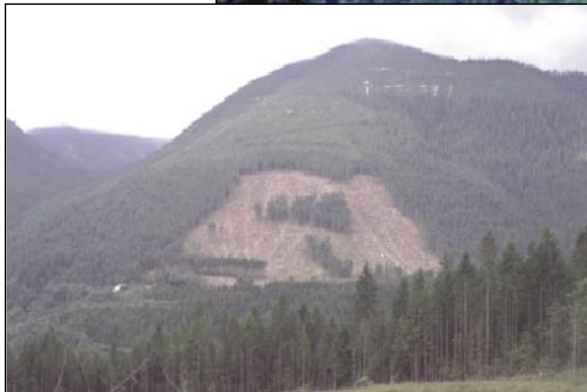
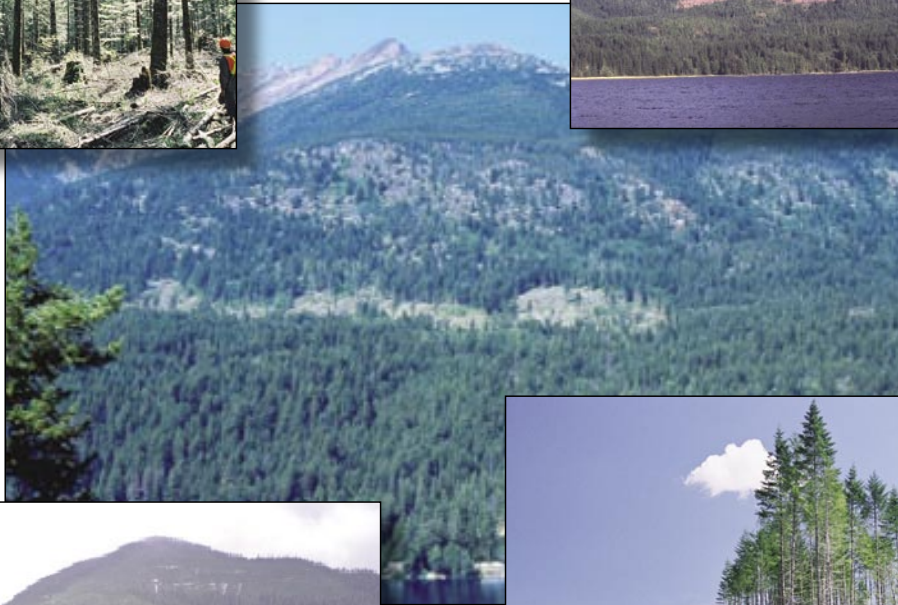




# The Public Response to Harvest Practices in British Columbia at the Landscape and Stand Level



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## Executive Summary

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The Ministry of Forests and Range (MoFR) is responsible for managing forested viewscapes on Crown land—areas visible along major travel corridors, and adjacent to towns, resorts, and recreation areas. To understand and quantify public acceptance of alteration of the forest scenery, we presented photographs of forested scenes to small groups in a survey format. Clearcut harvesting was surveyed in 1996, selection harvesting in 1997, and dispersed and aggregated retention harvesting in 2002. Each survey focused on a particular silvicultural system, and measured acceptance of mid-distance, landscape views.

In 2003, the MoFR undertook a further, integrated survey of the public acceptance of forest alteration. This survey included the full range of silvicultural systems, and included both landscape and in-stand views. Residents in eight British Columbia communities, and passengers on the Queen of the North ferry, were surveyed. They were shown 66 landscape and seven in-stand photographs of post-harvest forested scenes, and asked to rate each photograph according to their acceptance of the scenery. Participants included 714 British Columbia residents and 181

tourists visiting from elsewhere. The in-stand views were also surveyed by 22 executives and 51 foresters. The findings of the survey are:

- People prefer natural forest scenes to scenes modified by timber harvesting.
- There is a strong correlation between the defined Visual Quality Classes used in the MoFR classification system and public acceptance of forest viewscapes alteration.
- Tourists are less accepting of forest harvesting than are British Columbia residents, and the general public is less accepting of forest harvesting than are forestry professionals.
- People prefer the visual impact of selection harvesting to variable retention or clearcutting. People are accepting of harvesting if at least 24% of the trees remain on site.
- At the same scale of alteration, people prefer harvest openings with good visual design.
- Viewing from within the forest stand, people strongly prefer dispersed tree retention to clearcut or patch retention.
- Patch cuts are well received in landscape view but not well received in-stand.

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- District staff in the North Coast District, in particular Matt Lamb-Yorski, who co-ordinated the BCIT co-op students aboard the ferry Queen of the North.
- BC Ferries Operations Manager, Northern Services, Gordon Nettleton and Chief Steward Lorne Campbell, who permitted us to do the survey aboard the Queen of the North.
- BCIT students Gabe Maerov, Kristy Parsons, Kathleen Woodruff, and Leigh Evans, who administered the perception survey on the ferry Queen of the North.
- UVic co-op student Chris Jenson, who administered the survey in seven of eight communities, entered all the data, and carried out preliminary data analyses.
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- Amanda Nemec (International Statistics), who carried out the statistical analysis on public perception survey data and summarized this aspect of the survey.
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- Louise De Montigny, the STEMS co-ordinator.
- Zbigniew Olak, photographer of the STEMS sites.
- All the non-profit groups who participated in this survey (see Appendix 5).
- Gerrard Olivotto, who helped prepare this report to a publishable standard.

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November 2005



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## 1.0 Introduction

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The Ministry of Forests and Range has been conducting public perception surveys since 1989 to examine the public response to the various silvicultural systems being used in British Columbia. In 1994 we examined the public response to clearcutting and determined that percent alteration of a landform was the best predictor of response. As the percent of alteration increased, public acceptance decreased. In 1997, we looked at partial cutting and determined that volume or number of stems removed, by tree height, were the best predictors. As the stand was thinned and the texture of the forest canopy became so broken that the public could see the ground, the public response moved from like to dislike. In 2002, we found that the visual impact of retention cutting could be predicted using a combination of variables—the overall size of the opening, the quality of the block design in perspective view, and the percent of volume removed. Applying good visual design and reducing the volume removed substantially increase public acceptance. In all of these previous studies we looked at each silvicultural system in isolation, only looked at perspective views, and only sampled British Columbia residents.

This study goes beyond the earlier work by looking at the public response to different Visual Quality Classes (VQCs), investigating what people think of different silvicultural treatments at the landscape and site level, and soliciting outside views of our practices.

### 1.1 Objectives of the Study

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The broad objectives for this study were:

- to determine the public response to the three principal silvicultural systems being used in British Columbia across each of the five Visual Quality Classes.

- to examine for the first time in British Columbia what people think of the in-stand conditions of the seven silvicultural treatments carried out in the Sayward Forest STEMS (Silviculture Treatments for Ecosystem Management in the Sayward) project area.

In keeping with the broad objectives above, the specific objectives of this study were:

1. to match the sample group with the socio-demographic statistics for British Columbia as closely as possible
2. to explore the relationship between Visual Quality Class (VQC) and site and stand variables
3. to determine the relationship between public preference and the five Visual Quality Classes
4. to investigate the public response to the three broad silvicultural systems (clearcutting, partial cutting, and variable retention<sup>1</sup>) being used in British Columbia
5. to evaluate the influence of visual design on the Public Acceptance Rating (PAR)
6. to determine the thresholds of acceptance for percent alteration for clearcutting, and volume removed for partial cutting
7. to determine the public response to the in-stand conditions of seven specific silvicultural treatments carried out in the Sayward Forest STEMS project area
8. to compare the Public Acceptance Rating of silvicultural systems at the landscape level versus the stand level.

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1 Variable retention, which is generally broken into aggregated retention and dispersed retention, can include many partial cutting approaches.



## 2.0 Survey Methodology

This study involved a number of steps: selecting and classifying photographs, choosing participants, administering the survey, analyzing the results, and determining public acceptance thresholds.

### 2.1 Survey Delivery

#### 2.1.1 Selecting and classifying photographs

For Part 1 of this public perception survey, we selected a series of colour slides that showed natural and human-altered landscapes. Because one of the objectives was to compare public response to silvicultural systems across the different Visual Quality Classes, a minimum number of photographs were needed in each category to ensure statistical rigour. At the outset we made sure that we had at least 8–10 slides of each silvicultural

system in each Visual Quality Class category except Preservation and Maximum Modification. This produced a pool of about 150 slides. To reduce the number of slides for the slide show, we placed each group of 10 samples on a desk, shuffled them, and then randomly picked up five or six from the pool depending on what was needed. In the end we had 66 slides for the study.

The 66 slides were then randomly picked up and placed in the slide tray to be used for the survey. All site and stand information for each slide was recorded in an attribute table for use in the analysis of this study.

A team of Ministry of Forests and Range (MoFR) visual resource management specialists classified the pool of slides into Visual Quality Classes before the study. The slides that were chosen for the study by silvicultural system and Visual Quality Class (VQC) are described in Table 1.

**Table 1.** Distribution of colour slides by silvicultural system and VQC

Silvicultural system		Visual Quality Class (VQC)					Total
General	Specific	Preservation	Retention	Partial Retention	Modification	Maximum Modification	
Natural	Natural Scene	4					4
Hand Logging	Patch Cut		2	1			3
Partial Cut	Fir Reserve				1		1
	Group Selection			2			2
	Sanitation Cut		1				1
	Seed Tree		1		2	1	4
	Shelterwood	1	2	3	3		9
Variable Retention	Single Tree Selection		2				2
	Aggregated Retention		2	5	6	3	16
	Dispersed Retention			4	1		5
	Patch Cut		1				1
Clearcut	Clearcut		3	4	7	2	16
	Patch Cut		1	1			2
Natural		4					4
Hand Logging			2	1			3
Partial Cut		1	6	5	6	1	19
Variable Retention			3	9	7	3	22
Clearcut			4	5	7	2	18
Total number of slides		5	15	20	20	6	66

For Part 2 of the study, a professional photographer was hired to take representative photographs of the seven STEMS treatments in the Sayward Forest. These photos were reduced to three per page for the survey. The photos were placed in random order on three photo sheets. The order number and silvicultural system treatment are listed in Table 2. The photos can be seen in Appendix 1.

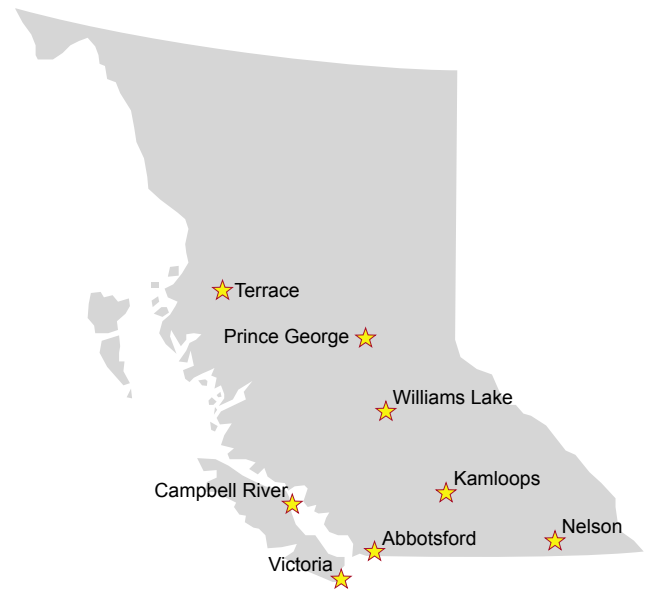
**Table 2.** *STEMS silvicultural treatments*

Order No.	STEMS Treatment
1	Patch Cut
2	Extended Rotation
3	Group Selection
4	Clearcut with Reserves
5	Commercial Thinning
6	Dispersed Retention
7	Aggregated Retention

### 2.1.2 Selecting participants

One of the greatest challenges in all public perception studies is getting participation from non-aligned groups or individuals to avoid bias. For this study the objective was to sample approximately 60–80 people in each of eight communities across the province and about 400 passengers on board the Queen of the North ferry.

