Post-mountain pine beetle recreational usage survey

Final Report

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Abstract

The impact of mountain pine beetle (MPB) on the outdoor recreational activity patterns of five communities in the Interior of British Columbia was assessed. Recreators were asked about changes in activity during and after MPB attack, as well as their preferences for forest management post-MPB, and general forest values. Paper surveys and semi-structured phone interviews resulted in data from over 100 respondents. Research findings suggest a high degree of place loyalty, both during and after MPB attack, as well as in MPB harvested areas. Visual quality continues to be a key issue and while there was some indication of conditional visual quality relaxation in some areas for the sake of managing post-MPB forests, it was also found that visual quality elicited highly emotionally laden responses that urge caution. Acceptability of commercial harvesting of post-MPB forests received mixed responses, and was affected by issues such as 1) post-harvest clean up and planting, 2) road and trail access for recreation use, 3) perception of risk related to fire and falling trees, and 4) ecological health and values, such as wildlife habitat. Specific preferences appeared strongly influenced by recreational activity involvement, and polarization between motorized and non-motorized users was noted. A strong influence of local community socio-economic and geographic contexts was also found to exist. The results reveal an outdoor recreational community that is diverse and sometimes divided on post-MPB forest management issues.

1.0 Introduction

The effects of the mountain pine beetle (MPB) epidemic in British Columbia have been far reaching. Current estimates suggest that approximately 630 million m^3 of pine trees have been killed, representing 47% of the merchantable pine volume in the province (Walton, 2010). By 2016 estimates are that 65% of the merchantable pine in the province will be dead. This represents clear hardships for the forest industry in the province in addition to communities that are dependent on this industry for their economic well-being. However, there are also significant ecological and social impacts as well.
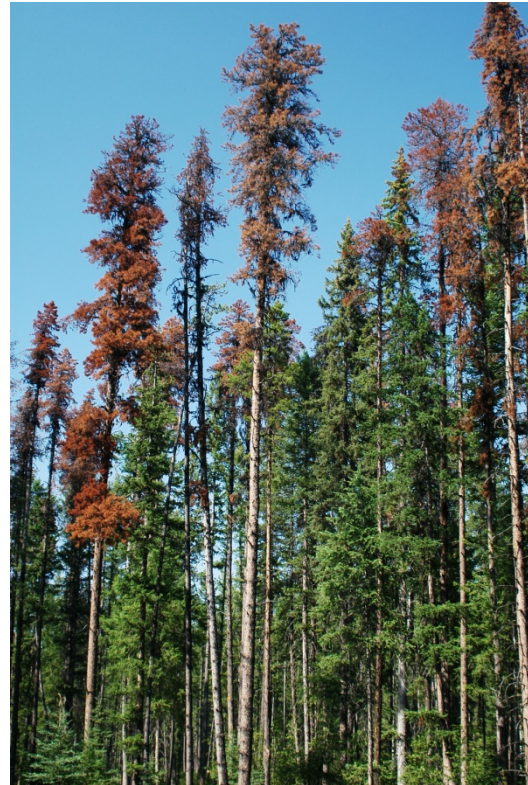
This report seeks to gather information on the effects that the MPB epidemic may have had on outdoor recreation in the interior of British Columbia, with a special focus on the later stages of the MPB experience. To accomplish this we have chosen to employ two methods; 1) a standard paper and pencil survey that was administered in local communities affected by the MPB epidemic and 2) a series of phone interviews with key informants. This research was conducted in the communities of Burns Lake, Fort St. James, Prince George, Quesnel, Vanderhoof, and Williams Lake. Our goal was to sample from a broad spectrum of outdoor recreational users, identified interested parties such as environmentalists and naturalists, forestry industry workers, local businesses specializing in recreational use and activities, and local recreation officers.

In the following sections we present our findings and offer a discussion to further elucidate the effects that the MPB epidemic has had on outdoor recreation in central BC as well as investigating the public's general perceptions of issues of forest management in areas affected by this epidemic. A review of relevant literature is also provided.

2.0 Literature Review

This literature review is intended to summarize research in several intersecting areas relevant to the present study. The review begins with a look at recreational perspectives in a broader sense, since it is these "recreational perspectives" of the forest that drive much of the study design. This is followed by a review of impacts and risk perception related to mountain pine beetle (MPB) which provides a baseline for understanding possible recreational perspectives on MPB attack. The community context is then reviewed, since recreational users must also be understood as members of larger communities that engage in collective dialogues over the impacts and management of MPB. Specific management preferences are then reviewed, with an emphasis on trade-off choices, such as between scenic beauty and biodiversity, in order to provide a baseline for trade-off questions posed in this research. Finally, the broader economic context faced by these communities is reviewed with the aim of gaining insight into how economic contexts may affect survey and interview respondents.

2.1 Recreational Perspectives

Recreational perspectives, particularly those of local users, may have unique qualities, when compared with the broader public, or one-time visitors to a place. This section explores some of these orientations.

