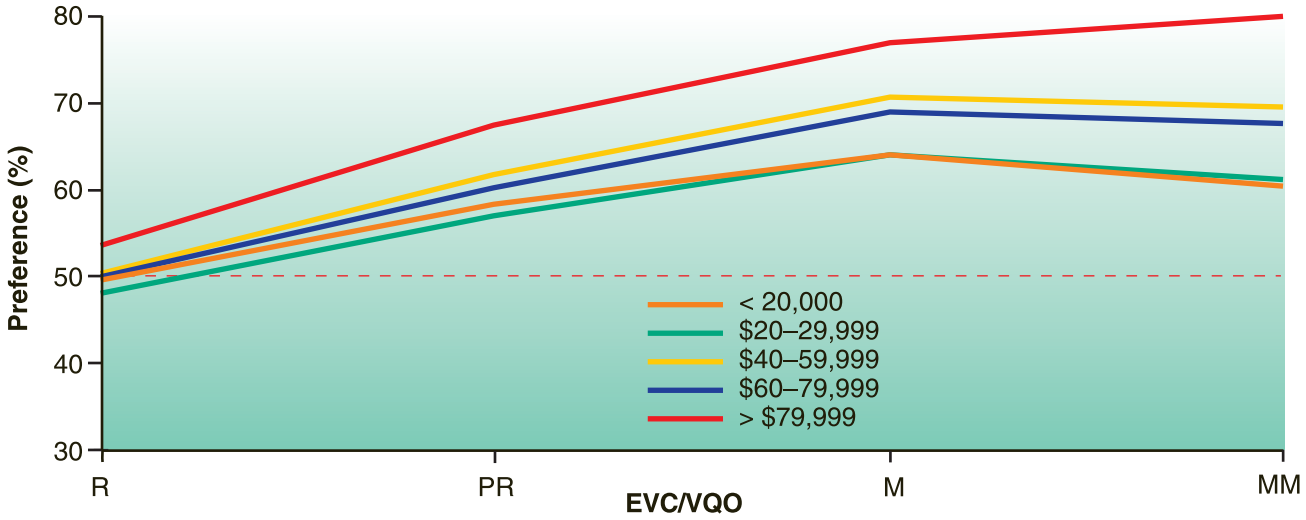
Note: Values of 50% or more indicate preference for P over R, PR, M, or MM.

Figure 12. *Average preference for partial cuts versus clear cuts, by income.*



Note: Values of 50% or more indicate preference for partial cut over clearcut.

Figure 13. *Average preference for Preservation versus other EVC classes, by income.*



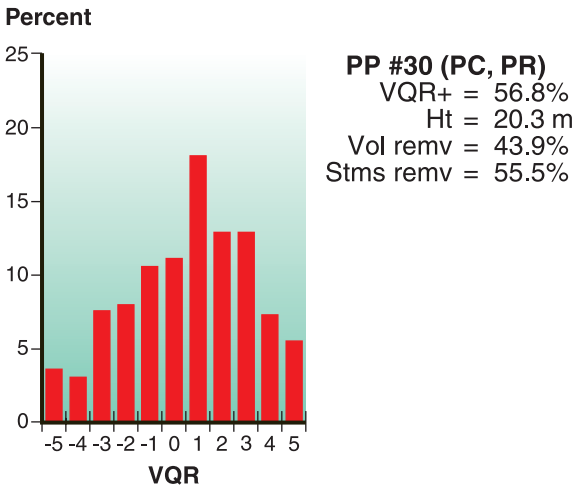
Note: Values of 50% or more indicate preference for P over R, PR, M or MM.

4.5 Objective V: Public preferences and site and stand variables

This section reports on results of the public perception study, in keeping with Objective 5: *to determine the relationship between public preferences and site and stand variables.*

In general, this particular analysis produced disappointing results. None of the variables showed a clear connection with public perception, although "basal area remaining" seems to have had a minor influence (i.e., public approval tended to increase with increasing basal area).

4.6 Sample study photographs and Visual Quality Ratings



Sample Photo
Note: Many scenes presented in the report have 2 photographs; however only the external views were used in the public perception portion of the study.

This section shows both external and internal views of many study sites, along with the Visual Quality Ratings and site attributes, such as stand height and volume removed.

Using the study photographs

This page explains how the sample photographs are organized and how to read the associated data. The photographs are organized by EVC class (P, R, PR, M, & MM) and silvicultural system (Partial Cut and Clearcut).

Graphs of Visual Quality Rating

Participants were asked to rate each slide on an 11 point scale of -5 to +5, according to the visual or scenic quality of the scene. Visual quality was described as "*the appearance of the scenery as it would affect your enjoyment of it.*"

The eleven point Likert scale went from -5 Very Low Visual Quality to +5 Very High Visual Quality with 0 representing the mid-point (indifference to visual quality).

The VQR graph accompanying each photo is a visual depiction of the percentage of the response received for each individual rating on the scale, from -5 to +5.

VQR+ (Visual Quality Rating +):

This is an indication of the relative degree of acceptance for the visual quality of a scene. The value represents the percentage of ratings received by the slide on the plus side of the scale (+1 to +5).

Acronyms and abbreviations used:

PP:

The Public Perception Study Slide reference number (see Table 11 for detailed information).

Silvicultural System Used

PC = Partial Cut

CC = Clearcut

N = No disturbance

EVC (Existing Visual Condition):

This letter gives the EVC class of the slide, as determined by Ministry of Forests visual landscape specialists:

P = Preservation

R = Retention

PR = Partial Retention

M = Modification

MM = Maximum Modification

Please refer to the glossary for definitions for each class.

Ht = Average height of the trees (m)

Vol remv = volume removed (m^3/ha)

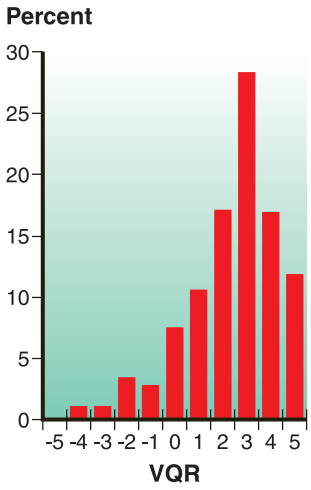
Stms remv = stems removed (no./ha)

% Alt (Percent Unit Alteration):

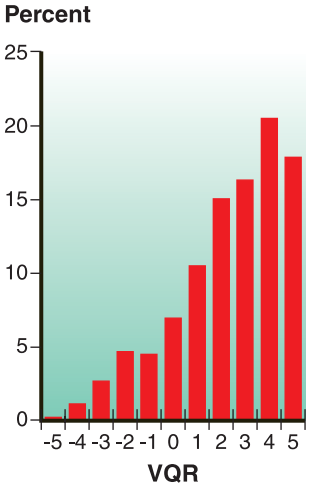
(Clearcut Slides only.) This is the percent of the forest cover removed expressed as a percentage of the dominant landform or landscape unit.

Visual Impacts of Partial Cutting

Preservation EVC – Partial Cut Slides

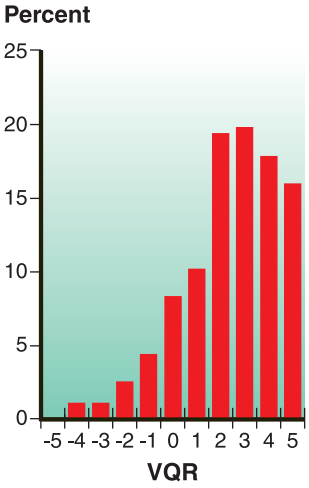


PP #53 (PC, P)
VQR+ = 84.6%
Ht = 21.6
Vol remv = N/A
Stms remv = N/A

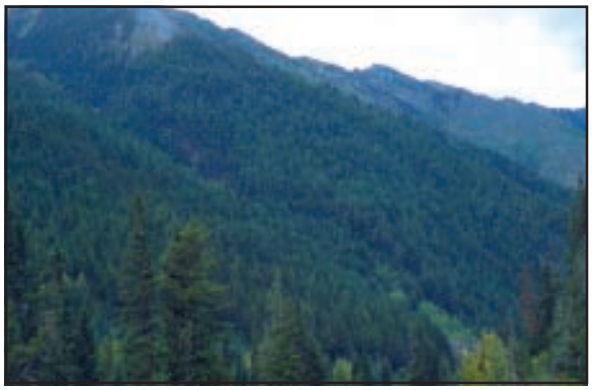


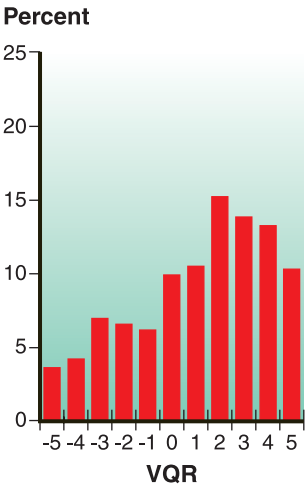
PP #40 (PC, P)
VQR+ = 81.2%
Vol remv = N/A
Stms remv = N/A

Preservation EVC – Partial Cut Slides



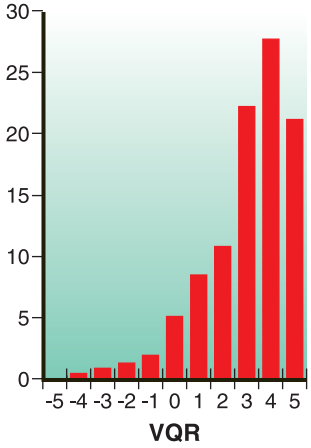
PP #62 (N, P)
VQR+ = 82.3%
Vol remv = N/A
Stms remv = N/A