Figure 1 shows the locations of communities chosen to represent the different regions of the province and to represent rural versus urban situations: Abbotsford, Campbell River, Kamloops, Nelson, Prince George, Terrace, Victoria, and Williams Lake. Campbell River was specifically targeted to determine how its residents would respond to the STEMS photographs in Part 2. The Queen of the North ferry was chosen as it provided the ideal opportunity to sample people visiting from outside the province. For the community portion of the survey, a list of non-profit organizations in each community was developed. Groups targeted included: service clubs, like the Lions and Rotary; search and rescue groups; seniors' centres; schools/colleges/universities; and professional groups. Initial contact with each group was by phone, at which time they were asked if they



**Figure 1.** *Community locations.*

would be interested in participating in the survey. As an incentive the MoFR offered to donate \$10 to the group for each survey package completed.

The first six or seven groups who signed up were selected for the survey. The phone offer was confirmed by email and a contract was prepared for each group to allow payment for completed forms. In total, 601 respondents were recruited from various not-for-profit organizations in eight communities throughout British Columbia from September to December 2003. Appendix 6 contains a list of the organizations that participated in the study.

To select people on the ferry, initially the study design called for co-op students to approach passengers in predetermined seats on the ferry, and ask them if they wanted to participate in the survey. If the answer was yes, they would be given a meeting time and place for the survey. This approach proved to be ineffective and time-consuming because often there was no one in the selected seats in May and June.

As a result a new approach was developed whereby the public address (PA) system was used to announce the survey, and ask for volunteers.

Only the first 10 people to arrive at the survey location were issued a survey package. People above the 10-person limit were invited to view the slides, but were not given a survey package. Some 294 respondents were recruited on the Queen of the North ferry over the 33 trips made between May and August 2003.

An additional sample of “Foresters” and “Executives” was collected during tours of the STEMS project area.

For analysis, domicile was used to separate ferry patrons into “Tourists” and residents of British Columbia. The latter group was combined with the eight communities to form a combined sample, hereafter referred to as the “Province.”

Table 3 summarizes the number of sample groups and total number of respondents in each of the four respondent categories: Province, Tourists, Executives, and Foresters.

### 2.1.3 Survey delivery

Consistency of delivery is critical to the success of all public perception studies. In all cases we presented a standardized introduction to the survey in a professional and unbiased manner. Before starting, a survey package was handed out to each participant. The survey administrators then introduced themselves and explained that the purpose of the survey was to help the MoFR understand how residents and visitors see and respond to management practices on our forested landscapes. It was then explained that the survey consisted of three parts.

- Part 1: Participants would be shown 66 slides of forested landscapes in British Columbia and would be asked to rate how acceptable they found the visual quality on a seven-point scale (+3 to -3, where +3 = very acceptable, 0 = neutral, and -3 = very unacceptable).

**Table 3.** Number of sample groups (i.e., organizations or ferry trips) and number of respondents classified as Province, Tourists, Executives, or Foresters

Population	(sub-population)	Number of sample groups	Number of respondents
Province	Abbotsford	6	72
	Campbell River	8	72
	Kamloops	4	79
	Nelson	5	76
	Prince George	6	78
	Terrace	5	75
	Victoria	5	74
	Williams Lake	7	75
	Ferry patrons	33	113
Province (total)		76	714
Tourists		30	181
Executives		1	22*
Foresters		2	51*
<b>Total sample size</b>		<b>109</b>	<b>968</b>

\*Note: The Forester and Executive respondents ranked STEMS photos only.

- Part 2: Participants would be asked to rate seven photographs showing the interior conditions of a forest using the same rating scale.
- Part 3: This questionnaire would document their socio-economic data such as age, sex, education level, occupation, and country of origin, so that the survey population could be compared with the 2001 Census profile for British Columbia and Canada.

The survey began with five practice slides (one slide from each of the five Visual Quality Classes), which were shown in random order. These permitted participants to calibrate their rating system and ask questions before tackling the main slide show. No ratings were collected from the practice slides.

Once the administrator was sure that the group was comfortable with the process, the main slide show was started. The slides were projected on a large screen (minimum 1.5 by 1.5 m) in a darkened room. The number of every fifth slide was announced so that participants did not get ahead or fall behind on their rating sheet. On board the Queen of the North, part of the rear cafeteria was cordoned off so that the survey could be administered.

The slides were arranged in the same random order for each survey. Each of the slides was shown for 8–10 seconds, with a prompt before moving to the next slide. To determine whether people rated the slides independently, the order of the slides was reversed for about one in every five groups.

A space for comments was included on the evaluation form so respondents could make notes about each photo.

As mentioned in section 2.1.2, a group of Foresters and Executives was solicited to complete Parts 2 and 3 of the survey. These respondents were given Part 2 of the survey before touring the actual site and were asked to rate the seven STEMS treatments using the same seven-point Likert scale as everyone else.

## 2.2 Statistical Methods

Descriptive statistics were compiled for the 66 forest landscapes evaluated by survey participants. For each silvicultural system and VQC, the number of blocks with a good, medium, or poor design was tabulated, and the sample mean, standard deviation, and sample size (number of blocks with data) were calculated for the following variables: cutblock area (ha), overall alteration of the landscape (% perspective area), stems removed (%), basal area removed (%), and volume removed (%). One-way analysis of variance (ANOVA) and logistic regression analysis were used to investigate the relationship between VQC and two potential predictors: stems removed and volume removed.

Demographic profiles (e.g., number and percentage of respondents by sex, age, and level of education) were constructed for the Province and Tourists samples, and compared graphically with the 2001 Census profiles for British Columbia and Canada.

Frequency distributions (number and percentage) of public acceptance ratings (PARs) were compiled for each slide and respondent group (Province, Tourists, Executives, and Foresters). Average PAR scores (i.e., averaging PAR over respondents for each slide) were compared by silvicultural system and by VQC, and the statistical significance of differences among groups was examined with a one-way ANOVA. In addition, average PAR was graphically related, by silvicultural system, to cutblock design and area, alteration, and volume removed. Acceptance thresholds for alteration and volume removed were determined by fitting (non-linear) regression models and calculating the value where the expected PAR is zero (i.e., where average PAR changes from a positive to negative rating). Finally, PAR means were compared across demographic groups, and ratings for STEMS stands were compared to the average ratings for landscapes assigned to the same silvicultural system (Table 2).

All statistical tabulations and analyses were carried out with SAS. The validity of the analyses depends on the usual ANOVA assumptions—that is, the sample scenes were assumed to have been randomly selected from a well-defined population of landscapes (i.e., silvicultural systems, VQC, block sizes, designs) and were assumed to have been independently evaluated by each respondent (e.g., ratings were assumed to be independent of the order of evaluation).

### 3.0 Survey Results

#### 3.1 Participant Profiles

This section presents the socio-demographic statistics collected from survey respondents and compares these with the socio-demographic characteristics for the provincial population and that of Canada.

Figures 2 through 5 compare the age, sex, education, occupation, and income distribution of survey respondents classified as Province or Tourists with the corresponding 2001 Census profiles for British Columbia and Canada.<sup>2</sup> Response rates were generally high (>97%) for all demographic questions, except questions about occupation and income, where response rates fell to ~92% and ~80%, respectively. The age distribution of survey participants was skewed towards older ages, compared with the corresponding distributions for British Columbia and Canada, with the exception of the 20- to 29-year-old group, which was over-represented among Tourists (Figure 2). Females were somewhat under-represented in the Province sample (Figure 3), while the number of individuals with university degrees was disproportionately large among all survey participants, especially Tourists (Figure 4).

The distribution of occupations for the Province sample resembled that of British Columbia and Canada, although the proportion of respondents with occupations in social sciences, education, government, or primary industry was noticeably

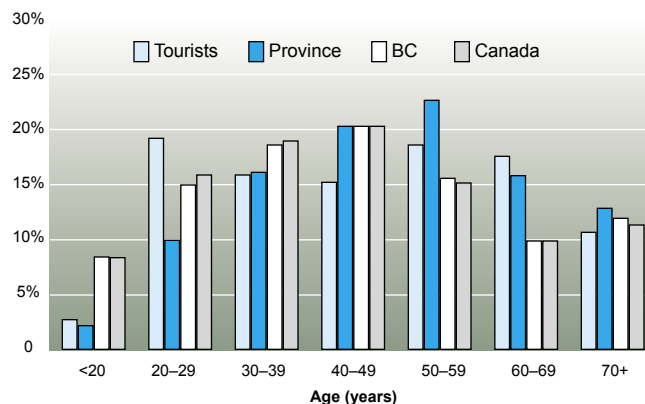


Figure 2. Age of survey respondents.

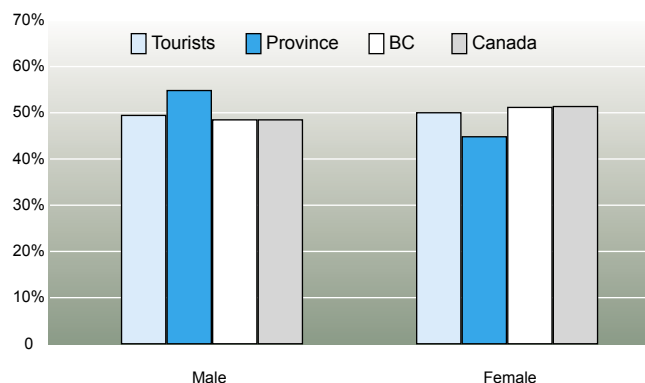


Figure 3. Gender of survey respondents.

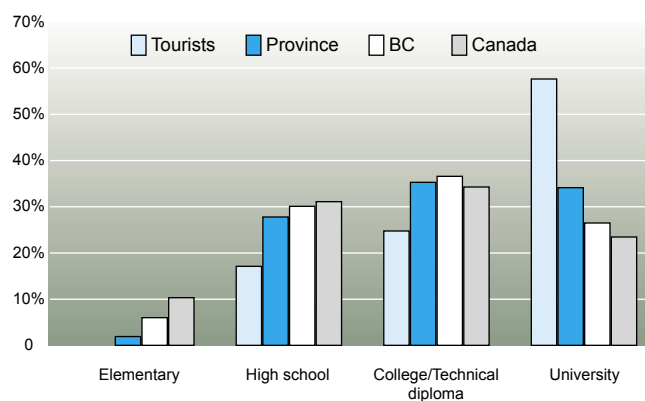


Figure 4. Highest level of education attained by survey respondents 20 years and older.