When asked about which sites they most preferred, Finnish recreators were found to favour scenic beauty over species richness, in site attribute prioritization. However, when asked about which sites they least preferred, recreators demonstrated a favouring for species richness over status quo management of the sites (Horne et al., 2005). These results suggest that site-based research may be able to provide a valuable level of nuance regarding preferences according to Horne et al. (2005). The present research therefore incorporated both site specific and area wide questions, with the intention of eliciting potential nuances.

User loyalty, or attachment, to specific sites may also be an important factor when considering the impact of MPB on recreational activity. In a single site study located in the Alberta foothills, Hailu et al., (2005) found that place identity and habits were strong predictors of site use, with travel cost being an additional influence. Place identity referred to both utility of a site for recreational use, and emotional meaning of a site, which may develop with repeated use. In cases of loyalty or attachment to a site, Hailu et al., (2005) found that users may hold the view that few other sites are suitable, and therefore use the same site repeatedly. In the present study, the concept of place loyalty or attachment was therefore considered as a potential factor influencing recreational activity during and after MPB outbreaks.

In terms of representation however, while recreation users may exhibit place loyalty and attachment, and have specific preferences about site management, their perceived level of

representation in forest management decisions may not be always be consistent or high according to Harshaw et al., (2005). In a study of the Sea-to-Sky Corridor in British Columbia, the groups with the highest perceived representation in forest management were mountain bikers and off-trail hikers, while mountaineers had the lowest perceived representation (Harshaw et al., 2005). This research raises the question of whether the full range of recreational user perspectives receives adequate attention in forest management planning.

Currie et al. (2009), for example, elaborate a case study where stakeholders in a land development project were assessed according to power, legitimacy and urgency. Various combinations of these three attributes resulted in different levels of salience of a stakeholder group. A stakeholder group with only one attribute was considered "latent" while the other groups had more ability to influence the process. Recreational users here were placed in the "latent" category since, although they were considered to have legitimacy as users, they lacked in urgency and power (such as economic or legal power). While the present study did not look specifically at the power and influence of recreational users in the context of MPB forest management, it has assumed legitimacy of the recreational perspective and, has in a sense, set out to assess the current pulse amongst this group, regarding forest management preferences

While recreational users may be associated with a single, broad interest group, there is typological variation across the range of users. Recreational experience may be influenced by factors such as generation, type of activity, size of group, and orientation to place, event or object in nature, according to Oku and Fukamachi (2006). While the current study's interest was to gain an overall sense of recreation perspective, it also sought information on nuances between users, such as activity and site preferences as well as demographics.

While there are nuances among recreationalists, it is also valuable to consider dominant trends over time. For example, in a Danish study by Zanderson and Termansen (2007), visitor preferences between 1977 and 1997 were compared. The study found that visitors traveled shorter distances, and spent less time at sites, in 1997 than 1977. However visitors were found to visit sites more frequently. Data also indicated an increased preference for species richness and forest density, and an increase in popularity of a forest as the forest matured. This study highlights the importance of including time when evaluating forest sites. This is especially relevant when considering newly aforested sites since recreational habits may shift as forests regenerate. In the present study, trends in recreational activity, frequency and location over a five-year period were therefore considered, since pine forests in the study area have undergone significant changes over time due to the MPB outbreak. The extent to which changes in user activity may be as a result of MPB infestation is therefore a salient question here since other factors may have also played a role.

This discussion on the recreational perspective has highlighted several factors that are salient to this study's design and approach. In summary:

- Connection to specific sites provides a more nuanced trade-off lens than that offered by broad area analysis.

- Recreational users offer a legitimate perspective on forest management.

- Recreational users are diverse in recreational preferences and this has been significantly connected to factors such as demographics, activity type and group size.

- Recreational preferences change over time, and this has been significantly associated with forest maturation.

In the specific context of MPB, there have been few studies on impacts of, and preferences for forest management that have targeted local recreational users. Studies have tended to focus on fire disturbance impacts on the tourism industry, such as fly in fishing lodges (Hunt et al., 2005) or with national park visitation (Muller and Job, 2009). A perspective on the impacts of MPB at the public community level may therefore be useful, considering that recreational use is likely to be significant within these local communities.

2.2 Perceived Risks and Impacts of Insect Pest Attacks

To gain a better understanding of how recreational users may experience MPB attacks, and respond in terms of activity changes, a review was carried out into the literature dealing with psychological impacts. At the emotional level, Flint, McFarlane and Mueller (2009) suggests that large-scale pest outbreaks can result in a community-wide grief processes, including denial, shock, anger, sadness, resignation, and moving on. This could be particularly salient if a strong place identity and attachment at pest outbreak sites was also found to be present. The renewal aspect of forest management in these cases may represent a positive emotional way forward for some affected users.