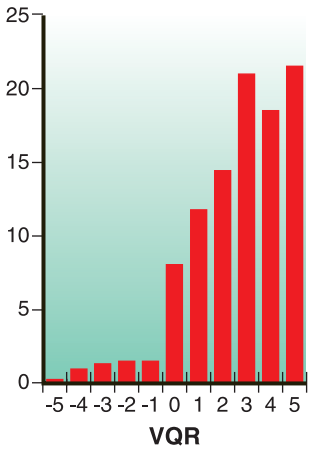


PP #35 (N, P)
VQR+ = 62.2%
Vol remv = N/A
Stms remv = N/A

Retention EVC – Partial Cut Slides

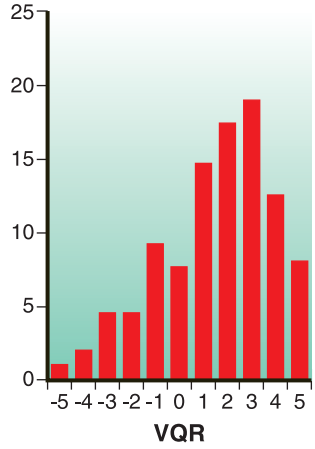


PP #64 (PC, R)
VQR+ = 89.8%
Ht = 21.5 m
Vol remv = 58.6%
Stms remv = N/A

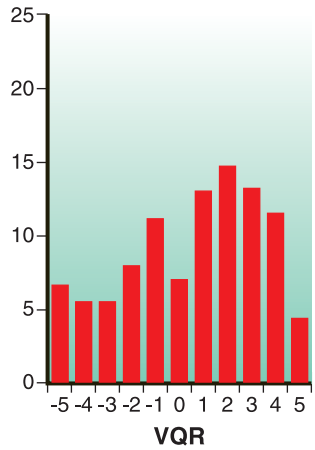


PP #22 (PC, R)
VQR+ = 86.8%
Ht = 28.4 m
Vol remv = 60.4%
Stms remv = 80.2%

Retention EVC – Partial Cut Slides



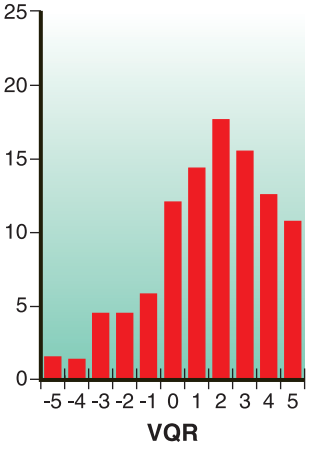
PP #45 (PC, R)
VQR+ = 71.1%
Ht = 13.5 m
Vol remv = 42.8%
Stms remv = 57.7%



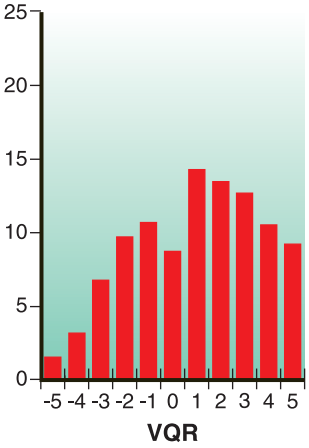
PP #15 (PC, R)
VQR+ = 55.8%
Ht = 31.9 m
Vol remv = N/A
Stms remv = 47%

Visual Impacts of Partial Cutting

Partial Retention EVC – Partial Cut Slides

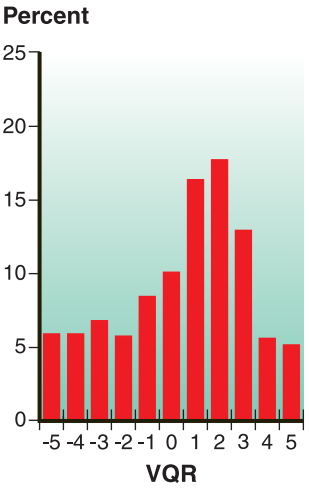


PP #9 (PC, PR)
VQR+ = 70.6%
Ht = 21.1 m
Vol remv = 81.0%
Stms remv = 81.9%

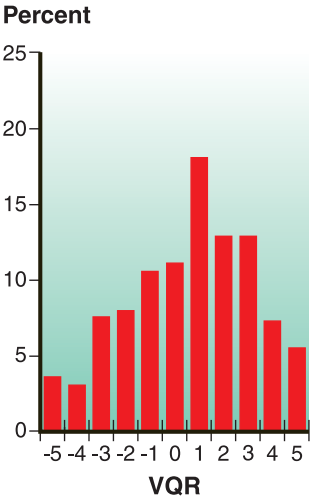


PP #50 (PC, PR)
VQR+ = 60.0%
Ht = 31.1 m
Vol remv = 75.0%
Stms remv = 73.9%

Partial Retention EVC – Partial Cut Slides



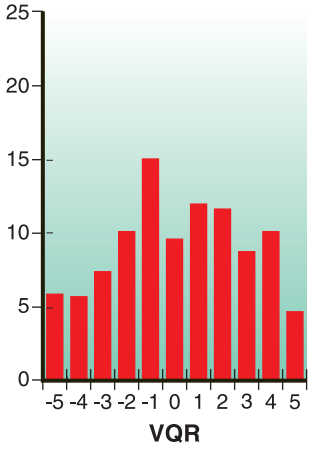
PP #58 (PC, PR)
VQR+ = 57.7%
Ht = 31.4 m
Vol remv = 42.1%
Stms remv = N/A



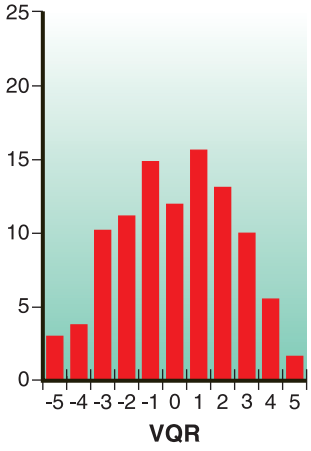
PP #30 (PC, PR)
VQR+ = 56.8%
Ht = 20.3 m
Vol remv = 43.9%
Stms remv = 55.5%

Visual Impacts of Partial Cutting

Modification EVC – Partial Cut Slides

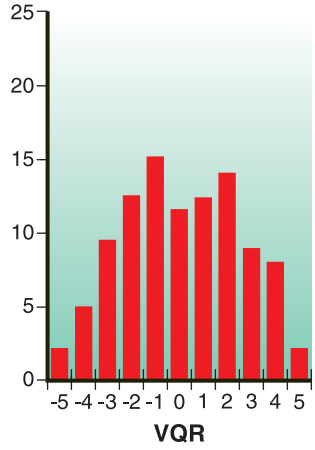


PP #11 (PC, M)
VQR+ = 45.8%
Ht = 28.6 m
Vol remv = 91.9%
Stms remv = 91.9%

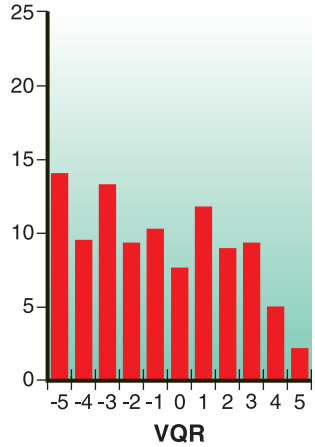


PP #42 (PC, M)
VQR+ = 45.2%
Ht = 23.4 m
Vol remv = 72.3%
Stms remv = 63.3%

Modification/Maximum Modification EVC – Partial Cut Slides



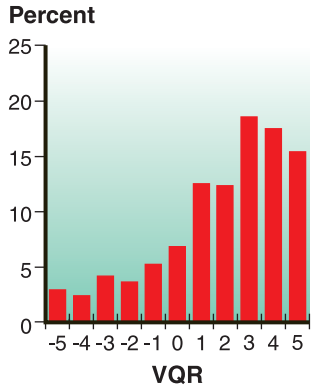
PP #47 (PC, M)
VQR+ = 45.2%
Ht = 29.0 m
Vol remv = 87.7%
Stms remv = 96.0%



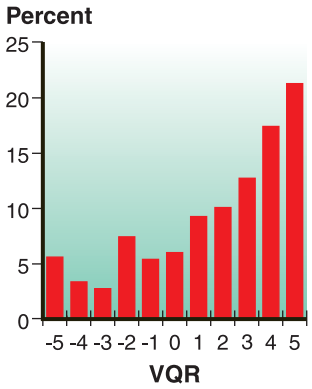
PP #63 (PC, MM)
VQR+ = 35.8%
Ht = 29.5 m
Vol remv = 83.3%
Stms remv = 72.0%