2 Source: 2001 Census Profile (British Columbia and Canada). 2003. BC Stats, Fall 2003 (revised Jan. 27, 2004). [www.bcstats.gov.bc.ca](http://www.bcstats.gov.bc.ca).

higher, and the proportion in manufacturing, processing, and utilities was lower than the provincial and national averages (Table 4). The distribution of occupations for Tourists showed a substantial departure from the British Columbia and Canada profiles, particularly in the areas of health, social sciences, education, and government. Survey respondents had higher incomes than the overall populations of British Columbia and Canada (Figure 5)—in part, a reflection of the differences in age and education.

Of the 177 Tourists on the Queen of the North that provided socio-demographic information, 29% were from other parts of Canada, 27% were from the United States, 29% were from Europe, and 13% were from Asia (Figure 6).

Upon comparing these numbers to Tourism BC Statistics for the year 2000 we found that our sample included a disproportionate number of Europeans and Asians relative to the normal tourist population visiting British Columbia. The Europeans were primarily from Germany and the United Kingdom.

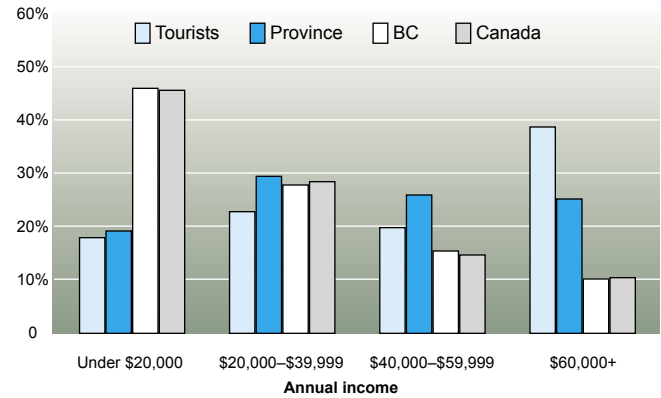


Figure 5. Income of survey respondents.

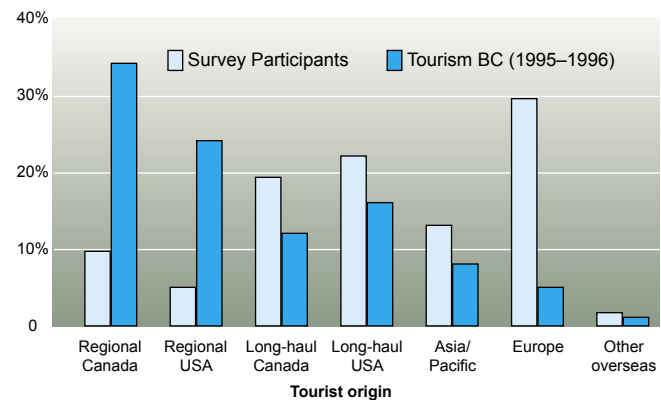


Figure 6. Tourist origins.

Table 4. Occupation of survey respondents

Occupation	Survey participants (number)			Survey participants (%)			2001 Census 15 years and older (%)	
	Province	Tourists	Total	Province	Tourists	Total	BC	Canada
Management	38	11	49	8.8	11.1	9.2	10.8	10.4
Business, finance, and administration	73	7	80	16.9	7.1	15.1	17.6	17.8
Natural and applied sciences	21	8	29	4.9	8.1	5.5	6.1	6.4
Health	18	15	33	4.2	15.2	6.2	5.2	5.2
Social sciences, education, and government	51	18	69	11.8	18.2	13.0	8.0	7.7
Art, culture, recreation, and sport	7	4	11	1.6	4.0	2.1	3.3	2.8
Sales and service	107	14	121	24.8	14.1	22.8	25.6	23.6
Trades, transport, and equipment operators	71	15	86	16.4	15.2	16.2	14.3	14.7
Primary industry	40	7	47	9.3	7.1	8.9	4.2	4.3
Processing, manufacturing, and utilities	6	0	6	1.4	0.0	1.1	4.8	7.0
<b>Sub-total</b>	<b>432</b>	<b>99</b>	<b>531</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
All occupations listed above	432	99	531	64.5	59.3	63.4		
Other occupations, retirees, homemakers, students, volunteers, and unemployed individuals	238	68	306	35.5	40.7	36.6		
<b>Sub-total</b>	<b>670</b>	<b>167</b>	<b>837</b>	<b>100</b>	<b>100</b>	<b>100</b>		
Responses	670	167	837	93.8	92.3	93.5		
No response	44	14	58	6.2	7.7	6.5		
<b>Total</b>	<b>714</b>	<b>181</b>	<b>895</b>	<b>100</b>	<b>100</b>	<b>100</b>		



### 3.2 Relationship between VQC and Site and Stand Variables

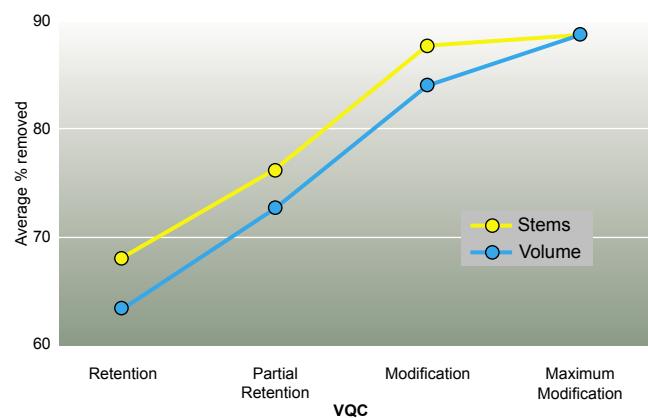
Descriptive data for the 66 forest landscapes in the survey are listed in Appendix 2. Photographs of those landscapes, and their PAR values, are presented in Appendix 7.

Before looking at the public response, the relationship between the assigned VQC and various cutblock site and stand variables were analyzed. Analyses were completed to examine if there was a relationship between block size, percentage alteration, stems removed, basal area, and volume removed relative to VQC. The results of this analysis are presented in Table 5.

There is little correlation between the actual size of a cutblock and VQC. Perspective percentage alteration of the landscape was found to be a good predictor variable and corroborates what previous studies have suggested (i.e., as the level of visible alteration on the landscape increases, there is an upward trend from Retention to Maximum Modification).

One-way ANOVA and logistic regression analysis were used to investigate the relationship between VQC and two potential predictors for partial cutting: stems removed and volume removed. Slide 33 (a partial cut with VQC = Modification) had an unusually small percentage (12.6%) of the stems removed relative to the large (92%) volume removed. When this outlier was omitted the mean percentage of stems removed increased from 81.7% to 87.5% for Modification.

Figure 7 illustrates the upward trend in the mean percentage of stems and volume removed



**Figure 7.** Comparison of VQC by average percentage of stems and volume removed.

**Table 5.** Landscapes summarized by VQC

	Visual Quality Class (VQC)					All VQC
	Preservation	Retention	Partial Retention	Modification	Maximum Modification	
Cutblock area (ha)		30.7 ± 21.0 n = 10	35.3 ± 22.1 n = 13	33.9 ± 17.0 n = 12	34.3 ± 3.6 n = 4	33.6 ± 18.6 n = 39
Alteration (%)		0.39 ± 0.41 n = 7	3.5 ± 2.5 n = 14	11.0 ± 6.7 n = 14	10.9 ± 1.6 n = 5	6.5 ± 6.1 n = 40
Stems removed (%)	n/a	67.9 ± 18.1 n = 6	76.0 ± 13.1 n = 13	81.7 ± 22.9 n = 13	88.6 ± 11.6 n = 4	78.1 ± 18.3 n = 36
Stems removed (%) (omitting Slide 33)		67.9 ± 18.1 n = 6	76.0 ± 13.1 n = 13	87.5 ± 10.0 n = 12	88.6 ± 11.6 n = 4	80.0 ± 14.6 n = 35
Basal area removed (%)		66.7 ± 16.2 n = 4	70.0 ± 18.1 n = 11	86.7 ± 5.1 n = 8	89.9 ± 5.2 n = 3	76.9 ± 16.2 n = 26
Volume removed (%)		63.3 ± 13.4 n = 8	72.6 ± 17.0 n = 15	84.0 ± 8.7 n = 13	88.4 ± 5.5 n = 4	76.0 ± 15.4 n = 40
Total number of landscapes	5	15	20	20	6	66

Note: Table entries are sample mean ± standard deviation and n = number of blocks with data.

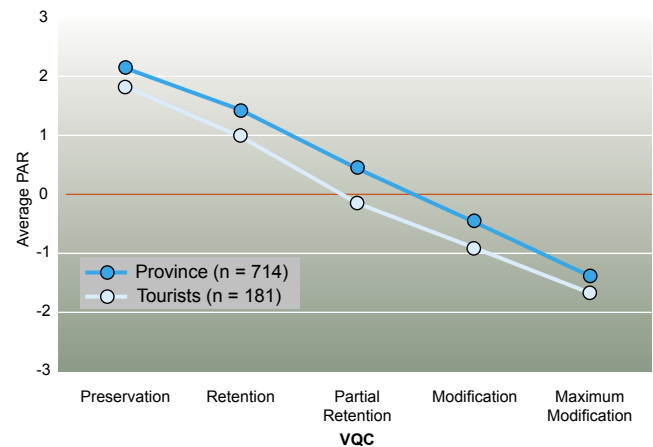
as VQC ranges from Retention to Maximum Modification. Differences between Retention and Partial Retention, and between Modification and Maximum Modification, were not statistically significant for either variable (ANOVA  $p > 0.1$ ; Slide 33 excluded in the case of stems removed), but the difference between Retention/Partial Retention (i.e., the average for the two classes) and Modification/Maximum Modification was highly significant ( $p < 0.003$ ) for both variables. Logistic regression analysis of the data suggests that volume removed is a slightly better individual predictor of VQC than stems removed, and that including both variables does little to improve the predictive power of a model that includes only one of the two predictors.

### 3.3 Public Acceptance Ratings (PARs) for Landscape Scenes

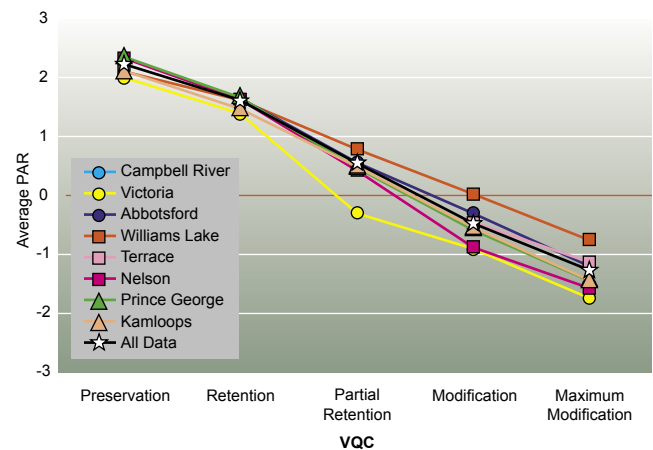
The PAR distribution for each of the 66 forest landscapes is tabulated for the Province in Appendix 3 and for Tourists in Appendix 4. Bar graphs showing the Province PAR rating for each photograph (sorted in order of decreasing average PAR) are included, along with the photos, in Appendix 7. The average PAR for the Province exceeded that for Tourists in all cases except Slide 36, which received a mean PAR of  $-0.55$  from the Province (rank = 51 out of 66) and  $-0.32$  (rank = 36 out of 66) from Tourists—both of which are unusually low scores for a natural scene. Slide 36 shows a Central Coast landscape in which there is a repetition of vegetation and natural peat bogs occurring in horizontal bands on the landscape. Most likely these bands were interpreted as a forest harvesting pattern. This outlier slide was omitted from the data compilations.