General beliefs about MPB attacks, and associated perceived threats, may well be a source of emotional stress for those who recreate in the forest. Potential threats cited in the literature included a loss of visual quality, falling tree hazards, pest outbreak expansion, and a long-term economic downturn fueled by declining wood quality (Englin, 1996). It was noted that insect pest attacks (such as with MPB) were often perceived to be of a higher ecological threat than other natural and anthropocentric disturbances (McFarlane and Watson, 2008).

Both emotional and cognitive perceptions of risk associated with MPB were found to decrease with knowledge (McFarlane and Watson, 2008). For example, higher levels of knowledge were found to lead to greater acceptability of MPB activity and management in national parks (McFarlane and Watson, 2008). Conversely when specific knowledge levels of MPB outbreak and related management options were low, communities found it more difficult to make choices regarding management alternatives (Meitner et al., 2008).

Attitudes about insect pest attacks appeared to be influenced by education level, environmental world-view, and salience of the issue, in visitors to a German park (Muller and Job, 2009). Views about insect pests were, perhaps surprisingly, found to be less influenced by repeated visits, longer stays, and previous experience. Chang, Lantz and MacLean (2009) in a series of case studies into public attitudes towards forest pest species in Canada found that people do not always differentiate well between different pest threats. Flint, McFarlane, and Mueller (2009) reported in their international synthesis that locals, though highly concerned, were not necessarily well informed. Furthermore insect pest species, such as MPB, were often perceived as catastrophic threats. This perception was clearly linked to negative attitudes. From a recreational point of view, attitudes towards MPB may therefore be influenced by pre-existing views, attitudes and knowledge levels notwithstanding actual experience in the forests.

2.3 Community Contexts

Community contextual variables (socio-economic, cultural, and physical) have the potential to influence how MPB infestations may impact different communities. Different community responses are therefore to be expected. Concerns of community identity were found to be tied to forested landscape identity, as well as greater ecological wellbeing. Qin and Flint (2010) specifically found in Colorado that organizational and structural contexts also affected results. Perceived intensity, trust in resource management, personal experience, and interpretation of risk were all found to be important factors in moulding perceptions. Tailoring resource management approaches to community contexts is therefore likely to be helpful in achieving management goals.

Conversely, McFarlane et al. (2006) did not necessarily support age, gender, education, residence area and social influences on attitudes towards management In Canada. Recent research by British Columbia Ministry of Forests and Range (2010) demonstrated a number of similarities across communities. Attitudinal differences between local visitors, and other Canadians, were found to be minimal, with a wider variation noted between local users and international users. Locals have historically been found to be more negative in attitude to MPB infestations.

It is possible that community level relationships may be challenged by ecological disturbances, which may highlight existing vulnerabilities. Resource managers and stakeholders seeking to respond to disturbances may find issues of trust and confidence arising according to Flint, McFarlane and Mueller, (2009). On a more positive note, these challenges may also present opportunities for new relationships to be developed. Understanding local residents and community concerns was therefore identified as critical. Bottom up participation, candid communication and incorporation of stakeholder expectations were reported to be key to successful management, and were able to potentially soften opposition in situations where hard

decisions had to be made (Muller and Job, 2009). Flint et al. (2009) concurred that incorporating local sentiments and views could assist in allowing this process, and might allow costly conflicts to be avoided.

The present study therefore anticipated that recreational responses to MPB would occur within multiple community contexts. These include recreational user groups, the local community, the region encompassing all five communities, and the larger area of the BC Interior, all of which are informed by a variety of collectively held perspectives and community values.

2.4 Forest Management Perspectives and Trade-offs

As with MPB response, it was found that acceptability of forest harvesting in general seemed to vary according to values (Meitner, 2008, Nelson, 2007), knowledge levels of forest ecology and management (Meitner, 2008; Kearny 2001), the socioeconomic relationship with the forest industry (Kearny, 2001, Palmer, 2008), and salience (McFarlane et al., 2006). While knowledge appeared to increase attitudes towards certain type of harvesting (i.e. Ribe, 1999), knowledge also was found to be able to reinforce pervading views and values in either direction (McFarlane et al., 2006). When considering the aesthetics of salvage logging, scenic beauty was considered to be both important, and interconnected with, the perspective of the perceiver and all that informs their perspective.

No clear preferences were shown for management of scenic beauty over ecological risk, though scenic values were rated important in comparisons of recovery time, recreation use, and cost (Meitner et al., 2008). As degrees of harvesting increased levels of acceptance decreased across all temporal stages (green to red to gray) of MPB affected stands. People preferred green landscapes ideally. However natural landscapes were reportedly significantly preferred to altered landscapes in all colour categories (British Columbia Ministry of Forests and Range, 2010).