Visual Impacts of Partial Cutting

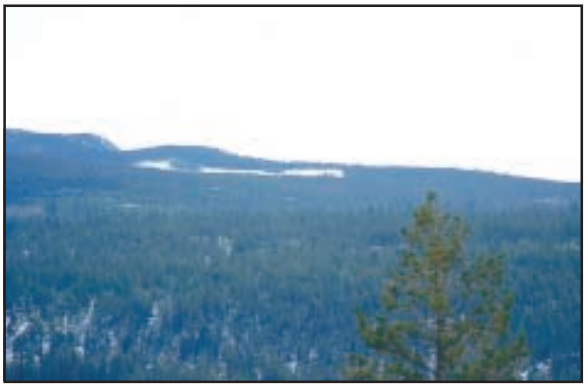
Clearcut Slides

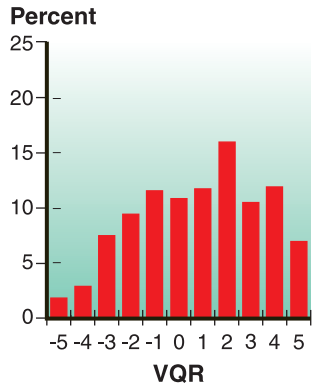


PP #38 (CC, R)
VQR+ = 75.6%
% Alt = 0.2

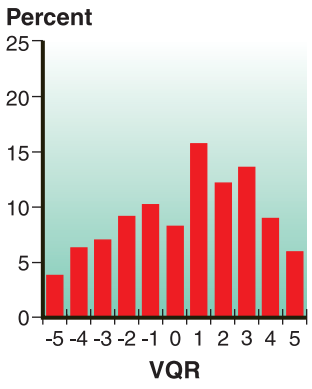


PP #48 (CC, R)
VQR+ = 70.2%
% Alt = 0.6



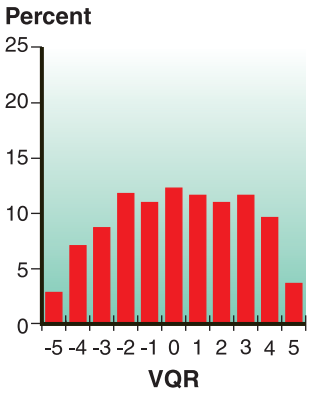


PP #21 (CC, PR)
VQR+ = 56.7%
% Alt = 4.9

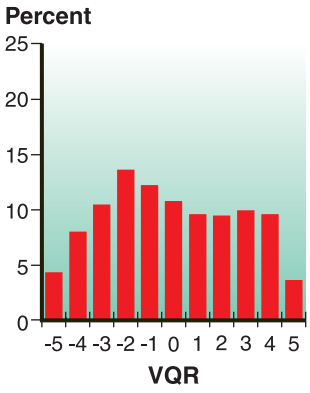


PP #3 (CC, PR)
VQR+ = 54.6%
% Alt = 1.4

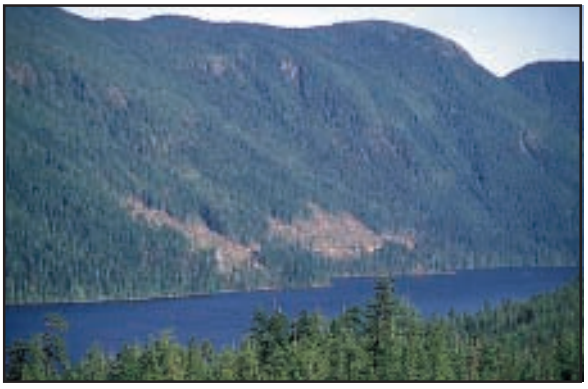
Clearcut Slides

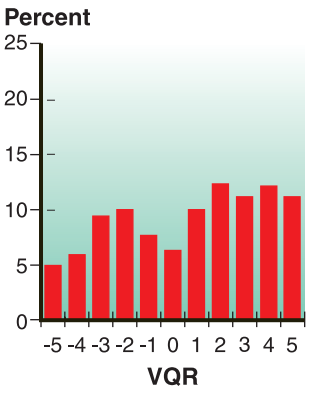


PP #57 (CC, PR)
VQR+ = 45.5%
% Alt = 1.8

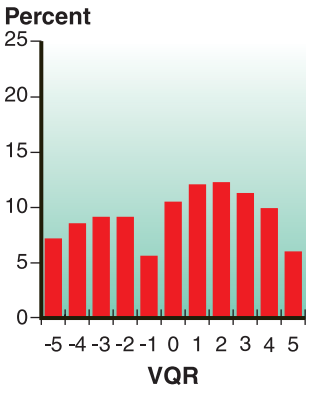


PP #54 (CC, PR)
VQR+ = 41.2%
% Alt = 8.1





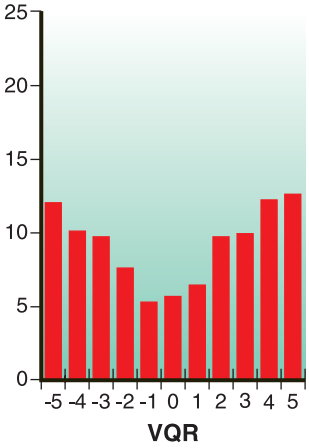
PP #41 (CC, M)
VQR+ = 55.3%
% Alt = 5.6



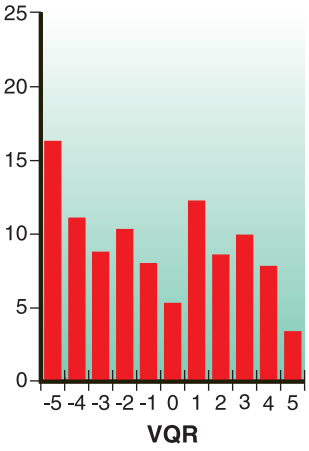
PP #8 (CC, M)
VQR+ = 49.5%
% Alt = 7.5

Visual Impacts of Partial Cutting

Clearcut Slides



PP #49 (CC, M)
VQR+ = 48.4%
% Alt = 16.5



PP #39 (CC, MM)
VQR+ = 40.3%
% Alt = 12.9

5.0 Conclusions

This section provides conclusions based on statistical analyses of the results.

Objective i)

Determine the relationship between Existing Visual Condition (EVC) and site and stand variables.

Conclusion:

Stepwise logistical regression analysis of all site and stand variables identified the variables "percent volume removed," "percent stems removed," and "average height of residual trees" used together as the best predictors of EVC.

Objective ii)

Determine the relationship between public preference (Visual Quality Rating) and EVC (assessment by visual landscape specialists).

Conclusion:

The public preferred the more natural scenes over the altered scenes. Preservation was preferred over Retention, Partial Retention, Modification and Maximum Modification. This indicates a correlation between EVC classes used by visual landscape specialists and the public's perceptions.

Objective iii)

Determine public preference (as far as visual quality is concerned) regarding partial cutting versus clear cutting.

Conclusion:

Respondents showed no preference for partial cuts over clear cuts in photographs classed as Retention EVC. Partial cuts were preferred slightly more often than clear cuts in the Partial Retention and Modification classes. The four clearcuts in the Maximum Modification class were preferred over the single partial cut.

Explanatory Note: *As previously mentioned in Section 3, there are extremely few trees remaining in a Maximum Modification partial cut. At this scale of logging, respondents appeared to be indicating a visual preference for clearcuts without any remaining trees versus a partial cut with a few scattered trees that looked out of place.*

Objective iv)

Determine the relationship between public preferences (re: visual quality) and socio-demographic and economic variables

Conclusion:

The degree of preference for one class of landscape over another differed significantly among communities. Neither gender nor origin (location of hometown, type of neighbourhood – rural, urban, or both) appears to have influenced preference. In contrast age, level of education, and income were highly correlated with landscape preference. Preference appeared weakest for the oldest group of respondents and the strongest for the youngest respondents. Preferences were also most pronounced for respondents with the highest level of education or income.

Objective v)

Determine the relationship between public preferences (re: visual quality) and the site stand variables.

Conclusion:

None of the site and stand variables showed a clear connection with public perception. This could possibly be explained by the relatively small sample size used for this portion of the study.

Demographic Statistics

In general, the sample study was reasonably close to the general population, although participants were somewhat younger (more individuals in the 30–49 age group and fewer over 49), with slightly better education and higher income than the province as a whole.

6.0 Discussion

6.1 Using the results

A better understanding of the relationship between visual appearance resulting from partial cutting and the public's enjoyment of the scene will assist resource managers in providing input into land use planning and resource management decision making.

It is important to note that this study was not meant to address the implications of managing for various degrees of visual quality. This study was designed to gain a better understanding of public perceptions about partial cutting, and resulting alterations to the landscape, from an aesthetic or visual enjoyment standpoint. The public, for the purposes of this study, is defined as a sample of the population that matches the socio-economic profile of the provincial population as a whole.

The results of this study are similar to comparable studies done elsewhere throughout North America [e.g.; *Managed Landscapes: What do people like?* (Magill[1] 1992), *Logging in Kootenay Landscapes: The Public Response* (Berris and Bekker[2] 1989), and *Clearcutting and Visual Quality: a public perception study (FRDA II[3] 1996)*]. Namely, that respondents of these public perception studies expressed a preference for, or enjoyment of, natural over altered landscapes. It must be recognized that this and other studies did not take into account the economic and social implications of managing for different visual quality objectives.

However, this study provides useful results for those interested in understanding public perceptions about visual alterations to the landscape.

6.1.1 Using site and stand variables to predict VQO for partial cuts

Based on a logistic regression analysis of the study data, the relationship between % volume (stems) removed, tree height and probable VQO can be charted as shown in Table 10. The resulting table shows the probability that a randomly selected partial cut would be classified into a particular VQO class given the values for "percentage of volume (stems) removed" and "remaining tree height."

The values in this table are estimated to have a 90% confidence rating in predicting VQO, as long as a stand is within the parameters of the study (see note below Table 10).

For example, if 60% of the stems/volume were removed by partial cutting within a 25 meter high stand, this table predicts that it would be classified as a Partial Retention VQO (with a 90%, or better, probability of accuracy).

[1] Magill, Arthur W., 1992. *Managed Landscapes: What do people like? P*acific Southwest Research Station, US Forest Service, US Dept. of Agriculture, Research Paper PSW–RP–213.