#### 3.3.1 PAR and Visual Quality Classes

Figure 8 illustrates that the trend in the Province and Tourists samples is the same. Both groups prefer retained landscapes over modified ones. Figure 9 illustrates that the trend among the various British Columbia communities is also the same.



**Figure 8.** Comparison of average PAR for different Visual Quality Classes by Province and Tourists.



**Figure 9.** Comparison of average PAR for different Visual Quality Classes by community.

#### 3.3.2 PAR and silvicultural systems

Trends in PAR for general and specific silvicultural systems are illustrated in Figures 10 and 11. The Province and Tourists exhibited similar patterns of preference for the different silvicultural systems, although ratings for the Province were, on average, half a PAR point higher than those of Tourists. For both groups, average PAR varied significantly over the full range of (broad) silvicultural systems, although differences between Variable Retention and Clearcut were not discernable. Natural scenes, Hand Logging, and Partial Cuts received favourable overall ratings from the Province, while Tourists rated only the first two systems favourably and were neutral on Partial Cuts. Variable Retention and Clearcut scenes received neutral overall ratings from the Province

and negative ratings from Tourists. In general, both groups had an unfavourable opinion of Aggregated Retention but were more or less neutral about Dispersed Retention.

### 3.3.3 PAR and visual design

Figure 12 illustrates the relationship between average PAR and cutblock design. Poorly designed blocks are less accepted than blocks with medium or good designs, regardless of silvicultural system. Blocks were assigned Poor, Medium, or Good design, depending on how well they subscribe to visual landscape design concepts and principles.

### 3.3.4 Thresholds of acceptance

Average ratings for individual Partial Cuts decreased non-linearly with increasing volume removed. Fitted models describing the relationships for Province and Tourists are illustrated in Figure 13. The thresholds for acceptance are given in the figure (i.e., maximum volume removed for an overall PAR of zero is 87% for the Province and 76% for Tourists). The fitted models for the three main silvicultural systems used in British Columbia are plotted in Figures 13, 14, and 15.

Alteration thresholds were derived in a similar manner for Clearcuts and slides classified as Variable Retention. The clearcut percent alteration threshold for the Province is 2.3% and for Tourists is 1.3%. These numbers are significantly lower than those derived through the 1996 Clearcut study, which found an acceptance level of 6% alteration for a broad provincial sample.

## 3.4 Public Acceptance of STEMS Silvicultural Treatments

Average PAR and descriptive statistics for the STEMS stands are presented in Appendix 5. Figure 16 shows the average ratings of the STEMS within-stand photographs by the Executives, Foresters, Province, and Tourists. The four groups of respondents agreed that the Extended Rotation (natural) stand was very acceptable. Opinions increasingly diverged for those images receiving less favourable ratings, with forestry

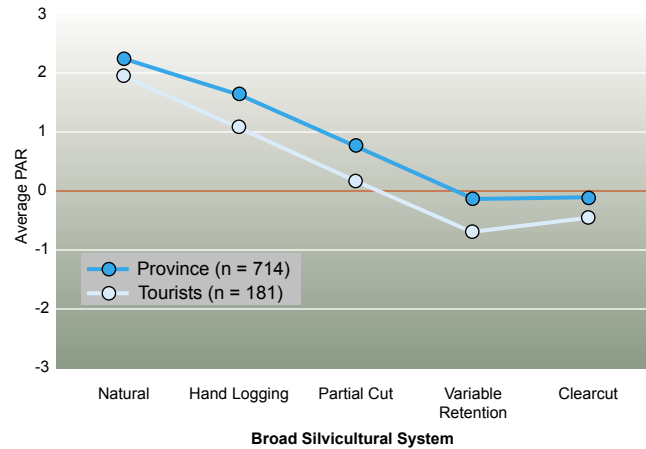


Figure 10. PAR response to broad silvicultural systems in perspective view.

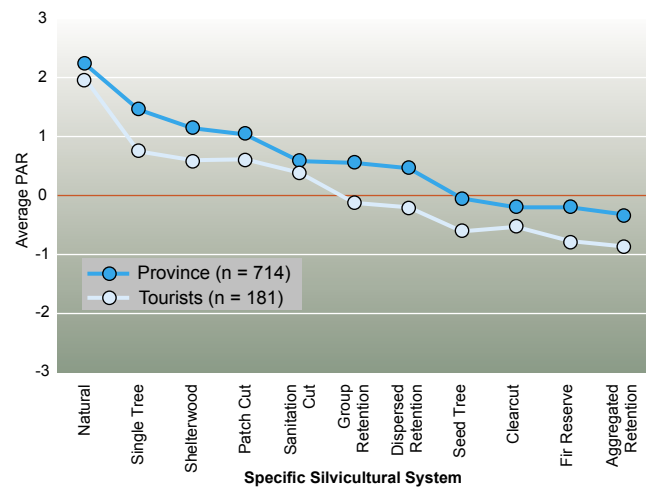


Figure 11. Response to specific silvicultural systems in perspective view, ordered by PAR ranking.

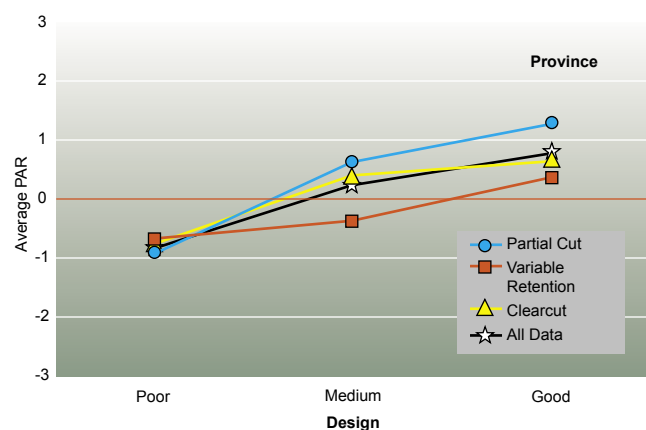
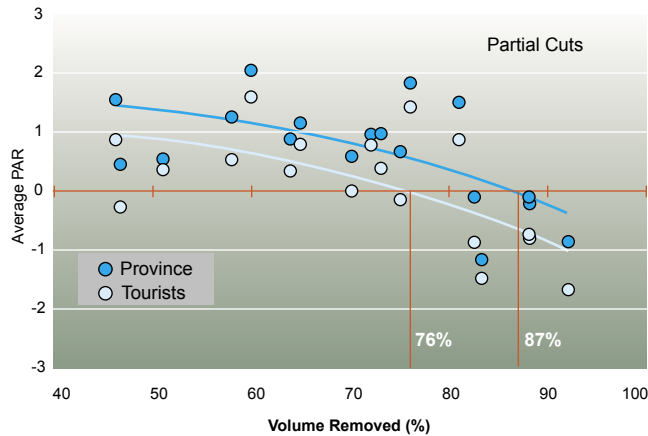
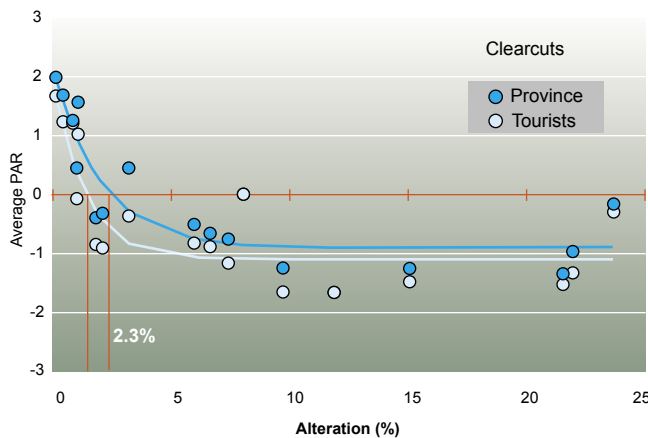


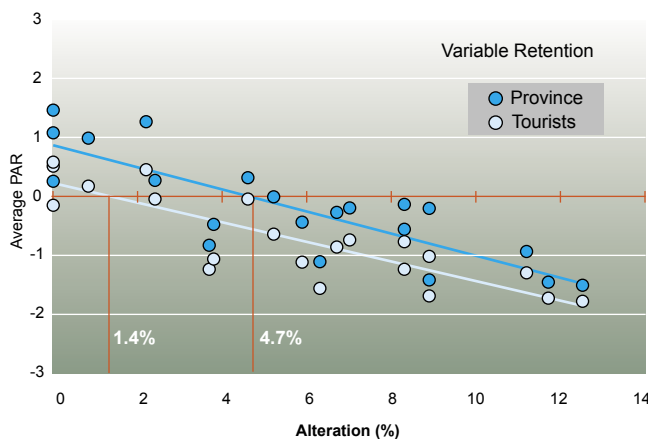
Figure 12. Comparison of average PAR (Province) for cutblocks with different silvicultural systems and good, medium, or poor designs.



**Figure 13.** Thresholds (% volume removed) for acceptance of Partial Cuts.

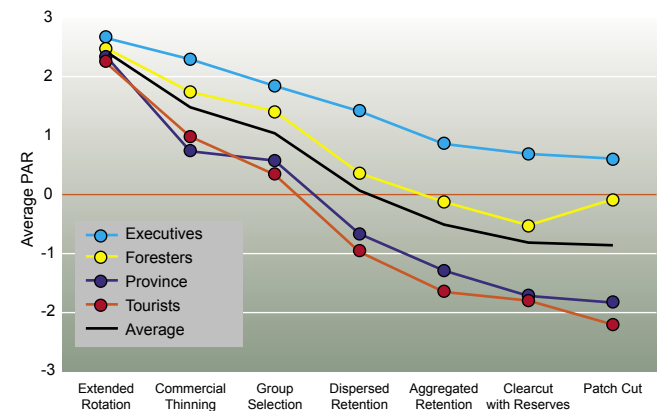


**Figure 14.** Thresholds (% alteration) for acceptance of Clearcuts.



**Figure 15.** Thresholds (% alteration) for acceptance of Variable Retention.

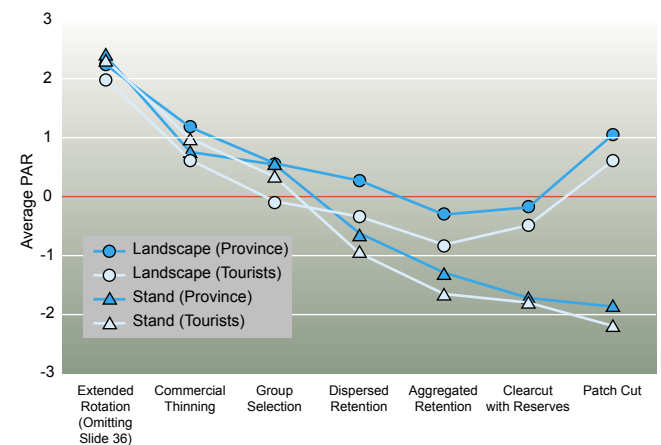
professionals being more accepting of alteration than the general public.