Research into trade-off choices regarding forest management in pest-infested areas has so far shown a preference for ecological integrity and habitat protection. Park visitors chose ecological integrity over visitor experience, inside and outside of parks, in a Canada, US and German research review (Flint, McFarlane and Mueller, 2009). In another German national park study, visitors were able to "see beyond" the scenic beauty risks to assess ecological factors (Mueller and Job, 2009). Chang, Lantz and MacLean (2009) also confirmed that for many, protecting habitats of ecological or biodiversity importance took precedence.

In the area of economic trade-offs, past research (Meitner et al., 2008) has shown support for salvage logging of MPB affected areas amidst threats of forecasted job reductions over a 20-year period. Regeneration preferences were for mixed replanting to prevent future outbreaks, in comparison with natural regeneration (Meitner et al., 2008). Preservation, retention and partial retention were found to be more acceptable than modification. This was with the exception of

the Burns Lake community, where some acceptance for modification was found (British Columbia Ministry of Forests and Range, 2010). Trade-off questions similar to those cited here were therefore incorporated into the design of the present study.

Returning to a recreational perspective, perceptions of forest harvesting have the potential to be polarized, given the differing perspectives of the forestry and recreation industries. In more generalized research on clear-cutting preferences, foresters, and those connected to the forestry economy, tended to have a higher level of acceptance of clear-cut areas than did other members of the public (Ribe, 2002, Palmer, 2008, Kearney et al., 2010). It is easy to assume that this was because their income is based on forest activities. Recreational users on the other hand, appeared to have a more mixed response. When studying recreational users in northern Ontario, Hunt et al. (2000) found that recreational activities with a higher level of physical activity, such as hunting, angling, snowmobiling, and motorized water vehicle activities, had a positive relationship with logged areas. Activities that were less consumptive and more scenic oriented were less desirable of logging. Also, one-day excursions were more positively correlated with logging than multi-day excursions, perhaps because logged areas, and associated road developments enabled day visitors to quickly penetrate the forest more deeply.

2.5 Economic Perspectives

Understanding the economic context provides a valuable backdrop to understanding local dynamics and perceptions. Schwab et al. (2009) simulated the economic implications of harvesting MPB impacted trees in British Columbia. Their research has predicted traded timber volumes to peak in 2015, resulting in an expansion of existing facilities, and then to reduce by approximately 20% as timber resources decline. Schwab et al. (2009) have anticipated the largest downturn to take place between 2031 and 2060 as limited timber is available, with up to 113 sawmills, 22 panel mills and 11 pulp mills becoming insolvent. A stabilization period is predicted in 2060 as roundwood matures (Schwab et al., 2009). When market conditions are baselined, the timber industry is predicted to be able to recover 45% of timber affected by MPB, while a downturn in the marketplace may result in a recovery of 34% (Schwab et al., 2009).

In terms of future management, a general level of public expectation for a short-term economic boom while salvage logging of dead wood continues is therefore anticipated. In the longer-term a decline is expected. Income loss is also anticipated in non-timber values, primarily due to a loss of visitor revenue as a result of reduced aesthetics and increased safety concerns. However it was noted by Flint et al. (2009) that perceived risks and impacts might change over time.

Community economic resilience offers a perspective on the relative vulnerability and stability of logging communities. Patriquin et al. (2007) modeled economic sensitivity related to MPB infestation, focusing on the communities of Burns Lake, Quesnel, Prince George, Kamloops and the Rocky Mountain Region. Communities that were most impacted by a 1% change in timber exports, such as Nadina, were anticipated to need to most support; Quesnel was also perceived

as quite sensitive to timber supply changes. Prince George and Kamloops were found to be relatively more stable, though Prince George was considered more impacted than Kamloops considering its higher dependence on forest resources. The Rocky Mountain region was found to be more stable in the face of MPB infestation (Patriquin et al., 2007). The authors have suggested that economies will not return to a business-as-usual state after available timber supplies fall below baseline levels, and that this may force a transition to alternative economies (Patriquin et al., 2007).

The present study may therefore be situated within this larger context of economic vulnerability and change. Bringing awareness to these conditions may help with an understanding of the possible constraints faced by local recreation groups and users as they balance the multiple needs of their community and personal lives.

2.6 Summary

Understanding the later stages of the MPB epidemic through the eyes of those who recreate regularly in affected pine forests in the Interior of BC is clearly multi-dimensional. The intersecting perspectives of recreation usage, perceived risk and understanding, community and economic contexts all appear to be relevant. While one could focus on any number of groups impacted by MPB, such as tourists or the general public, a recreational perspective allows visitation over time as well as site specific information (such as place affinity), to be embedded within a local community context, resulting in a more nuanced perspective, that may aid future research and decision making.

3.0 Survey

To gain a quantitative understanding of the impacts of mountain pine beetle (MPB) on recreational activity in the interior of British Columbia, as well as timber and non-timber values, a survey was carried out across six communities. Four high-level questions guided the development of this survey, as follows:

1) In general how has MPB infestation impacted outdoor recreation in the past five years?

2) What types of recreational activities are taking place, and with what frequency?