[2] Berris, Catherine and Bekker, Pieter, 1989. *Logging in Kootenay Landscapes: The Public Response.* B.C. Ministry of Forests, Land Management Report #57, ISSN 0702–9861.

[3] B.C. Ministry of Forests, Recreation Section, 1996. *Clearcutting and Visual Quality: a public perception study.* Canada–British Columbia Partnership Agreement on Forest Resource Development FRDA II Report.

Table 10. *Predicting VQOs for Partial Cuts*

Tree Height (Meters)

Volume (Stems) Removed in %	5	10	15	20	25	30	35	40	45	50
10	R	R	R	R	R	R	R	R	PR	PR
20	R	R	R	R	R	R	PR	PR	PR	PR
30	R	R	R	R	PR	PR	PR	PR	PR	PR
40	R	R	PR	PR	PR	PR	PR	PR	PR	M
50	PR	PR	PR	PR	PR	PR	PR	M	M	M
60	PR	PR	PR	PR	PR	M	M	M	M	M
70	PR	PR	PR	M	M	M	M	M	M	M
80	PR	PR	M	M	M	M	M	M	M	M
90	M	M	M	M	M	M	M	M	M	M

Note: There is a 90% or better chance of achieving the VQO shown, within 10–40 m tree height.

Note: This table is derived from forest stands within the following parameters. Any extrapolation outside these parameters should be used with caution.

SLOPE	3 - 47%
DBH	17.5 - 86.3 cm
TREE HEIGHT	11 - 39 m
PRE-HARVEST VOLUME	70 - 844 m^3/ha
PRE-HARVEST BASAL AREA	21 - 68 m^2/ha
PRE-HARVEST STEMS	136 -1150 /ha

6.2 Limitations

A fundamental limitation of any public preference study is that the results are highly dependent on the questions asked and the specific phrasing used.

In this study the following instructions were given to the participants:

> *"Please respond to the appearance of the scenery as if you were outside experiencing it from a distance. Rate the scenes relative to each other on a scale from –5 (Very Low Visual Quality) to +5 (Very High Visual Quality). The mid-point is 0. Visual quality can be considered as the appearance of the scenery as it would affect your enjoyment of it."*

The terms "visual quality" and "enjoyment" are open to interpretation. If these terms had been explicitly defined, or different terms used (e.g.: satisfaction versus enjoyment) the results may have been different.

No sensitivity analysis was done to assess the dependence of the results on the question or other aspects of research methodology. This was due to a lack of time and resources.

As far as the photos are concerned, the scenes shown to the respondents may not represent the full-range of scenes found in the province, although the researchers did their best in selecting a representative range.

There were several variables in the photographs, in addition to the relative scale of the alteration, which could influence an observer's perception, such as:

- the design and shape of the alterations;
- colour contrast relative to soil colour and the degree of green-up;
- the distance between the viewer and the alteration; and,
- photographic factors such as haze, sharpness, brightness and colour contrast.

Any interpretation or use of the research findings should take the above limitations into account.

7.0 Glossary

Clearcut: a silvicultural system that removes the entire stand of trees in a single harvesting operation from an area that is one hectare or greater and at least two tree lengths in width.

Existing visual condition (EVC): a component of the visual sensitivity inventory that presents the level of human-made landscape alterations caused by resource development activities and expressed in terms of the visual quality objective categories. *(see definitions under Visual Quality Objective)*

Human-caused alteration: any type of disturbance to a landscape caused by human activity.

Partial cut: a general term referring to silvicultural systems other than clearcutting, in which only selected trees are harvested. Partial cutting systems include seed tree, shelterwood, selection, and clearcutting with reserves.

Percent alteration: the scale of human alteration to the landscape, including cutblocks, expressed as a percentage of a landscape unit or the total scene.

Scenic area: any visually sensitive area or scenic landscape identified through a visual landscape inventory or planning process carried out or approved by the district manager.

Viewshed: a physiographic area composed of land, water, biotic, and cultural elements which may be viewed and mapped from one or more viewpoints and which has inherent scenic qualities and/or aesthetic values as determined by those who view it.

Visual Absorption Capability (VAC): a component of the visual sensitivity inventory that rates the relative capacity of a landscape to absorb land-use alterations and still maintain its visual integrity.

Visual impact assessment: an evaluation of the visual impact of resource development proposals on forest landscape.

Visual landscape analysis: the process of recommending visual quality objectives based on the visual sensitivity inventory and social factors.

Visual landscape inventory: the identification, classification, and recording of the location and quality of visual resources and values.

Visual landscape management: the identification, assessment, design, and manipulation of the visual features or values of a landscape, and the consideration of these values in the integrated management of provincial forest and range lands.

Visual quality: the character, condition, and quality of a scenic landscape or other visual resource and how it is perceived, preferred, or otherwise valued by the public.

Visual Quality Objective (VQO): a resource management objective established by the district manager or contained in a higher level plan that reflects the desired level of visual quality based on the physical characteristics and social concern for the area.

The specific VQO classes are defined as follows:

Preservation: No visible alterations.
Retention: Human-caused alterations are visible but not evident.
Partial retention: Human-caused alterations are evident but subordinate and not dominant.
Modification: Human-caused alterations are dominant but have natural appearing characteristics.
Maximum Modification: Human-caused alterations are dominant and out of scale.

Visual Quality Rating (VQR): a measure of the public's "enjoyment of the scenery," for use in this study.

Visual resource: the quality of the environment as perceived through the visual sense only.

Visual Sensitivity Class: a component of the visual sensitivity inventory that rates the sensitivity of the landscape based on biophysical characteristics and viewing and viewer related factors.

Visual Sensitivity Inventory: the identification, classification, and recording of the location and quality of visual resources that may be problematic if not managed to the concepts, principles and practices set out in the visual landscape management process.

Visually Effective Green-up: the stage at which regeneration is seen by the public as newly established forest. When VEG is achieved the forest cover generally blocks views of tree stumps, logging debris and bare ground. Distinctions in height, colour, and texture may remain between a cutblock and adjacent forest but the cutblock will no longer be seen as recently cut-over.

Visually sensitive areas: viewsheds that are visible from communities, public use areas, and travel corridors — including roadways and waterways — and any other viewpoint so identified through referral or planning processes.

Appendices

Appendix 1: Data for Partial Cut Sites

Table 11. *Data for 66 Partial Cut Sites*

Perception Study Slide #	EVC	Analysis Slide #	AREA	SLOPE	DBH	HT	LCR	CRNWDTH	VOL1	VOL2	VOLRMV	PCVOLRMV	BA1	BA2	BARMV	PCBARMV	STEMS1	STEMS2	STEMSRMV	PCSTMRMV
63	MM	44	36.4	15	50.8	29.5	59.3	4.8	402.1	67.2	334.9	83.3	.	6.7	.	.	474.6	133	341.6	72
11	M	3	12.6	35	35.6	28.6	35	2.1	352	28.5	323.5	91.9	37	3	34	91.9	370	30	340	91.9
	M	8	26.8	40	44.4	31.3	30	1.6	491	82	409	83.3	58	7.9	50	86.2	749	40	709	94.7
47	M	10	22	15	52.9	29.4	35	1.4	195	24	171	87.7	20	2.4	18	90	276	11	265	96
24	M	14	23	15	50.3	34.1	30	2.3	408	54	363	89	45	4.8	40	88.9	501	24	477	95.2
	M	15	25	31	48	31.1	25	1.6	462	88	374	81	50	8.5	41.5	83	642	47	595	92.7
36	M	22	29.8	8	22.8	17.3	40	1.3	199	24	175	87.9	27	4	23	85.2	1067	50	1017	95.3
12	M	30	30	.	26.8	20.2	80.3	3.0	279	33	246	88.2	.	6.7	.	.	766	2.5	763.5	99.7
19	M	32	37.7	15	35.9	32.9	53	5.8	287.4	102.2	185.2	64.4	.	10.7	.	.	938.1	13.3	924.8	98.6
27	M	34	.	20	22.3	17.2	57.7	3.3	.	34.2	.	.	.	6	.	.	.	50	.	.
	M	37	11.9	38	52.8	33.3	53.2	4.9	425	74.3	350.7	82.5	.	6.7	.	.	511.7	33.3	478.4	93.5
42	M	46	53.5	15	23.8	23.4	48.7	2.4	482.6	133.9	348.7	72.3	.	17.3	.	.	1000.2	633.3	366.9	36.7
	M	69	30.2	40	45.5	29.8	20	7	291.2	47.4	243.8	83.7	.	5	.	.	302.9	30.8	272.1	89.8
	M	73	2.5	35	86.3	38.9	40	3	505	70.8	434.2	86	60	6.8	53.3	88.8	733	11.5	721.5	98.4
30	PR	1	37.2	40	33.1	20.3	40	1.7	173	97	76	43.9	20	14	6	30	375	167	208	55.5
7	PR	4	.	10	67.5	37.5	45	2.7	500	45	455	91	.	.	.	.	.	10	.	.
9	PR	9	21	32	29.4	21.1	30	1.5	479	91	388	81	62	13	49	79	1052	190	862	81.9
33	PR	11	29	25	49.2	22.4	75	2	350	51	299	85.4	.	6.8	.	.	.	36	.	.
61	PR	12	42	30	35.9	22.8	30	1.2	409	45	364	89	44	6	38	86.4	701	59	642	91.6
65	PR	13	14	15	45.6	31.9	25	1.3	518	141	377	72.8	54	13.2	41	75.9	651	81	570	87.6
	PR	18	.	35	48.2	31.3	35	1.8	450	131	319	70.9	.	12.6	.	.	.	69	.	.
	PR	19	.	33	52.6	34	30	1.8	450	54	396	88	.	4.8	.	.	.	22	.	.
	PR	23	35	12	27.7	19.8	40	1.3	200	70	130	65	27	10.6	16	59.3	755	176	579	76.7
59	PR	24	99	20	33.3	26.3	40	1.6	.	129	.	.	.	14.7	.	.	.	169	.	.
	PR	29	.	20	60.3	32.8	71.1	8	166	43.8	122.2	73.6	.	4	.	.	244.6	30	214.6	87.7
37	PR	35	38.7	22	24.3	14.9	69.2	2.6	208.8	58.4	150.4	72	.	12	.	.	340.3	93	247.3	72.7
50	PR	39	33.9	15	42.1	31.1	54.1	4.4	545.2	136.5	408.7	75	.	13.3	.	.	1149	300	849	73
58	PR	43	22.6	30	48.3	31.4	37.2	3.9	407.3	236	171.3	42.1	.	22	.	.	402.5	400	2.5	0.6
	PR	51	10	30	45.5	26.7	73.5	4.1	212.7	122	90.7	42.6	.	12.7	.	.	136.3	16.7	119.6	87.7
	PR	52	42.4	40	46	24.9	30	2.5	210	142	59.9	28.5	.	18.3	.	.	750	269.9	480.1	64
	PR	54	90.8	30	31.8	24.3	50	3.5	277.6	244	33.3	12.1	.	28	.	.	981.7	352.1	629.6	64.1
	PR	61	28.7	31	35.2	27.6	50	7	344.3	105.8	238.5	69.3	.	13.3	.	.	560.4	137.1	423.3	75.5
	PR	62	41.6	18	48.1	21.9	50	8.5	281.5	97.1	184.4	65.5	.	15	.	.	309.5	70.3	23x9.2	77.3
	PR	63	17.6	25	29	27.7	30	4	333.2	242.3	89.9	27	.	28.3	.	.	1150.6	430	720.6	62.6
	PR	64	34.8	40	34.5	28.9	60	6	251.1	122.5	132.6	52	.	13.3	.	.	218.5	113.2	105.3	48.2
	PR	71	4.6	45	60	36	30	6	671.5	87	584.5	87	57.6	8	49.6	86.1	525	257	268	51
	PR	72	26.4	20	43.3	25.7	65	4	214.7	232.4	97.5	45.4	44.5	17.2	27.3	61.2	458	117.2	340.8	74.4
	PR	74	11.3	47	55.3	27.5	45	5	844	175.3	668.7	79.2	93	18	75	80.6	304	75	229	75.3
	PR	79	38.2	23	22.6	15	90	6	385.2	47.1	338.1	87.8	.	8.3	.	.	353	208.4	144.6	41
	PR	80	2.9	45	50	37	30	6	747.4	304	443.4	59.3	68.3	27	41.3	60.5	700	134	566	80.9
	R	2	24.8	25	30.2	23.3	35	1.3	194	67	127	65.5	21	9	12	57.1	376	121	255	67.8