**Figure 16.** Comparison of average ratings of the STEMS stands by Executives, Foresters, Province, and Tourists.

### 3.5 Comparison of Public Acceptance of Silvicultural Systems at the Landscape and Stand Levels

Average ratings for STEMS stands and landscape views of equivalent silvicultural systems (Figure 17) were similar and tended to be positive for Extended Rotation, Commercial Thinning, and Group Selection, but differed for the remaining systems. In-stand views received negative ratings while the corresponding landscape views received considerably more favourable ratings, especially in the case of the Patch Cut.



**Figure 17.** Comparison of average PAR for STEMS stands and landscape views of equivalent silvicultural systems.

## 4.0 Survey Conclusions

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The following conclusions are based on statistical analyses of the data collected.

### Objective

1. to match the sample group with the socio-demographics statistics for British Columbia as closely as possible.

### Conclusion

The population in this study was found, on average, to be slightly older, to be more educated, and to earn higher incomes than the overall populations for British Columbia and Canada. Males were slightly over-represented in the Province sample. The distribution of occupations for the Province sample resembled that of British Columbia and Canada. Based on the findings of past studies it is anticipated that the group sampled will hold slightly more conservative views than the general provincial population. However, it is not anticipated that this will unduly bias the results of this study.

2. to explore the relationship between VQC and site and stand variables.

There is no correlation between the actual size of a cut-block and VQC. Percentage alteration of the landscape in perspective view is a good predictor of VQC in that, as the level of alteration on the landscape increases, there is an upward trend from Retention to Maximum Modification. Volume removed is a slightly better individual predictor of VQC than stems removed.

3. to determine the relationship between PAR and VQCs.

The trend for the Province and Tourists samples were the same. Both groups prefer retained landscapes over modified ones. This held true for communities as well. Tourists in all cases rated each Visual Quality Class lower than did the Province. This response suggests that Tourists on average are less tolerant of forest harvesting activities than are the British Columbia public.

- |  |  |
|--|--|
| 4. to investigate PAR in relation to the broad silvicultural systems being used in British Columbia. | The Province and Tourists exhibited similar patterns of preference for the different silvicultural systems. Natural scenes, Hand Logging, and Partial Cuts received favourable overall ratings from the Province, while Tourists rated only the first two systems favourably and were neutral on the third. Variable Retention and Clearcut scenes received neutral overall ratings from the Province and negative ratings from Tourists. Both groups had an unfavourable opinion of Aggregated Retention but were more or less neutral about Dispersed Retention. Ratings for the Tourists were, on average, half a PAR point lower than those of the Province. |
| 5. to evaluate the influence of visual design on PAR.  | The better the visual design, the greater the PAR. Poorly designed cutblocks tended to be less acceptable than blocks with good or medium design.  |
| 6. to determine the thresholds of acceptance for the three broad silvicultural systems.              | For Partial Cutting (including Dispersed Retention) to achieve an acceptable PAR, 24% or more of the volume must be retained on a block. For Clearcut openings to achieve an acceptable PAR, alterations cannot exceed 2.3% of the landform in perspective view. This is a significantly smaller number than the 6% identified in the 1996 Clearcut study. For Aggregated Retention openings to achieve an acceptable PAR, alterations cannot exceed 4.3% of the landform in perspective view.   |
| 7. to determine public acceptance of in-stand conditions for seven STEMS openings.                   | The extended rotation (natural) stand received the highest overall PAR and was followed in descending order by the Commercial Thinning, Group Selection, Dispersed Retention, Aggregated Retention, Clearcut with Reserve, and Patch Cut. On average, Aggregated Retention, Clearcut with Reserve and Patch Cut were seen as unacceptable.   |
| 8. to compare PAR of silvicultural treatments at the landscape and stand level.                      | Average ratings for STEMS stands and landscape views of equivalent silvicultural systems were similar and tended to be positive for Extended Rotation (natural), Commercial Thinning, and Group Selection, but differed for the remaining systems. Dispersed Retention and Patch Cuts got positive ratings in the landscape view, but were poorly received at the stand level. Aggregated Retention and Clearcut with Reserves received failing grades in both views.  |



## 5.0 Recommendations

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### 5.1 Using the Results

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#### 5.1.1 Visual management system

The survey results illustrate that the established system of Visual Quality Class (VQC) definitions of alteration in perspective view provides a good measure of public acceptance of forest harvesting activity (Figure 8). The survey also found that foresters and executives are generally more tolerant of forest harvesting at the stand level than are the public (Figure 16). In forest planning activities that will affect scenic areas, forest managers should therefore use the existing VQC system rather than appraising expected results using their own perceptions.

#### 5.1.2 Harvest unit design

The survey found that tourists are generally less accepting of forest alteration than are British Columbia residents (Figures 8, 10, and 11). The survey also found that well-designed alterations are more accepted than those with poor design (Figure 12). Therefore, careful consideration should be given to harvest units in scenic areas that visitors to British Columbia will be viewing. Where silviculturally suited, partial cutting and dispersed retention, maintaining at least 24% of the stand (Figure 13) will be accepted by both British Columbia residents and visitors (Figures 10 and 13).

#### 5.1.3 In-stand views of harvesting

The public is generally less accepting of alterations viewed from within the forest stand (Figure 17). In-stand views are analogous to views of roadside harvesting seen by the travelling public. The STEMS results suggest that careful consideration should be given to manage roadsides with screening (no harvest), commercial thinning, or group selection (Figure 16). Dispersed and aggregated retention, clearcuts with reserves, and even small patch cuts, although acceptable in distant views, cause a negative impression on the public

in-stand (Figure 17).

### 5.2 Study Limitations

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The fundamental limitation of any public perception study is that the results depend highly on the question(s) asked and the phrasing used. In this study the following instructions were given to participants.

*Pretend you are travelling down a highway or walking along a trail or viewing the landscapes from this ferry.*

*Rate each of the slides that you will see based on your “enjoyment” of the visual quality. Select (–3) if you find the scenery to be Very Unacceptable, (–2) Moderately Unacceptable and (–1) Slightly Unacceptable. If you are indifferent or find the scenery neither good nor bad then select the midpoint of (0). If you find the scenery enjoyable then select (+1) if it is Slightly Acceptable, (+2) if Moderately Acceptable and (+3) if you find the scenery to be Very Acceptable. Remember the midpoint is Zero.*

The terms “visual quality” and “enjoyment” are open to interpretation. If these terms had been explicitly defined, or different terms used, the results may have been different.

Photographs for the study were carefully chosen to represent specific silvicultural systems and specific VQCs on middle-ground landscapes. However, photography factors such as haze, sharpness, brightness, colour contrast, and presence of water in some photographs may have influenced respondent perception.

Interpretation of the results or use of research findings should take these limitations into account.

### 5.3 Future Work

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The current work described is a valuable start, but the appearance of stands will change markedly as they green up so there is need for continuing evaluation.

## 6.0 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-heights in width, and is designed to manage the area as an even-aged stand.

**Hand Logging:** A method of harvesting timber in which loggers use jacks and small winches to manually move felled timber. Hand logging often occurs along shorelines, and openings are usually small and non-intrusive.

**Natural Disturbance:** Used in the context of this study to describe natural scenes with no human disturbances. Some scenes contained natural disturbances like slide tracks.

**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, clearcutting with reserves, and retention.

**Percentage Alteration:** The scale of human alteration to the landscape, including cutblocks, expressed as a percentage of the perspective view of a landform or the total scene.

**Public Acceptance Rating (PAR):** A measure of the public and tourists' "acceptance" of visual quality in this study.

**Retention System:** A silvicultural system that is designed to retain individual trees or groups of trees to maintain structural diversity over the area of the cutblock for at least one rotation, and leave more than half the total area of the cutblock within one tree-height from the base of a tree or group of trees, whether or not the tree or group of trees is inside the cutblock.

**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 that may be viewed and mapped from one or more viewpoints and that has inherent scenic qualities and/or aesthetic values as determined by those who view it.

**Visual Landscape 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 resource management process.

**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 Class (VQC):** A classification that refers to the character and/or condition of the visual resource and is described using the same terminology as Visual Quality Objectives.

**Visual Quality Objective (VQO):** A resource management objective established under the Government Actions Regulation that reflects the desired level of visual quality based on the physical characteristics and social concern for the area.

The specific Visual Quality Classes are defined as follows:

- **Preservation:** consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, is (i) very small in scale, and (ii) not easily distinguishable from the pre-harvest landscape;
- **Retention:** consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, is (i) difficult to see, (ii) small in scale, and (iii) natural in appearance;
- **Partial Retention:** consisting of an altered forest landscape in which the alteration, when assessed from a significant viewpoint, is (i) easy to see, (ii) small to medium in scale, and (iii) natural and not rectilinear or geometric in shape;

- **Modification:** consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, (i) is very easy to see, and (ii) is
  - (A) large in scale and natural in its appearance, or
  - (B) small to medium in scale but with some angular characteristics;
- **Maximum Modification:** consisting of an altered forest landscape in which the alteration, when assessed from a significant public viewpoint, (i) is very easy to see, and (ii) is
  - (A) very large in scale,
  - (B) rectilinear and geometric in shape, or
  - (C) both.

**Visual Resource:** The quality of the environment as perceived through the visual sense only.

**Visual Resource 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 rangelands.

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

**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.

## 7.0 References

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## Appendix 1. Public Perception Survey response form and questionnaire

### Part 1 – Photography Survey

For each of the following slides please rate how acceptable/unacceptable you find the visual quality. Rate each of the scenes on a scale from –3 (which is Very Unacceptable) to +3 (which is Very Acceptable). The mid-point is 0. Next to each line on your response sheet there is a blank space where you can write a comment, word or phrase to describe what influenced your rating of each slide. Repeating phrases or words is okay; if nothing comes to mind, then just leave this space blank.

*FOR THE PURPOSE OF THIS SURVEY, VISUAL QUALITY CAN BE CONSIDERED THE ATTRACTIVENESS OF THE SCENERY AS IT WOULD AFFECT YOUR ENJOYMENT OF IT.*

SLIDE #	Very Unacceptable	Neutral					Very Acceptable	COMMENTS
1	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
2	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
3	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
4	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
5	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
6	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
7	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
8	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
9	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
10	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
11	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
12	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
13	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
14	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
15	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
16	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
17	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
18	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
19	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	
20	○ -3	○ -2	○ -1	○ 0	○ +1	○ +2	○ +3	



SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
21				
22				
23				
24				
25				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
26				
27				
28				
29				
30				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
31				
32				
33				
34				
35				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
36				
37				
38				
39				
40				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
41				
42				
43				
44				
45				

SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
46				
47				
48				
49				
50				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
51				
52				
53				
54				
55				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
56				
57				
58				
59				
60				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
61				
62				
63				
64				
65				
SLIDE #	Very Unacceptable	Neutral	Very Acceptable	COMMENTS
66				
67				
68				
69				
70				

Part 2 – Assessing Interior Forest Scenes

The following pictures show a variety of interior forest scenes. Please rate how acceptable/unacceptable you find each scene by *circling the rating which best describes your feelings*. Rate each of the scenes on a scale from +3 (Very Acceptable) to -3 (Very Unacceptable). The mid-point is 0. Below each photograph there is a blank space where you can write a comment, word or phrase to describe what influenced your rating of each picture. Repeating phrases or words is okay, and if nothing comes to mind, then just leave this space blank.