3) To what degree is harvesting of MPB wood acceptable at specific recreational sites and does that acceptability vary by user group?

4) What forest values, including timber and non-timber, are of significance to people who recreate in MPB infested forests?

This survey was administered in communities where MPB infestations are in their later stages and many of the pine forests are "grey" with few "red" trees on the landscape. Because the

forest industry has an important economic base in these communities, discussions about how to manage large tracts of MPB affected forests are particularly timely and pertinent. This survey is intended to shed some light on the experiences and preferences of those who recreate in these forests.

The methods section provides a brief overview of who was surveyed, how and when, as well as limitations and assumptions. Several graphs, organized by topic, are then displayed, and brief interpretations provided. An integrative summary is then offered to conclude this section.

3.1 Methods

3.1.1 Survey Overview and Development

The survey consists of the following sections:

- Five questions related to the impact of MPB on recreation generally.

- One question asking participants to list specific recreation sites anywhere within the Interior of British Columbia (described as points, routes and areas) and to indicate changes in usage and acceptability of harvesting at those sites.

- Four "trade-off" questions relating to forest values (such as preferred forest regeneration strategy).

- A forest values rating question with 11 timber and non-timber values listed.

- Demographic questions (age, gender, occupation, education).

- Finally a section for comments.

The four-page survey included only check box and numerical responses, except for the listing of recreational sites and comments sections. A one-page survey consent form was also administered. The full survey is located in Appendix A and the consent from is located in Appendix B.

Survey development invariably includes assumptions about how participants will respond. In this study, it was assumed that participants would respond to all questions within a "mountain pine beetle" context. It was also assumed that some questions might be sensitive in nature, such as the listing of specific recreational sites (a favorite, "secret" fishing hole), or a choice between two valued options in the trade-off section. Finally, it was assumed that the questions and language would be accessible across most participants of the study.

3.1.2 Survey Administration

The communities selected for the survey are located south and west of Prince George, and all communities are in regions impacted by MPB. The communities included are Burns Lake, Fort St. James, Prince George, Quesnel, Vanderhoof, and Williams Lake. Each of these communities, with the exception of Prince George, has population sizes under 15,000 people. Prince George was included in part because many of its citizens were considered likely to recreate in the other communities listed as well as locally.

Table 1 - Survey community's populations

Population sizes	2006 Canada Census
Burns Lake	2,107
Fort St. James	1,355
Prince George	70,981
Quesnel	9,326
Vanderhoof	4,064
Williams Lake	10,744

Recreational groups in each area were invited to complete the survey. Listings were obtained from local areas forest recreation representatives, Internet searches, local tourism offices and word of mouth. Approximately 70 recreational clubs, associations and outfitters were contacted individually by phone and email, and a request was made to forward a flyer with the dates and times of the survey to all members. Advertisements were placed in a leading community newspaper, and posters were placed in outfitter stores. Participants were encouraged to fill out the survey in person, however in a small number of cases we allowed individuals to digitally submit the survey if they were unable to make it to their community forum that day and had expressed an interest to participate.

One survey day was allocated to each community, except for Prince George, where two survey days were allocated, due to the larger population size. Between 8-10 hours of survey time was spent in each community. Survey locations were selected by seeking input from local community members regarding high traffic public areas. They consisted of recreation complexes (Williams Lake and Quesnel), shopping centers (Burns Lake and Vanderhoof), universities (Prince George and Fort St. James), a library (Prince George) and a city hall (Quesnel).

Completed surveys amounted to 127. Six of these had to be discarded due to insufficient or incorrect information and/or a lack of consent form. Survey data was entered into an Excel spreadsheet, and calculations and charts were done using Excel. This report contains percentages. Rounding up of averages was carried out to ensure percentages total 100% for the figures in this report. This results in a rounding error of 1%.

3.1.3 Limitations

The most often stated criticism of this survey appears to be the fact that it was not offered online. Several participants suggested that it would have reached more people had it been available online. The decision to do a paper-only version was supported by three reasons: first, a decision was made to sample only in local communities, and it would be challenging to contain an online version locally; second, it was considered important to ensure that only one survey be completed per person, which is complex to regulate in an online survey; and third, the survey format had a level of complexity that would have required significant time to prepare for online distribution.

A second limitation related to the choice of words used within the survey. While the overall context of the survey was MPB infested forests, not all questions relating to harvesting and forest values indicated "in MPB infested forests" which resulted in a lack of clarity for some respondents. Some survey vocabulary was also unfamiliar to some participants. The most common vocabulary question was "what does 'riparian' mean"? Results referring to riparian zones may therefore be skewed, given this issue.

A third limitation was the length of the survey. A handful of respondents in person chose not to complete the survey due to a concern that it would take up too much time. The actual amount of time taken was found to be on average between 10 and 20 minutes.