Table 11. *Data for 66 Partial Cut Sites (cont.)*

Perception Study Slide #	EVC	Analysis Slide #	AREA	SLOPE	DBH	HT	LCR	CRNWDTH	VOL1	VOL2	VOLRMV	PCVOLRMV	BA1	BA2	BARMV	PCBARMV	STEMS1	STEMS2	STEMSRMV	PCSTMRMV
1	R	5	49.8	30	48.1	30.2	55	2.4	320	77	243	75.9	.	7.6	.	.	.	42	.	.
	R	6	49.8	30	38.7	27.7	45	1.7	320	67	253	79.1	.	7.3	.	.	.	62	.	.
44	R	7	24	11	34.8	22.9	45	1.9	320	57	263	82.2	.	7.4	.	.	.	78	.	.
	R	17	.	25	31.9	28.7	40	1.2	300	68	232	77.3	.	7.1	.	.	.	89	.	.
22	R	20	27	26	45.9	28.4	40	2.3	391	155	236	60.4	47	16	31	66	500	99	401	80.2
16	R	21	.	22	43.8	28.2	25	2.3	277	152	125	45.1	.	16.1	.	.	.	107	.	.
34	R	26	27.9	3	29.4	20.2	30	1.4	194	88	106	54.6	24	13.1	10.9	45.4	793	193	600	75.7
45	R	27	33.2	45	17.8	13.5	15	1.5	234	99	135	57.7	34.7	16	18.8	54.2	1109	634	475	42.8
15	R	31	80	35	41.9	31.9	57.9	5.2	.	277.7	.	.	.	26	.	.	566.7	300	266.7	47.1
25	R	33	95	15	17.5	10.8	69	3.3	70.4	38.4	32	45.5	.	10.7	.	.	247.2	80	167.2	67.6
43	R	38	87	15	22.2	11.5	78.9	3.1	300	20.4	279.6	93.2	.	5.3	.	.	550	100	450	81.8
55	R	42	30.8	15	65.6	41.4	28.2	8.3	746.6	696.5	50.1	6.7	.	50.7	.	.	249.9	266	-16.1	-6.4
64	R	45	66.4	40	26.8	21.5	51.6	3.7	229	94.7	134.3	58.6	.	13.3	.	.	484.4	466.7	17.7	3.7
	R	48	.	30	33.3	22.7	57.3	3.3	.	197.1	.	.	.	26	.	.	151.9	73.3	78.6	51.7
	R	49	145	15	24.9	15.3	78.2	3.1	166	76.1	89.9	54.2	.	14.7	.	.	503.8	600	-96.2	-19.1
	R	55	12	35	28.6	26.2	30	4	331.3	174.8	156.5	47.2	.	21.3	.	.	414.1	329.9	84.2	20.3
	R	56	26.7	14	45.7	38.4	35	6	365.8	247.7	118.1	32.3	.	20	.	.	460.4	247.7	212.7	46.2
	R	59	18	23	25	17.9	90	6	246	55.3	76.3	31	.	8.3	.	.	285.1	169.7	115.4	40.5
	R	60	25.4	40	50.8	30.6	60	8.5	238.1	220.3	17.8	7.5	.	23.3	.	.	443.5	115.3	328.2	74
	R	67	21.4	45	51.9	29.8	30	7	365.5	196.6	168.9	46.2	.	21.7	.	.	405.3	102.5	302.8	74.7
	R	78	23.3	15	26.6	24.7	30	2.5	296.4	265.2	31.2	10.5	34	28.3	5.7	16.8	980	510.2	469.8	47.9
2	P	28	.	35	22.9	22.9	29.2	3.1	.	167.1	.	.	.	22	.	.	.	70	.	.
40	P	36	45.1	15	35.6	28.1	59.9	4.3	.	261.1	.	.	.	28	.	.	.	500	.	.
53	P	41	627.3	25	31.2	21.6	62.8	7.2	107	103.6	3.4	3.2	.	14.7	.	.	170.5	43.3	127.2	74.6
	P	50	43	45	32.5	29	70	3	230	166.3	64	27.8	27.2	22.8	4.4	16.2	333	243	90	27

Appendix 2: Detailed methodology for statistical analyses

(EVC versus site and stand variables)

The characteristics of the partial cuts in the five EVC classes were summarized by calculating the mean, maximum, minimum, and standard deviation of the variables listed in Table 12. Stands with unusually large or small values were identified with the aid of boxplots, histograms, and probability plots. Pre- and post-harvest measurements were checked for consistency (e.g., VOLRMV should be equal to VOLUME1-VOLUME2). All apparent outliers and discrepancies were checked with the field sheets and corrected if errors were found.

Analysis of the relationship between the stand variables and visual impact (See Section 4.1 and Objective 1) was restricted to EVC classes M, PR, and R (61 partial cuts) because of lack of data in the P and MM classes. The following logistic regression model was fitted to the data:

$$\log\left[\frac{p_{EVC}}{1-P_{EVC}}\right] = \alpha\, EVC + \beta_1\chi_1 + \beta_2\chi_2 + \ldots + \beta_K\chi_K$$

where p_{EVC} is the probability that a partial cut with characteristics $\chi_1, \chi_2, \ldots, \chi_K$ has a visual impact classified as *EVC* or greater (e.g., P_{PR} is the probability that the impact is M or PR) and $\alpha_{EVC}, \beta_1, \beta_2, \ldots, \beta_K$ are unknown parameters to be estimated. The slope parameters $\beta_1, \beta_2, \ldots, \beta_K$ were assumed to be the same for all EVC classes. This assumption – also known as the "proportional odds assumption" – was tested by computing a score statistic, which has a chi-squared distribution with k degrees of freedom under the null hypothesis of equal slopes (for details refer to SAS/STAT User's Guide, Version 6, Fourth Edition, Volume 2, 1989, SAS Institute, Cary, NC). The EVC classes were assumed to be mutually independent for all stands in the sample.

The predictive value of individual stand variables (Table 12) was assessed by fitting a series of univariate logistic models (i.e., models with a single *x*i on the right side of Equation 1). Subsets consisting of two or more potentially useful predictors were selected by stepwise logistic regression. This procedure was applied to two sets of variables: all stand variables and stand variables with few missing values. All logistic models were fitted by the method of maximum likelihood estimation. The statistical significance of the estimated coefficients $\beta_1, \beta_2, \ldots, \beta_K$ were evaluated with a score test and the (unadjusted and adjusted) generalized coefficient of determination R^2, which is analogous to R^2 in an ordinary regression analysis (refer to SAS/STAT Software, Changes and Enhancements, Release 6.10, 1994, SAS Institute, Cary, NC).