- +3 Very Acceptable
- +2
- +1
- 0- Neutral
- 1
- 2
- 3 Very Unacceptable

COMMENTS



- +3 Very Acceptable
- +2
- +1
- 0- Neutral
- 1
- 2
- 3 Very Unacceptable

COMMENTS



+3 Very Acceptable  
 +2  
 +1  
 -0- Neutral  
 -1  
 -2  
 -3 Very Unacceptable

COMMENTS

---



+3 Very Acceptable  
 +2  
 +1  
 -0- Neutral  
 -1  
 -2  
 -3 Very Unacceptable

COMMENTS

---



+3 Very Acceptable  
 +2  
 +1  
 -0- Neutral  
 -1  
 -2  
 -3 Very Unacceptable

COMMENTS

---



- +3 Very Acceptable
- +2
- +1
- 0- Neutral
- 1
- 2
- 3 Very Unacceptable

COMMENTS



- +3 Very Acceptable
- +2
- +1
- 0- Neutral
- 1
- 2
- 3 Very Unacceptable

COMMENTS



### Part 3 – Demographic Information

Please take a few minutes to fill out this questionnaire. We need this information so that we can compare responses from different groups. All answers will be kept confidential and anonymous.

1. What is your Age?  
☐ Less than 20   ☐ 20-29   ☐ 30-39   ☐ 40-49   ☐ 50-59   ☐ 60-69   ☐ 70 Plus
2. Are you?  
☐ Male   ☐ Female
3. What is the highest level of education that you have attained?  
 Check the highest level.  
☐ Elementary   ☐ University - Bachelors  
☐ High School   ☐ University - Masters/PhD  
☐ College/Technical Diploma
4. Where are you from?  
☐ British Columbia  
☐ Other Canadian Province \_\_\_\_\_  
☐ USA (List State) \_\_\_\_\_  
☐ United Kingdom  
☐ Europe (List Country) \_\_\_\_\_  
☐ Australia  
☐ Other \_\_\_\_\_
5. Where do you live? Place Name \_\_\_\_\_  
☐ Rural Area   less than 2500 people.  
☐ Town   2500 – 24,999  
☐ City   25,000 – 249,999  
☐ Large City   250,000 or more people
6. What is your occupation? \_\_\_\_\_
7. What is your total annual income? (Optional)  
☐ Less than \$20,000   ☐ \$60,000 to \$79,999  
☐ \$20,000 to 39,999   ☐ \$80,000 or over  
☐ \$40,000 to \$59,999

**Thank you for taking time to participate in this survey.**



## Appendix 2. Descriptive data and PAR (means and ranks) for 66 forest landscapes

(Slides in order of increasing mean PAR for Province)

Slide	District	Block Area (ha)	Silvicultural System (general)	Silvicultural System (specific)	VQC	Design	Alteration (%)	Stems removed (%)	Basal area removed (%)	Volume removed (%)	Province			Tourists			Average	
											Mean PAR	Rank	n	Mean PAR	Rank	n	Mean PAR	Rank
20	DIC		N	N	P	-----					2.42	1	712	2.39	1	180	2.41	1
65	DCS		N	N	P	-----					2.19	2	711	1.93	2	181	2.06	2
2	DSI		N	N	P	-----					2.12	3	703	1.59	6	179	1.86	4
62	DOS	27	PC	SW	R	G		80.0	66.0	60.0	2.08	4	709	1.63	5	178	1.85	5
30	DCR		HL	PC	R	G					2.05	5	712	1.78	3	176	1.91	3
6	DHW		CC	CC	R	M	0.0				1.97	6	706	1.64	4	180	1.81	6
26	DAB	49.8	PC	ST	R	G				76.0	1.86	7	710	1.46	7	181	1.66	7
60	DIC		HL	PC	R	G					1.84	8	711	1.28	9	179	1.56	8
59	DOS		PC	SW	P	G					1.81	9	710	1.30	8	181	1.56	9
63	DHW		CC	CC	R	M	0.3				1.64	10	710	1.22	10	179	1.43	10
4	DKA	21.4	PC	SE	R	G		74.8		46.3	1.59	11	706	0.93	13	178	1.26	12
49	DSI		CC	CC	R	G	0.9				1.56	12	710	1.00	12	181	1.28	11
16	DAB	21	PC	SW	PR	M		81.9	79.0	81.0	1.54	13	709	0.86	14	177	1.20	13
66	DSI	18.4	VR	DR	PR	G	0.0	71.7	61.2	64.3	1.49	14	705	0.55	19	176	1.02	15
48	DOS	33.2	PC	SE	R	G		42.8	54.0	58.0	1.28	15	711	0.58	18	179	0.93	17
5	DKA		VR	AR	PR	G	2.2	93.9		92.9	1.27	16	710	0.46	20	177	0.86	19
64	DSI	9	CC	PC	R	G	0.7				1.23	17	706	1.15	11	180	1.19	14
55	DIC		HL	PC	PR	M					1.18	18	712	0.33	24	181	0.75	21
18	DKA	24.8	PC	SW	R	G		67.8	57.0	65.0	1.18	19	707	0.82	15	181	1.00	16
1	DSI	16.5	VR	AR	R	G	0.0			62.0	1.10	20	705	0.60	17	178	0.85	20
50	DAB	33.4	VR	AR	R	G	0.8	91.0	89.7	88.2	1.00	21	712	0.16	25	179	0.58	24
37	DHW	53.5	PC	SW	M	M		67.0		72.0	1.00	22	712	0.80	16	178	0.90	18
13	DAB	14	PC	SW	PR	M		87.0	76.0	73.0	0.99	23	712	0.39	21	181	0.69	22
61	DCS	83.1	VR	DR	PR	G		66.6	52.5	56.2	0.99	24	711	0.15	26	181	0.57	25
41	DOS	37.7	PC	SW	M	G		85.8		64.0	0.91	25	711	0.37	23	178	0.64	23
25	DOS	33.9	PC	SW	PR	M		73.8		75.0	0.69	26	712	-0.12	32	180	0.28	28
10	DSI		PC	GS	PR	G		74.4	73.8	70.0	0.61	27	709	0.02	27	179	0.31	27
12	DRM	80	PC	SC	R	G		51.0		51.0	0.56	28	708	0.39	22	180	0.48	26
28	USA	23.6	PC	GS	PR	G	0.9	55.1	47.9	46.8	0.47	29	710	-0.24	34	179	0.12	32
15	DSI		CC	CC	PR	M	0.9				0.43	30	711	-0.08	31	179	0.18	29
17	DCS		CC	CC	PR	G	3.1				0.43	31	707	-0.38	37	180	0.02	34
9	DSI	21.8	VR	AR	PR	G	4.6			86.7	0.32	32	705	0.00	28	180	0.16	30
27	DCR	27.2	VR	DR	PR	G	2.4	75.9	82.9	81.0	0.28	33	711	-0.04	30	180	0.12	31
52	DSI	11.8	VR	PC	R	G	0.0				0.27	34	710	-0.12	33	179	0.07	33
39	DSI	24.5	VR	AR	PR	M	5.2			86.0	-0.01	35	713	-0.62	38	176	-0.31	37
43	DKM		CC	CC	PR	M	8.0				-0.02	36	705	-0.03	29	179	-0.02	35
35	DAB	22	PC	ST	M	M		96.0	88.0	88.0	-0.07	37	711	-0.71	39	180	-0.39	38
53	DHW	11.9	PC	SW	M	M		93.5		82.5	-0.08	38	710	-0.85	45	181	-0.47	42
31	DKL	41.9	VR	DR	M	P	8.3	96.1	92.0	91.3	-0.11	39	712	-0.76	41	177	-0.44	39
3	DCR	40	VR	AR	M	P	8.9	76.7	80.3	80.3	-0.18	40	701	-1.00	49	177	-0.59	45
23	DKM		CC	CC	M	P	23.6				-0.18	41	705	-0.32	35	180	-0.25	36
22	DCR	61.3	VR	AR	PR	G	7.0	77.3	92.0	85.2	-0.18	42	709	-0.73	40	180	-0.46	41
24	DOS	30	PC	FR	M	M		96.0		88.0	-0.19	43	712	-0.78	42	180	-0.48	43
21	DKL	72.2	VR	DR	PR	G	6.7	91.2	74.0	64.1	-0.26	44	711	-0.84	44	179	-0.55	44
56	USA	29.9	CC	PC	PR	P	2.0	50.8	37.2	34.4	-0.32	45	710	-0.93	48	181	-0.63	46
44	DKA		CC	CC	PR	P	1.7				-0.41	46	710	-0.88	46	179	-0.64	47
38	DCR	34	VR	AR	M	G	5.9	94.2	87.9	89.9	-0.41	47	712	-1.09	51	180	-0.75	50
46	DCR	28	VR	AR	PR	G	3.8	88.5	93.2	93.1	-0.47	48	711	-1.04	50	181	-0.75	49
45	DSA		CC	CC	M	P	5.9				-0.53	49	710	-0.82	43	180	-0.67	48
40	DCR	15.7	VR	AR	M	P	8.3	95.7	95.4	96.2	-0.54	50	707	-1.21	54	179	-0.87	52
36	DNC		N	N	P	-----					-0.55	51	710	-0.32	36	179	-0.44	40
32	DSI		CC	CC	M	M	6.5				-0.69	52	712	-0.89	47	179	-0.79	51
7	DCR		CC	CC	M	P	7.3				-0.77	53	704	-1.15	52	178	-0.96	53
29	DCR	30.6	VR	AR	M	P	3.7	89.8	82.8	82.0	-0.81	54	709	-1.20	53	180	-1.01	54
33	DOS		PC	ST	M	P		12.6		92.0	-0.84	55	708	-1.64	61	180	-1.24	57
58	DCR	72	VR	AR	M	M	11.2	73.7	84.4	82.0	-0.94	56	712	-1.29	55	181	-1.11	55
14	DAB		CC	CC	M	G	21.9				-0.98	57	712	-1.34	56	181	-1.16	56
47	CWK	17.9	VR	AR	M	P	6.3	85.1	82.9	83.7	-1.08	58	712	-1.54	60	181	-1.31	59
51	DHW	36.4	PC	ST	MM	P		72.0		83.3	-1.16	59	712	-1.45	57	177	-1.30	58
8	RSI		CC	CC	M	M	15.0				-1.26	60	711	-1.50	58	179	-1.38	60
57	DKM		CC	CC	MM	P	9.6				-1.27	61	712	-1.67	62	181	-1.47	62
11	DSI		CC	CC	M	P	21.5				-1.36	62	708	-1.51	59	180	-1.44	61
19	DCR	35.4	VR	AR	MM	G	8.9	90.6	84.9	84.9	-1.39	63	712	-1.68	63.5	181	-1.54	63
42	DCR	36.3	VR	AR	MM	P	11.7	98.6	95.2	95.4	-1.44	64	711	-1.69	65	179	-1.56	64
34	DCK	28.9	VR	AR	MM	P	12.5	93.2	89.5	90.1	-1.49	65	711	-1.76	66	180	-1.62	65
54	DKM		CC	CC	MM	P	11.8				-1.67	66	713	-1.68	63.5	181	-1.67	66