A fourth limitation was that it proved difficult to reach people who recreate but were not members of the clubs we contacted. This appeared particularly true of activities such as camping and hiking as many users who participate in these activities may not be a member of a group specifically oriented to this, However we should note that users participating in these activities were in fact well represented activities among respondents.

A fifth limitation was the assumption among some participants, who represented clubs, that they were filling out the survey on behalf of their club. As a result rather than sending the survey announcement out to all members, they asked a small group of informed club members to complete the survey. In hindsight it could perhaps have been made clearer that the survey was intended for broad representation, not only "knowledgeable" representation.

A sixth limitation was the hesitancy among some participants to fill out the survey in full. Some participants wanted to understand the linkage between the survey, local level harvest planning, and other activities happening in the area. Some participants also chose not to complete the

survey because they felt it did not apply to them, since MPB infestation had not impacted their activity in the forest. In several cases, further clarification on intention and purpose of the survey was needed before participants would engage.

On the other hand a number of indicators suggest that this survey was successfully administered. Over 100 valid responses were received from the five communities. While this represents a small sample of the overall population (0.1%), the more accurate population size is that of self-identified outdoor recreational enthusiasts, which is assumed to be much smaller. Additionally a wide range of recreational activities was represented, and over 500 recreational sites were listed. Finally, as will be shown in the results section, the data shows consistent results between questions at a high level of analysis.

3.2 Results

This results section is organized according to the higher-level survey questions listed in the introduction of this section. Briefly, these are:

- Impact of mountain pine beetle infestation on recreation.

- Site-specific recreational activity and frequency.

- The degree of acceptability of harvesting pine beetle infested wood.

- The forest values of significance for participants of this study.

3.2.1 Impacts of Mountain Pine Beetle (MPB) Infested Forests on Recreational Activity

Changes in recreational frequency, location and activity in MPB forests over the past five years are indicated in Figures 1, 2, and 3.
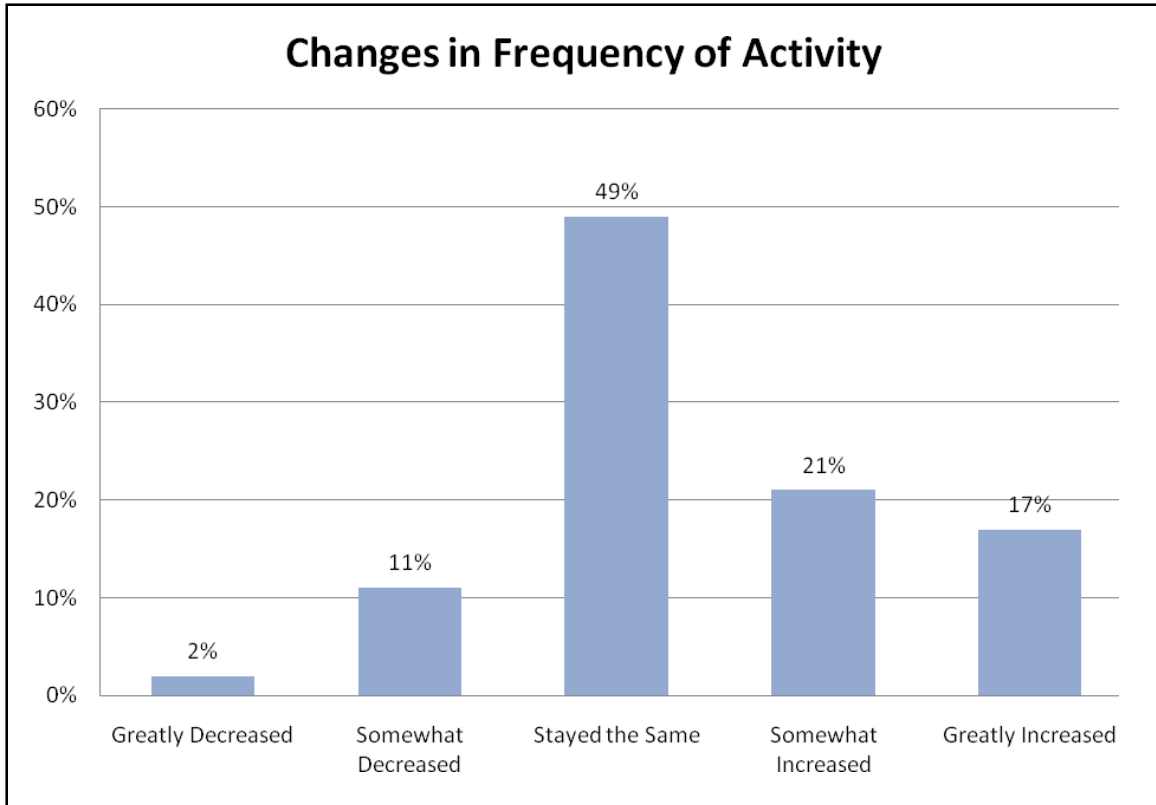
Changes in Frequency of Activity