Table 12. *Summary of relationship between variables and EVC (univariate logistic models).*

Variable	Number of Stands			Slope X^2	Prob	R^2	Adjusted R^2	Equal Slopes X^2	Prob.
	M	PR	R						
AREA	12	22	19	4.569	0.0325	0.0875	0.0992	0.126	0.7228
SLOPE	12	26	22	0.136	0.712	0.0023	0.0027	0.948	0.3302
DBH	13	26	22	2.725	0.0988	0.0472	0.0536	1.324	0.2499
HT	13	26	22	2.240	0.1345	0.0384	0.0436	0.001	0.9779
LCR	13	26	22	0.346	0.5563	0.0057	0.0065	0.460	0.4978
CRNWDTH	13	26	22	0.374	0.5411	0.006	0.0068	0.746	0.3878
VOLUME1	12	25	20	2.441	0.1182	0.0382	0.0434	1.417	0.234
VOLUME2	13	26	22	6.242	0.0125	0.1216	0.1382	4.281	0.0385
VOLRMV	12	25	20	10.789	0.001	0.163	0.1853	1.324	0.2498
PCVOLRMV	12	25	20	13.102	0.0003	0.2262	0.2572	2.733	0.0983
BA1	7	9	5	0.466	0.4947	0.0199	0.0225	2.906	0.0882
BA2	13	25	22	9.773	0.0018	0.1782	0.2023	5.638	0.0172
BARMV	7	9	5	3.443	0.0635	0.1521	0.1724	2.303	0.1291
PCBARMV	7	9	5	11.084	0.0009	0.5205	0.5898	2.243	0.1342
STEMS1	12	21	17	2.144	0.1431	0.0406	0.046	0	0.9946
STEMS2	13	26	22	6.447	0.0111	0.1208	0.1372	0.955	0.3284
STMRMV	12	21	17	11.666	0.0006	0.2222	0.2516	0.013	0.9106
PCSTMRMV	12	21	17	16.399	0.0001	0.3575	0.4048	2.806	0.0939

Appendix 3: Public Perception Study Data

Table 13. *Average VQR ratings*

Rank by public pref	Slide #	Type	EVC	-5	-4	-3	-2	-1	0	1	2	3	4	5	# of Resp
1	2	PC	R	0	0.20	0.20	1.29	0.88	2.57	4.78	13.9	14.95	29.11	32.13	458
2	64	PC	R	0	0.52	0.80	1.33	2.00	5.17	8.52	10.85	22.1	27.59	21.11	458
3	44	PC	R	0.16	0	0.72	1.59	1.73	6.95	8.34	15.92	20.1	23.36	21.12	460
4	22	PC	R	0.16	0.87	1.18	1.4	1.38	8.03	11.73	14.44	20.91	18.41	21.48	460
5	1	PC	R	0	1.03	1.45	3.03	2.56	5.97	11.32	11.56	17.38	17.01	28.7	455
6	53	PC	P	O	1.04	0.97	3.36	2.76	7.42	10.49	17.08	28.24	16.83	11.79	458
7	62	N	P	0	1.00	1.01	2.45	4.34	8.3	10.15	19.3	19.76	17.82	15.88	459
8	46	N	P	2.96	3.33	1.74	3.75	2.40	3.98	10.81	14.68	16.29	19.06	21.00	455
9	40	PC	P	0.17	1.12	2.66	4.66	4.48	6.88	10.42	15.02	16.26	20.49	17.85	460
10	5	CC	R	0.19	1.02	1.14	4.76	4.85	7.75	11.25	15.60	18.72	18.90	15.54	453
11	13	CC	PR	0.41	1.37	1.95	2.83	5.43	8.49	14.79	19.53	20.25	14.82	10.14	458
12	4	PC	PR	0.96	0.54	2.11	5.02	4.73	8.41	12.05	15.46	18.47	19.03	13.22	454
13	61	PC	PR	0.33	1.15	1.98	4.42	5.22	10.24	18.27	17.54	18.39	11.19	11.28	458
14	14	CC	R	0.69	1.35	2.33	5.41	5.78	9.09	12.79	16.27	17.44	17.12	12.71	455
15	26	CC	R	0.35	1.72	1.6	4.4	6.58	9.33	13.69	18.03	14.24	17	13.05	454
16	43	PC	R	1.70	0.87	2.78	4.01	6.34	8.45	11.37	14.32	19.07	15.34	15.76	461
17	38	CC	R	2.80	2.30	4.05	3.46	5.06	6.76	12.48	12.16	18.47	17.3	15.16	453
18	16	PC	PR	0.36	2.04	3.99	4.92	5.99	7.58	11.37	13.2	15.9	18.12	16.53	452
19	29	N	P	0.66	4.11	3.56	2.7	5.01	10	12.11	14.06	16.13	17.68	13.98	456
20	65	PC	PR	0.16	3.14	1.87	5.72	7.54	9.04	13.48	10.66	16.71	20.1	11.57	459
21	25	PC	R	2.49	2.5	4.38	4.89	5.98	7.83	12.55	15.6	18.05	15.02	10.71	457
22	45	PC	R	1.06	1.89	4.43	4.43	9.19	7.59	14.64	17.33	18.91	12.53	8.01	458
23	59	PC	R	0.6	2.95	3.52	5.88	7.87	8.03	13.37	16.26	17.27	15.52	8.74	453
24	9	PC	PR	1.55	1.3	4.42	4.44	5.74	11.94	14.37	17.55	15.42	12.54	10.74	454
25	33	PC	PR	0.16	0.82	1.08	5.39	8.82	13.15	17.3	21.53	16.34	10.16	5.24	455
26	48	CC	R	5.54	3.32	2.69	7.25	5.27	5.87	9.19	9.96	12.57	17.24	21.1	456
27	23	CC	PR	1.17	1.41	6.06	6.2	7.28	9.62	13.14	13.52	16.25	16.52	8.82	459
28	52	PC	PR	0.57	3.68	5.17	6.31	9.59	8.04	15.48	16.01	16.8	10.97	7.38	461
29	17	N	P	4.83	6.33	7.12	5.73	5.69	4.65	7.09	6.03	11.18	18.06	23.3	453
30	31	CC	PR	2.92	3.66	5.85	4.81	7.57	10.11	10.19	17.83	13.83	12.47	10.77	455
31	20	CC	MM	4.45	4.47	5.9	4.73	8.03	7.71	6.32	11.04	12.77	15.77	18.81	459
32	28	CC	M	5.36	4.88	7.06	9.05	5.34	3.97	7.88	9.53	14.48	18.88	13.58	454
33	35	N	P	3.48	4.1	6.84	6.56	6.07	9.93	10.37	15.19	13.86	13.27	10.33	456
34	55	PC	R	2.82	3.27	7.46	6.36	5.61	12.44	12.38	11.39	13.28	14.36	10.62	455
35	7	PC	R	1.45	3.92	7.21	5.75	10.12	9.88	18.43	12.35	14.58	10.36	5.94	449
36	34	PC	R	6.26	4.48	4.84	8.76	8.06	6.71	15.6	9.83	12.89	12.01	10.57	457
37	50	PC	PR	1.41	3.06	6.72	9.61	10.54	8.67	14.23	13.47	12.65	10.48	9.17	457
38	18	CC	MM	7.79	6.66	8.0	7.83	7.61	3.6	7.1	8.37	14.44	12.83	15.77	456
39	37	PC	PR	4.7	5.87	5.34	8.08	9.32	9.13	10.2	13.31	12.92	12	9.14	453
40	58	PC	PR	5.86	5.85	6.72	5.72	8.39	10.08	16.31	17.6	12.88	5.54	5.05	459
41	15	PC	R	6.49	5.41	5.54	7.89	11.09	6.89	12.95	14.71	13.22	11.49	4.32	458
42	21	CC	PR	1.72	2.88	7.35	9.31	11.46	10.77	11.59	15.89	10.37	11.84	6.82	457

Table 13. *Average VQR ratings (cont.)*

Rank by public pref	Slide #	Type	EVC	-5	-4	-3	-2	-1	0	1	2	3	4	5	# of Resp
43	30	PC	PR	3.59	2.94	7.47	7.99	10.48	11.1	18.03	12.84	12.85	7.26	5.45	459
44	41	CC	M	4.84	5.91	9.32	9.93	7.59	6.18	9.81	12.28	11.03	12.05	11.06	452
45	3	CC	PR	3.65	6.14	6.85	9.03	10.05	8.23	15.64	12.11	13.56	8.87	5.87	452
46	36	PC	M	1.61	2.7	6.72	10.09	11.33	12.31	14.44	14.9	12.71	9.44	3.76	458
47	10	PC	M	9.31	5.91	6.86	8.4	7.78	7.03	9.46	14.08	12.37	10.3	8.5	458
48	32	CC	MM	11.41	7.74	6.01	7.53	7.41	6.98	10.34	10.56	13.73	10.69	7.6	457
49	19	PC	PR	2.42	3.11	3.67	8.74	13.26	16.32	17.72	17.79	7.04	7.94	2	454
50	8	CC	M	7.04	8.31	9.03	8.97	5.46	10.4	11.94	12.1	11.05	9.85	5.86	456
51	27	PC	M	7.74	6.17	6.45	5.34	10.66	13.15	17.1	12.04	12.4	6.15	2.79	449
52	49	CC	M	11.99	9.98	9.64	7.42	5.14	5.52	6.27	9.54	9.79	12.17	12.53	452
53	57	CC	PR	2.79	7	8.53	11.7	10.87	12.2	11.47	10.93	11.48	9.52	3.5	459
54	24	PC	M	1.36	5.2	9.84	11.71	15.37	9.73	14.5	13.54	11.71	6.03	1.01	457
55	11	PC	M	5.79	5.58	7.3	10.1	14.98	9.48	11.9	11.58	8.67	10.07	4.56	453
56	42	PC	M	2.97	3.6	10.14	11.1	14.79	11.83	15.56	13.02	9.92	5.5	1.57	455
57	47	PC	M	2.05	4.84	9.43	12.47	15	11.43	12.14	13.93	8.83	7.86	2.01	460
58	51	CC	MM	17.08	9.07	9.35	10.49	5.07	6.64	10.5	10.23	12.61	6.01	2.94	455
59	54	CC	PR	4.14	7.94	10.31	13.5	12.06	10.62	9.43	9.28	9.82	9.47	3.45	461
60	39	CC	MM	16.08	10.9	8.58	10.13	7.81	5.19	12.06	8.42	9.8	7.67	3.36	456
61	6	CC	PR	7.84	9.42	11.84	10.57	13.21	9.33	10.94	12.19	11.16	2.92	0.6	453
62	12	PC	M	7.37	8.94	11.24	13.46	11.62	9.67	10.78	9.58	7.92	7.07	2.35	455
63	63	PC	MM	13.93	9.32	13.2	9.19	10.2	7.53	11.59	8.92	9.12	4.87	2.03	455
64	60	CC	M	8.05	12.58	12.11	12.9	11.89	8.65	9.46	10.7	7.06	4.26	2.34	456
65	56	CC	M	19.68	14.1	15.7	5.54	6.82	8.21	7.89	7.33	7.92	3.89	1.92	452