## Appendix 3. PAR distributions for 66 forest landscapes: Province

(Slides in order of decreasing mean PAR)

Slide	Number of respondents PAR								Number of respondents PAR								Mean	Rank
	-3	-2	-1	0	1	2	3	Total	-3	-2	-1	0	1	2	3	Total		
20	6	5	7	42	37	123	492	712	0.8	0.7	1.0	5.9	5.2	17.3	69.1	100	2.42	1
65	3	2	16	41	78	208	363	711	0.4	0.3	2.3	5.8	11.0	29.3	51.1	100	2.19	2
2	5	9	22	47	70	176	374	703	0.7	1.3	3.1	6.7	10.0	25.0	53.2	100	2.12	3
62	2	2	19	57	90	206	333	709	0.3	0.3	2.7	8.0	12.7	29.1	47.0	100	2.08	4
30	5	5	25	42	89	220	326	712	0.7	0.7	3.5	5.9	12.5	30.9	45.8	100	2.05	5
6	10	9	22	47	102	192	324	706	1.4	1.3	3.1	6.7	14.4	27.2	45.9	100	1.97	6
26	6	10	31	68	91	211	293	710	0.8	1.4	4.4	9.6	12.8	29.7	41.3	100	1.86	7
60	6	6	26	67	105	243	258	711	0.8	0.8	3.7	9.4	14.8	34.2	36.3	100	1.84	8
59	6	9	23	65	120	237	250	710	0.8	1.3	3.2	9.2	16.9	33.4	35.2	100	1.81	9
63	1	5	39	72	143	276	174	710	0.1	0.7	5.5	10.1	20.1	38.9	24.5	100	1.64	10
4	3	9	30	105	133	234	192	706	0.4	1.3	4.2	14.9	18.8	33.1	27.2	100	1.59	11
49	6	11	42	69	157	239	186	710	0.8	1.5	5.9	9.7	22.1	33.7	26.2	100	1.56	12
16	5	10	45	93	139	215	202	709	0.7	1.4	6.3	13.1	19.6	30.3	28.5	100	1.54	13
66	4	11	43	70	170	263	144	705	0.6	1.6	6.1	9.9	24.1	37.3	20.4	100	1.49	14
48	4	20	61	100	165	227	134	711	0.6	2.8	8.6	14.1	23.2	31.9	18.8	100	1.28	15
5	7	17	54	129	151	197	155	710	1.0	2.4	7.6	18.2	21.3	27.7	21.8	100	1.27	16
64	17	30	49	104	135	222	149	706	2.4	4.2	6.9	14.7	19.1	31.4	21.1	100	1.23	17
55	28	32	54	101	121	205	171	712	3.9	4.5	7.6	14.2	17.0	28.8	24.0	100	1.18	18
18	11	14	55	122	181	202	122	707	1.6	2.0	7.8	17.3	25.6	28.6	17.3	100	1.18	19
1	12	33	87	80	165	183	145	705	1.7	4.7	12.3	11.3	23.4	26.0	20.6	100	1.10	20
50	6	23	90	108	196	197	92	712	0.8	3.2	12.6	15.2	27.5	27.7	12.9	100	1.00	21
37	14	42	77	109	162	173	135	712	2.0	5.9	10.8	15.3	22.8	24.3	19.0	100	1.00	22
13	5	25	78	132	193	184	95	712	0.7	3.5	11.0	18.5	27.1	25.8	13.3	100	0.99	23
61	11	36	82	105	180	182	115	711	1.5	5.1	11.5	14.8	25.3	25.6	16.2	100	0.99	24
41	7	20	87	139	199	179	80	711	1.0	2.8	12.2	19.5	28.0	25.2	11.3	100	0.91	25
25	11	35	107	143	203	142	71	712	1.5	4.9	15.0	20.1	28.5	19.9	10.0	100	0.69	26
10	39	55	111	104	136	160	104	709	5.5	7.8	15.7	14.7	19.2	22.6	14.7	100	0.61	27
12	13	65	108	141	162	144	75	708	1.8	9.2	15.3	19.9	22.9	20.3	10.6	100	0.56	28
28	14	48	124	155	187	137	45	710	2.0	6.8	17.5	21.8	26.3	19.3	6.3	100	0.47	29
15	21	61	136	123	175	132	63	711	3.0	8.6	19.1	17.3	24.6	18.6	8.9	100	0.43	30
17	42	57	115	118	157	154	64	707	5.9	8.1	16.3	16.7	22.2	21.8	9.1	100	0.43	31
9	27	77	120	135	167	120	59	705	3.8	10.9	17.0	19.1	23.7	17.0	8.4	100	0.32	32
27	37	71	130	123	166	137	47	711	5.2	10.0	18.3	17.3	23.3	19.3	6.6	100	0.28	33
52	37	61	119	169	151	128	45	710	5.2	8.6	16.8	23.8	21.3	18.0	6.3	100	0.27	34
39	40	88	148	155	157	95	30	713	5.6	12.3	20.8	21.7	22.0	13.3	4.2	100	-0.01	35
43	57	97	147	120	127	97	60	705	8.1	13.8	20.9	17.0	18.0	13.8	8.5	100	-0.02	36
35	29	103	168	137	171	72	31	711	4.1	14.5	23.6	19.3	24.1	10.1	4.4	100	-0.07	37
53	41	107	146	137	162	89	28	710	5.8	15.1	20.6	19.3	22.8	12.5	3.9	100	-0.08	38
31	43	106	165	130	143	92	33	712	6.0	14.9	23.2	18.3	20.1	12.9	4.6	100	-0.11	39
3	54	91	180	118	138	97	23	701	7.7	13.0	25.7	16.8	19.7	13.8	3.3	100	-0.18	40
23	86	110	151	93	107	77	81	705	12.2	15.6	21.4	13.2	15.2	10.9	11.5	100	-0.18	41
22	37	109	170	137	163	72	21	709	5.2	15.4	24.0	19.3	23.0	10.2	3.0	100	-0.18	42
24	33	112	181	138	147	79	22	712	4.6	15.7	25.4	19.4	20.6	11.1	3.1	100	-0.19	43
21	61	112	155	131	149	83	20	711	8.6	15.8	21.8	18.4	21.0	11.7	2.8	100	-0.26	44
56	44	111	199	139	134	60	23	710	6.2	15.6	28.0	19.6	18.9	8.5	3.2	100	-0.32	45
44	60	134	174	128	119	71	24	710	8.5	18.9	24.5	18.0	16.8	10.0	3.4	100	-0.41	46
38	43	139	198	120	133	58	21	712	6.0	19.5	27.8	16.9	18.7	8.1	2.9	100	-0.41	47
46	52	129	196	134	135	51	14	711	7.3	18.1	27.6	18.8	19.0	7.2	2.0	100	-0.47	48
45	69	160	165	110	121	58	27	710	9.7	22.5	23.2	15.5	17.0	8.2	3.8	100	-0.53	49
40	72	134	184	124	119	52	22	707	10.2	19.0	26.0	17.5	16.8	7.4	3.1	100	-0.54	50
36	158	107	104	112	107	73	49	710	22.3	15.1	14.6	15.8	15.1	10.3	6.9	100	-0.55	51
32	107	159	168	85	97	69	27	712	15.0	22.3	23.6	11.9	13.6	9.7	3.8	100	-0.69	52
7	133	149	152	76	104	66	24	704	18.9	21.2	21.6	10.8	14.8	9.4	3.4	100	-0.77	53
29	106	154	189	94	109	40	17	709	15.0	21.7	26.7	13.3	15.4	5.6	2.4	100	-0.81	54
33	113	149	179	114	103	35	15	708	16.0	21.0	25.3	16.1	14.5	4.9	2.1	100	-0.84	55
58	114	183	175	103	73	48	16	712	16.0	25.7	24.6	14.5	10.3	6.7	2.2	100	-0.94	56
14	151	162	157	79	103	45	15	712	21.2	22.8	22.1	11.1	14.5	6.3	2.1	100	-0.98	57
47	141	183	178	88	66	37	19	712	19.8	25.7	25.0	12.4	9.3	5.2	2.7	100	-1.08	58
51	163	167	167	99	77	31	8	712	22.9	23.5	23.5	13.9	10.8	4.4	1.1	100	-1.16	59
8	217	159	127	72	83	41	12	711	30.5	22.4	17.9	10.1	11.7	5.8	1.7	100	-1.26	60
57	183	177	163	75	73	33	8	712	25.7	24.9	22.9	10.5	10.3	4.6	1.1	100	-1.27	61
11	235	156	130	73	65	30	19	708	33.2	22.0	18.4	10.3	9.2	4.2	2.7	100	-1.36	62
19	231	185	116	66	59	35	20	712	32.4	26.0	16.3	9.3	8.3	4.9	2.8	100	-1.39	63
42	227	191	119	71	65	22	16	711	31.9	26.9	16.7	10.0	9.1	3.1	2.3	100	-1.44	64
34	247	165	126	85	48	27	13	711	34.7	23.2	17.7	12.0	6.8	3.8	1.8	100	-1.49	65
54	327	150	85	46	54	30	21	713	45.9	21.0	11.9	6.5	7.6	4.2	2.9	100	-1.67	66

## Appendix 4. PAR distributions for 66 forest landscapes: Tourists

(Slides in order of decreasing mean PAR)