Category	Percentage
Greatly Decreased	2%
Somewhat Decreased	11%
Stayed the Same	49%
Somewhat Increased	21%
Greatly Increased	17%

Figure 1 - Changes in Frequency of Activity in 5 years by Percentage

Results in Figure 1 indicate that approximately 50% respondents were generally recreating with the same frequency, while nearly 40% saw an increase in activity, and about 12% saw a decrease in activity frequency.
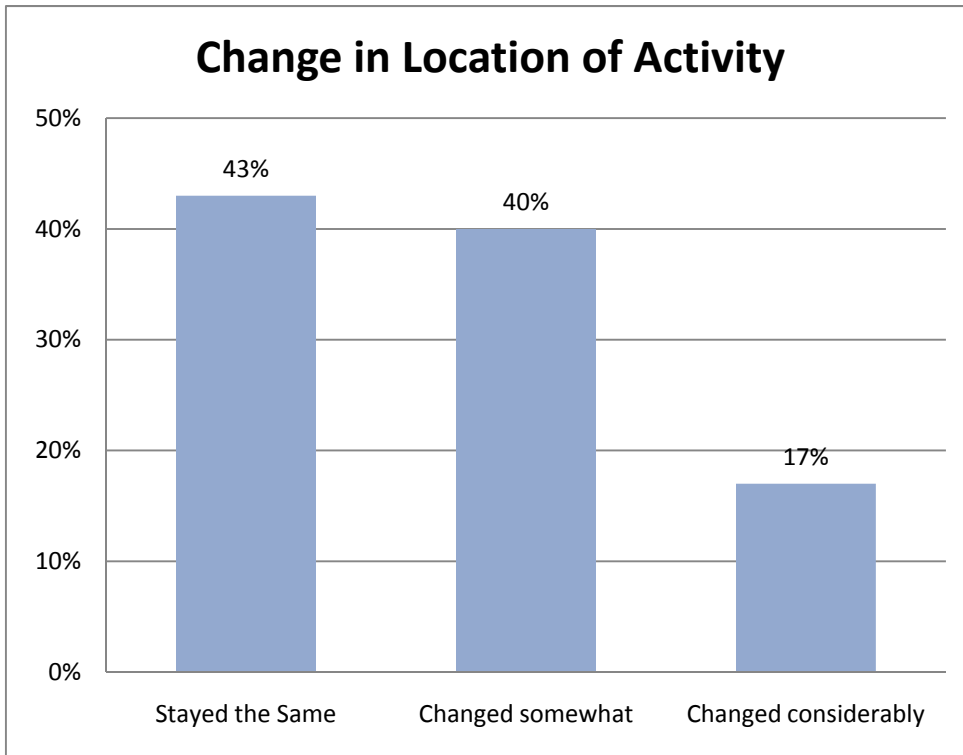
Change in Location of Activity

Figure 2 Change in Location of Activity in 5 years by Percentage
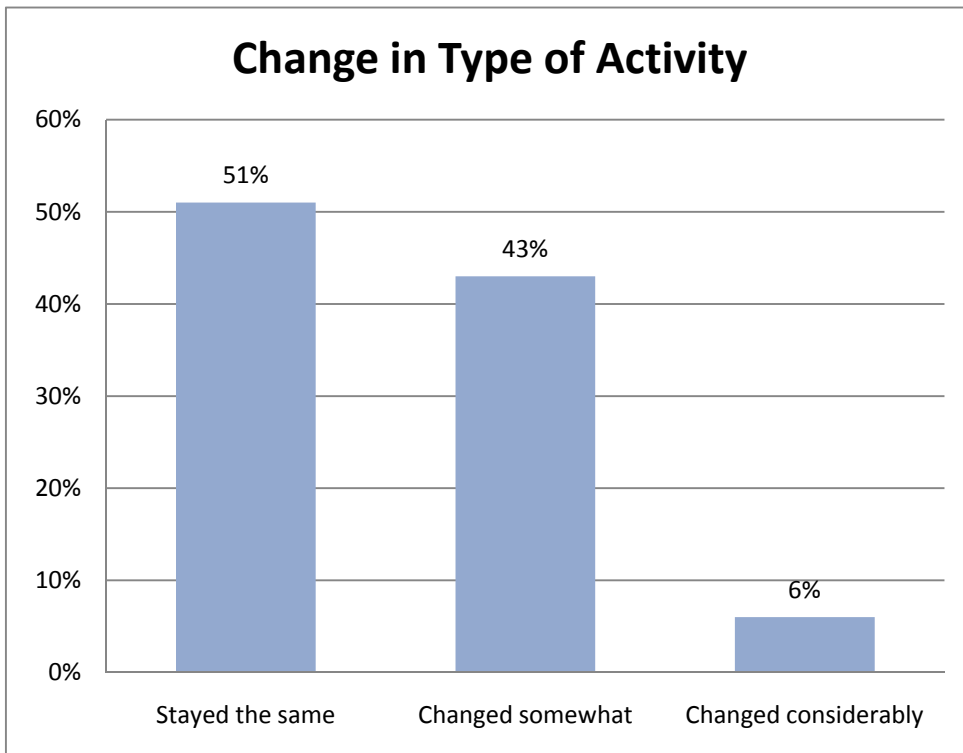
Change in Type of Activity

Figure 3 Change in Type of Activity in 5 years by Percentage

Figures 2 and 3 indicate that most respondents experienced some or no change in recreation location or activity during the MPB infestation, while a few participants experienced a significant change.