Appendix 4: Landscape preferences of selected socio-economic groups

Table 14a. *Landscape preferences by gender*[a]

Note: Table 14 is designed to be read as follows (for example); "the preference for Preservation over MM for Males was 66.0%, for P over M was 67.7%," etc. The PC:CC column indicates the preference for Partial Cuts (PC) over Clearcuts (CC) for each EVC, by socio-economic group. Any value under 50% indicates there was no preference.

	Preservation				Retention			
Gender	MM	M	PR	R	MM	M	PR	PC:CC
Male (223)[b]	66.0	67.7	60.4	51.5	68.2	69.3	60.5	47.9
	2.0	1.7	1.4	0.9	1.7	1.3	0.9	1.0
Female (237)	67.0	68.5	60.2	48.9	70.6	71.4	62.5	49.0
	2.0	1.6	1.4	1.0	1.7	1.2	0.9	0.9
P-value	0.725	0.750	0.914	0.055	0.321	0.234	0.106	0.395

	Partial Retention			Modification		MM
Gender	MM	M	PC:CC	MM	PC:CC	PC:CC
Male (223)	63.6	62.0	58.3	54.8	53.4	34.8
	1.5	0.9	0.9	1.2	1.6	2.0
Female (237)	65.7	62.9	60.4	56.4	53.3	38.8
	1.5	0.9	0.7	1.1	1.5	1.9
P-value	0.337	0.437	0.074	0.327	0.980	0.149

[a] The first and second rows are respectively average preference and its associated standard error. The P-values are based on a one-way ANOVA of the group means.

[b] The number of responses for each group is given in parentheses.

Table 14b. *Landscape preferences by age*[a]

	Preservation				Retention			
Age in years	MM	M	PR	R	MM	M	PR	PC:CC
< 20 (34)	75.9	78.8	71.7	56.4	74.2	76.7	67.6	47.7
	4.2	3.2	3.3	2.5	4.1	2.6	2.0	2.6
20-29 (78)	70.3	71.4	64.4	51.9	72.2	72.3	63.9	49.1
	3.4	2.6	2.2	1.5	3.0	2.1	1.4	1.7
30-49 (248)	67.7	69.0	60.1	50.0	70.9	71.6	61.6	49.3
	2.0	1.6	1.4	0.9	1.6	1.2	0.9	0.9
50-69 (61)	62.5	62.2	55.6	48.5	65.3	65.0	57.9	48.3
	3.7	3.2	2.9	1.9	3.1	2.4	1.7	1.7
> 69 (36)	49.4	54.8	50.8	44.7	55.9	60.8	56.8	41.8
	4.4	3.3	3.0	2.3	3.8	2.8	2.1	2.4
P-value	0.0010	0.0001	0.0002	0.0090	0.0060	0.0006	0.0009	0.0610

	Partial Retention			Modification		MM
Age in years	MM	M	PC:CC	MM	PC:CC	PC:CC
20 (34)	63.3	63.2	60.7	53.9	56.7	31.3
	4.0	1.8	1.6	3.1	3.0	5.3
20-29(78)	66.5	62.8	60.2	57.5	53.2	38.0
	2.9	1.7	1.2	2.0	2.6	3.4
30-49 (248)	66.9	64.2	59.9	56.5	56.1	38.3
	1.4	0.8	0.8	1.1	1.5	1.9
50-69 (61)	62.4	59.2	55.8	55.5	47.5	32.3
	2.7	1.5	1.7	2.1	2.9	3.6
> 69 (36)	50.4	54.7	58.1	47.4	41.7	35.6
	3.2	2.2	2.1	2.5	2.8	4.9
P-value	0.0020	0.0004	0.1640	0.0350	0.0020	0.5060

[a] The first and second rows are respectively average preference and its associated standard error. The P-values are based on a one-way ANOVA of the group means.

[b] The number of responses for each group is given in parentheses.

Table 14c. *Landscape preferences by education*[a]

	Preservation				Retention			
Education	**MM**	**M**	**PR**	**R**	**MM**	**M**	**PR**	**PC:CC**
Grades 1-8 (18)	57.8	65.0	62.7	52.7	60.2	62.7	60.0	48.6
	7.0	4.8	5.2	3.6	5.8	4.1	2.9	3.2
Grades 9-13 (130)	58.5	61.9	56.3	47.5	63.2	66.1	59.8	46.2
	2.7	2.2	2.0	1.4	2.2	1.6	1.2	1.2
Post-Sec. (228)	72.1	72.2	62.5	51.4	74.4	73.7	62.6	49.3
	2.0	1.6	1.4	0.9	1.7	1.3	0.9	1.0
P-value	0.0001	0.0007	0.0310	0.0350	0.0001	0.0003	0.1510	0.1530

	Partial Retention			Modification		MM
Education	**MM**	**M**	**PC:CC**	**MM**	**M**	**PC:CC**
Grades 1-8 (18)	53.3	54.4	60.2	49.8	49.5	35.1
	5.7	2.9	2.6	4.1	4.2	9.0
Grades 9-13 (120)	58.2	58.6	59.3	51.8	46.7	34.5
	1.9	1.1	1.1	1.4	1.9	2.7
Post-Sec. (228)	70.5	65.8	59.6	59.3	58.8	39.1
	1.5	0.9	0.8	1.1	1.6	2.0
P-value	0.0001	0.0001	0.9570	0.0001	0.0001	0.3790

[a] The first and second rows are respectively average preference and its associated standard error. The P-values are based on a one-way ANOVA of the group means.

[b] The number of responses for each group is given in parentheses.

Table 14d. *Landscape preferences by household income*[a]

	Preservation				Retention			
Income	**MM**	**M**	**PR**	**R**	**MM**	**M**	**PR**	**PC:CC**
<$20,000 (70)	60.7	64.2	58.5	49.8	64.6	66.9	60.3	48.0
	3.6	2.7	2.5	1.7	3.1	2.1	1.4	1.8
$20,000-39,999 (80)	61.4	64.3	57.2	48.2	66	67.9	60.1	48.9
	3.5	2.8	2.4	1.7	3	2.2	1.4	1.6
$40,000-59,999 (122)	69.8	70.8	61.9	50.6	72.1	72.5	62.4	48.2
	2.7	2.2	1.9	1.2	2.3	1.7	1.3	1.3
$60,000-79,999 (96)	67.8	69.2	60.5	50.1	71.1	72.2	62.1	48.6
	3.2	2.8	2.3	1.5	2.6	2.1	1.4	1.4
>$79999 (54)	80.2	77.1	67.7	53.7	79.7	76.9	65.9	49.3
	3.1	2.6	2.4	1.5	2.9	2.2	1.6	2.2
P-value	0.002	0.015	0.063	0.269	0.008	0.019	0.121	0.981

	Partial Retention			Modification		MM
Income	**MM**	**M**	**PC:CC**	**MM**	**PC:CC**	**PC:CC**
< $20000 (70)	60.3	59.3	59.5	53.5	48.1	34.9
	2.9	1.7	1.5	2.1	2.6	3.3
$20,000-39,999 (80)	61.9	61.1	57.5	54.4	49.3	34.3
	2.7	1.5	1.4	2.0	2.6	3.3
$40,000-59,999 (122)	67.5	64.2	60.1	56.8	57.0	40.2
	2.0	1.1	1.0	1.5	2.1	2.8
$60,000-79,999 (96)	67.2	64.7	60.0	56.8	55.1	38.7
	2.3	1.5	1.5	1.7	2.6	3.2
>$79999 (54)	71.6	65.1	60.5	60.6	61.2	38.1
	2.9	1.6	1.7	2.2	2.9	3.9
P-value	0.030	0.031	0.587	0.158	0.005	0.618

[a] The first and second rows are respectively average preference and its associated standard error. The P-values are based on a one-way ANOVA of the group means.

[b] The number of responses for each group is given in parentheses.