Slide	Number of respondents PAR								Number of respondents PAR								Mean	Rank
	-3	-2	-1	0	1	2	3	Total	-3	-2	-1	0	1	2	3	Total		
20	1	1	0	9	12	47	110	180	0.6	0.6	0.0	5.0	6.7	26.1	61.1	100	2.39	1
65	0	2	7	15	30	51	76	181	0.0	1.1	3.9	8.3	16.6	28.2	42.0	100	1.93	2
30	7	1	5	14	29	48	72	176	4.0	0.6	2.8	8.0	16.5	27.3	40.9	100	1.78	3
6	3	4	11	15	32	53	62	180	1.7	2.2	6.1	8.3	17.8	29.4	34.4	100	1.64	4
62	4	2	7	18	40	48	59	178	2.2	1.1	3.9	10.1	22.5	27.0	33.1	100	1.63	5
2	5	7	8	19	30	38	72	179	2.8	3.9	4.5	10.6	16.8	21.2	40.2	100	1.59	6
26	1	7	6	21	43	64	39	181	0.6	3.9	3.3	11.6	23.8	35.4	21.5	100	1.46	7
59	2	2	15	27	47	50	38	181	1.1	1.1	8.3	14.9	26.0	27.6	21.0	100	1.30	8
60	1	5	14	33	41	40	45	179	0.6	2.8	7.8	18.4	22.9	22.3	25.1	100	1.28	9
63	1	3	12	36	40	61	26	179	0.6	1.7	6.7	20.1	22.3	34.1	14.5	100	1.22	10
64	4	9	14	22	42	58	31	180	2.2	5.0	7.8	12.2	23.3	32.2	17.2	100	1.15	11
49	3	7	24	24	44	53	26	181	1.7	3.9	13.3	13.3	24.3	29.3	14.4	100	1.00	12
4	3	8	21	32	43	44	27	178	1.7	4.5	11.8	18.0	24.2	24.7	15.2	100	0.93	13
16	2	8	26	28	49	40	24	177	1.1	4.5	14.7	15.8	27.7	22.6	13.6	100	0.86	14
18	2	13	17	38	47	42	22	181	1.1	7.2	9.4	21.0	26.0	23.2	12.2	100	0.82	15
37	8	13	22	33	29	33	40	178	4.5	7.3	12.4	18.5	16.3	18.5	22.5	100	0.80	16
1	5	19	25	17	56	40	16	178	2.8	10.7	14.0	9.6	31.5	22.5	9.0	100	0.60	17
48	7	13	24	36	37	49	13	179	3.9	7.3	13.4	20.1	20.7	27.4	7.3	100	0.58	18
66	4	9	30	31	59	32	11	176	2.3	5.1	17.0	17.6	33.5	18.2	6.3	100	0.55	19
5	2	10	37	41	42	33	12	177	1.1	5.6	20.9	23.2	23.7	18.6	6.8	100	0.46	20
13	4	16	29	34	60	30	8	181	2.2	8.8	16.0	18.8	33.1	16.6	4.4	100	0.39	21
12	3	25	31	26	44	37	14	180	1.7	13.9	17.2	14.4	24.4	20.6	7.8	100	0.39	22
41	4	13	27	44	55	29	6	178	2.2	7.3	15.2	24.7	30.9	16.3	3.4	100	0.37	23
55	19	20	25	26	29	34	28	181	10.5	11.0	13.8	14.4	16.0	18.8	15.5	100	0.33	24
50	8	18	31	41	46	31	4	179	4.5	10.1	17.3	22.9	25.7	17.3	2.2	100	0.16	25
61	14	18	29	35	45	31	9	181	7.7	9.9	16.0	19.3	24.9	17.1	5.0	100	0.15	26
10	19	24	27	29	40	24	16	179	10.6	13.4	15.1	16.2	22.3	13.4	8.9	100	0.02	27
9	12	24	39	30	35	32	8	180	6.7	13.3	21.7	16.7	19.4	17.8	4.4	100	0.00	28
43	21	26	30	23	34	29	16	179	11.7	14.5	16.8	12.8	19.0	16.2	8.9	100	-0.03	29
27	12	22	34	42	41	22	7	180	6.7	12.2	18.9	23.3	22.8	12.2	3.9	100	-0.04	30
15	14	27	30	39	33	29	7	179	7.8	15.1	16.8	21.8	18.4	16.2	3.9	100	-0.08	31
25	6	19	49	46	40	17	3	180	3.3	10.6	27.2	25.6	22.2	9.4	1.7	100	-0.12	32
52	22	27	21	35	40	23	11	179	12.3	15.1	11.7	19.6	22.3	12.8	6.1	100	-0.12	33
28	4	21	56	46	38	13	1	179	2.2	11.7	31.3	25.7	21.2	7.3	0.6	100	-0.24	34
23	28	35	31	25	19	18	24	180	15.6	19.4	17.2	13.9	10.6	10.0	13.3	100	-0.32	35
36	23	30	34	30	33	15	14	179	12.8	16.8	19.0	16.8	18.4	8.4	7.8	100	-0.32	36
17	19	32	35	34	35	23	2	180	10.6	17.8	19.4	18.9	19.4	12.8	1.1	100	-0.38	37
39	24	27	46	37	23	17	2	176	13.6	15.3	26.1	21.0	13.1	9.7	1.1	100	-0.62	38
35	19	41	48	32	24	13	3	180	10.6	22.8	26.7	17.8	13.3	7.2	1.7	100	-0.71	39
22	20	37	53	32	25	9	4	180	11.1	20.6	29.4	17.8	13.9	5.0	2.2	100	-0.73	40
31	23	36	49	28	30	8	3	177	13.0	20.3	27.7	15.8	16.9	4.5	1.7	100	-0.76	41
24	16	36	55	46	20	6	1	180	8.9	20.0	30.6	25.6	11.1	3.3	0.6	100	-0.78	42
45	22	46	47	26	24	11	4	180	12.2	25.6	26.1	14.4	13.3	6.1	2.2	100	-0.82	43
21	22	46	42	32	25	12	0	179	12.3	25.7	23.5	17.9	14.0	6.7	0.0	100	-0.84	44
53	31	39	42	25	30	13	1	181	17.1	21.5	23.2	13.8	16.6	7.2	0.6	100	-0.85	45
44	24	45	50	25	19	13	3	179	13.4	25.1	27.9	14.0	10.6	7.3	1.7	100	-0.88	46
32	37	41	36	24	20	14	7	179	20.7	22.9	20.1	13.4	11.2	7.8	3.9	100	-0.89	47
56	26	33	63	27	26	6	0	181	14.4	18.2	34.8	14.9	14.4	3.3	0.0	100	-0.93	48
3	35	39	43	21	31	6	2	177	19.8	22.0	24.3	11.9	17.5	3.4	1.1	100	-1.00	49
46	24	44	61	24	24	3	1	181	13.3	24.3	33.7	13.3	13.3	1.7	0.6	100	-1.04	50
38	31	46	50	23	23	6	1	180	17.2	25.6	27.8	12.8	12.8	3.3	0.6	100	-1.09	51
7	40	47	38	18	23	11	1	178	22.5	26.4	21.3	10.1	12.9	6.2	0.6	100	-1.15	52
29	41	49	44	19	11	10	6	180	22.8	27.2	24.4	10.6	6.1	5.6	3.3	100	-1.20	53
40	29	59	46	17	21	7	0	179	16.2	33.0	25.7	9.5	11.7	3.9	0.0	100	-1.21	54
58	41	61	30	18	22	7	2	181	22.7	33.7	16.6	9.9	12.2	3.9	1.1	100	-1.29	55
14	60	44	31	15	12	13	6	181	33.1	24.3	17.1	8.3	6.6	7.2	3.3	100	-1.34	56
51	54	42	42	17	14	6	2	177	30.5	23.7	23.7	9.6	7.9	3.4	1.1	100	-1.45	57
8	63	39	36	17	17	4	3	179	35.2	21.8	20.1	9.5	9.5	2.2	1.7	100	-1.50	58
11	75	37	26	10	18	7	7	180	41.7	20.6	14.4	5.6	10.0	3.9	3.9	100	-1.51	59
47	60	51	32	14	16	4	4	181	33.1	28.2	17.7	7.7	8.8	2.2	2.2	100	-1.54	60
33	60	54	34	14	11	6	1	180	33.3	30.0	18.9	7.8	6.1	3.3	0.6	100	-1.64	61
57	64	43	42	19	10	2	1	181	35.4	23.8	23.2	10.5	5.5	1.1	0.6	100	-1.67	62
19	76	48	19	15	12	6	5	181	42.0	26.5	10.5	8.3	6.6	3.3	2.8	100	-1.68	63.5
54	84	44	12	13	12	12	4	181	46.4	24.3	6.6	7.2	6.6	6.6	2.2	100	-1.68	63.5
42	66	56	23	13	13	6	2	179	36.9	31.3	12.8	7.3	7.3	3.4	1.1	100	-1.69	65
34	80	42	23	14	13	6	2	180	44.4	23.3	12.8	7.8	7.2	3.3	1.1	100	-1.76	66

## Appendix 5. Average PAR and descriptive statistics for STEMS stands

### *Average PAR for STEMS stands*

(The last column is the average of the means for the four respondent groups; n is the number of responses)

No.	Silvicultural system	Province		Tourists		Executives		Foresters		Average PAR
		Mean PAR	n	Mean PAR	n	Mean PAR	n	Mean PAR	n	
2	Extended Rotation	2.44	711	2.32	181	2.64	22	2.46	50	2.46
5	Commercial Thinning	0.77	708	0.98	181	2.32	22	1.74	50	1.45
3	Group Selection	0.56	710	0.35	181	1.82	22	1.37	51	1.03
6	Dispersed Retention	-0.68	712	-0.94	179	1.41	22	0.35	51	0.04
7	Aggregated Retention	-1.29	712	-1.64	179	0.86	22	-0.12	51	-0.55
4	Clearcut with reserves	-1.75	710	-1.79	181	0.68	22	-0.55	51	-0.85
1	Patch Cut	-1.85	712	-2.20	181	0.59	22	-0.10	51	-0.89

### *Descriptive statistics for STEMS stands*

No.	Silvicultural system	Block Area (ha)	Stems Removed (%)	Basal area Removed (%)	Volume Removed (%)
2	Extended Rotation	12.0	0	0	0
5	Commercial Thinning	18.6	52	46	46
3	Group Selection	21.6	20	15	19
6	Dispersed Retention	18.2	96	89	90
7	Aggregated Retention	25.5	80	82	83
4	Clearcut with reserves	10.9	100	100	100
1	Patch Cut	35.7	25	18	18

The STEMS technical report is available at: [www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr017.htm](http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr017.htm)

## Appendix 6. Groups and associations that participated in the survey

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### Nelson (5) Groups

- Daybreak Rotary
- Kiwanis Club
- Rod and Gun Club
- West Kootenay Eco-Society
- Fire and Rescue Services

### Kamloops (4) Groups

- Brock-Central Lions Club
- New Life Mission
- Search and Rescue Society
- Kiwanis Club

### Abbotsford (6) Groups

- Abbotsford Lions Club
- Search and Rescue
- Food Bank
- Community Futures
- Clearbrook Golden Age Society
- Clearbrook Lions Club

### Prince George (6) Groups

- Daybreak Rotary
- United Way
- Caledonia Ramblers
- Search and Rescue
- Alpine Club of Canada
- Hart Pioneer Centre

### Terrace (5) Groups

- Skeena Valley Rotary Club
- Rod and Gun
- Fire and Rescue
- Women's Centre
- Sierra Club

### Victoria (5) Groups

- Volunteer Victoria
- Fairfield Horizons (Activity Centre)
- Blanshard Community Centre
- Victoria Conference Centre
- Government Employees

### Campbell River (8) Groups

- United Way
- Rotary
- District of Campbell River
- Community Futures
- Search and Rescue Society
- Discovery Coast Greenways Land Trust
- Professional Forester Network
- General Public

### Williams Lake (7) Groups

- Association For Community Living
- Children's Fundraising Society
- Canadian Legion
- Sportsmen's Association
- Seniors Activity Centre
- Carrier Chilcotin Tribal Council
- Tsilhqot'in National Government

## Appendix 7. Photographs in order of most preferred to least preferred as rated by Province