Table 14e. *Landscape preferences by forestry income*[a]

	Preservation				Retention			
Forestry Income	**MM**	**M**	**PR**	**R**	**MM**	**M**	**PR**	**PC:CC**
No (346)	66.1	67.7	59.8	49.7	69.4	70.5	61.6	49.4
	1.6	1.3	1.2	0.8	1.4	1.0	0.7	0.7
Yes (109)	69.6	70.1	62.6	51.8	70.7	70.7	62.0	46.2
	2.8	2.3	2.1	1.3	2.3	1.8	1.3	1.5
P-value	0.293	0.380	0.249	0.190	0.644	0.917	0.747	0.042

	Partial Retention			Modification		MM
Forestry Income	**MM**	**M**	**PC:CC**	**MM**	**PC:CC**	**PC:CC**
No (346)	64.7	62.7	59.4	55.8	53.7	37.3
	1.3	0.7	0.7	0.9	1.3	1.6
Yes (109)	65.3	62	59.1	55.8	52.8	36.4
	2.1	1.3	1.1	1.6	2.1	2.8
P-value	0.827	0.636	0.823	0.994	0.712	0.777

[a] The first and second rows are respectively average preference and its associated standard error. The P-values are based on a one-way ANOVA of the group means.

[b] The number of responses for each group is given in parentheses.

Appendix 5: Response to Public Survey Questionnaire

After providing demographic information, respondents were asked to respond to questions related to scenic quality, clearcutting, and forest resources. This section presents the results of those responses.

Scenic Quality

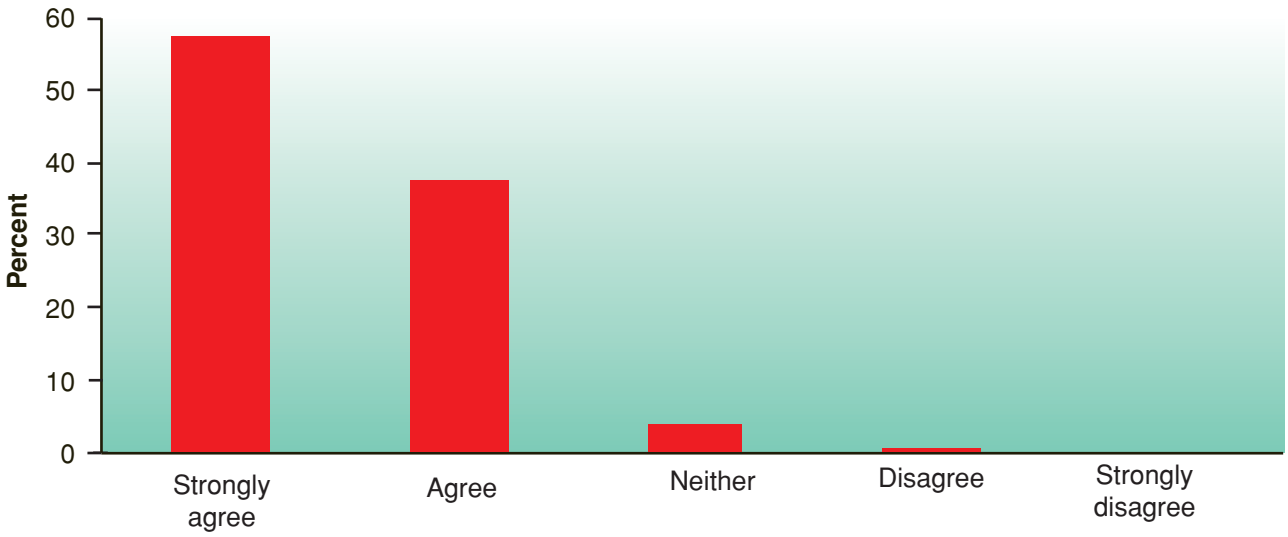
Respondents were asked, "The scenic quality of the forested landscape in the province is important. Do you: Strongly agree, Agree, etc." (see Table 15 and Figure 14 below).

Table 15. Response to Scenic Quality Question

Scenic Quality is Important	Percent*
Strongly agree	57.7
Agree	37.6
Neither agree nor disagree	3.8
Disagree	0.8
Strongly disagree	0.2

* Based on a total of 443 responses

Figure 14. *Response to Scenic Quality Question*



Clearcutting

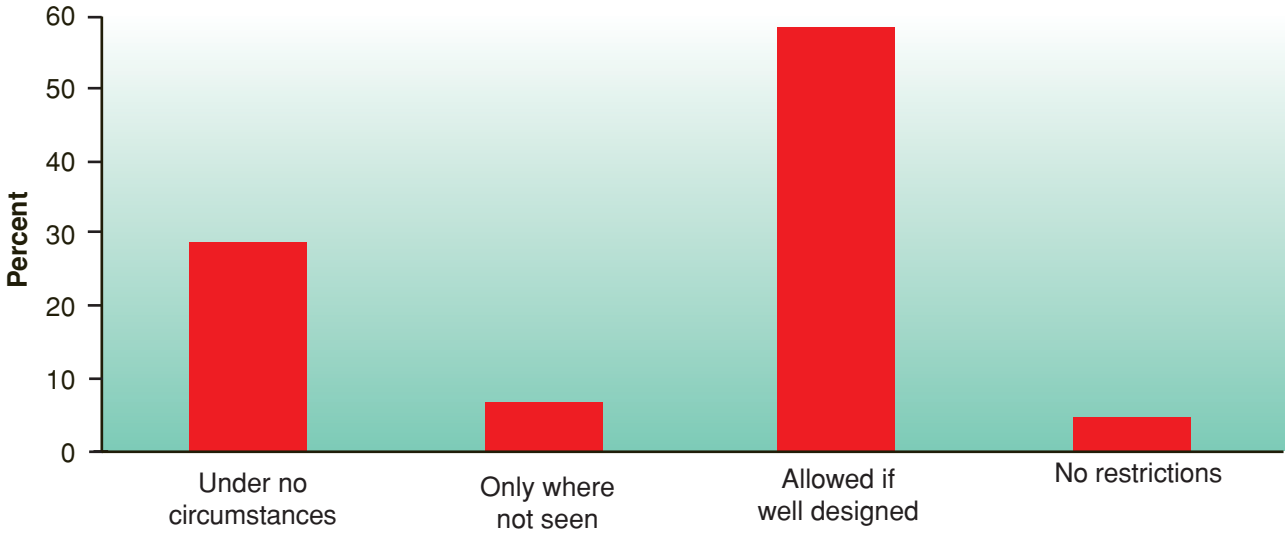
Respondents were asked to complete the statement, "Clearcutting should:" (See Table 16 and Figure 15).

Table 16. *Response to Clearcutting Statement*

Clearcutting should:	Percent*
Not be allowed under any circumstances.	29.0
Only be allowed where it is not seen.	7.2
Be allowed if it is well designed and done carefully.	58.7
Generally have no restrictions placed on it, provided there is adequate replanting.	5.1

* Based on a total of 443 responses

Figure 15. *Response to Clearcutting Statement*



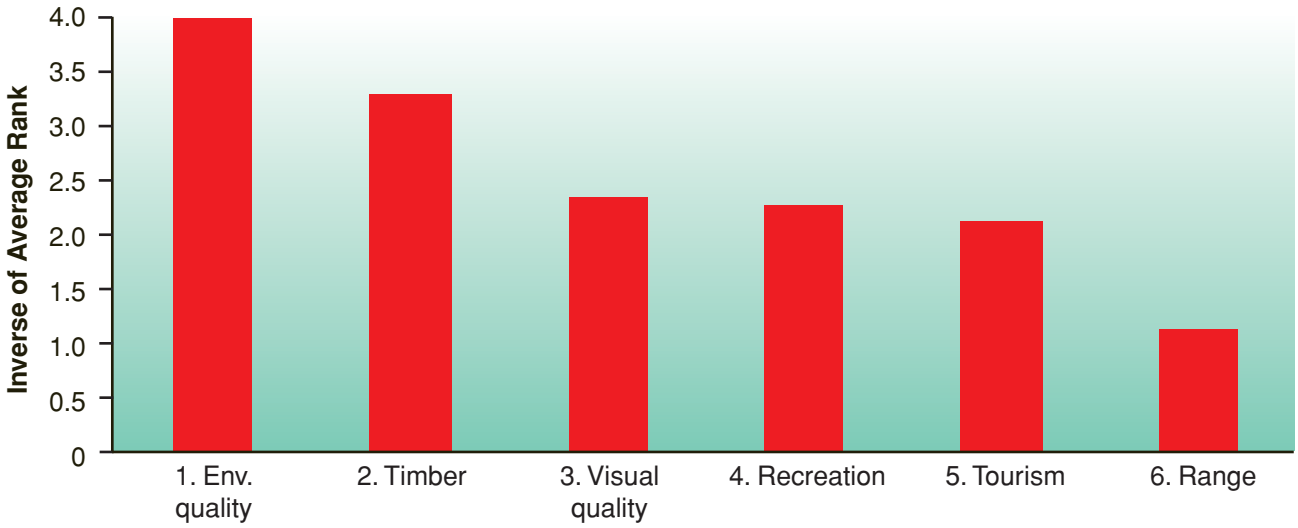
Forest Management Objectives

Respondents were asked to rate 6 forest management objectives from most important (1) to least important (6) (see Table 17 and Figure 16).

Table 17. *Relative importance of each Forest Management objective (Average Rating)*

Forest Management Objective	Importance: (average rating) *1 = most important 6 = least important*	Inverse of Average Rating
1. Environmental quality	2.02	3.98
2. Timber	2.73	3.27
3. Visual Quality	3.67	2.33
4. Recreation	3.73	2.27
5. Tourism	3.88	2.12
6. Range	4.89	1.11

Figure 16. *Average Rating of forest Managment Objectives (inverse)*



Publication # REC028