Degree of Influence by Mountain Pine Beetle (MPB)

Respondents rated overall changes in activity, as influenced by MPB, on a scale from 1-5, with 1=no impact, and 5=high impact. Results in Figure 4 show that MPB on average was considered to have a relatively low (rating of 1-2) impact on changes in recreational frequency, activity, and location in MPB affected areas.
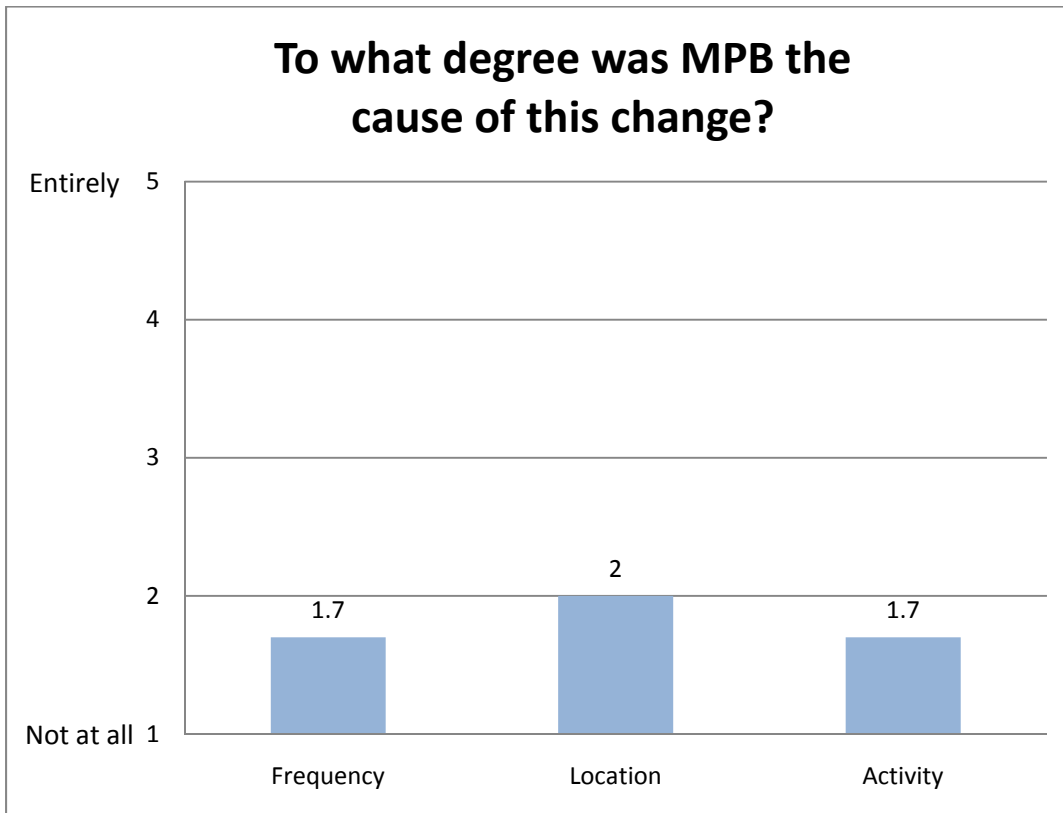

Figure 4 Degree of change in recreation caused by mountain pine beetle (MPB)

Participants were also asked to rate their experience as positive or negative on a scale from 1-5, with 1=negative and 5=positive. The mean response was 3.3. A closer look at the data shows that 47% respondents gave a "positive" rating (higher than 3) and 30% of respondents gave a "negative" rating (lower than 3), indicating a slightly more positive experience.

Changes in recreational usage in the forest based on recreational activity estimates

Participants were asked to estimate the number of days they spent in MPB affected forests during the year prior to, during, and after the outbreak. Averages are shown in Table 2, and depicted graphically in Figure 5.

Table 2 - Average number of days recreating in forest areas affected by mountain pine beetle

	# of days in the Summer (May – September)	# of days in the shoulder seasons (April & October)	# of days in the Winter (November – March)	*Overall Average*
Prior to the outbreak	26	11	17	**18**
During the red attack stages	25	10	15	**17**
Currently	28	13	18	**20**
Overall Average	**27**	**12**	**17**	
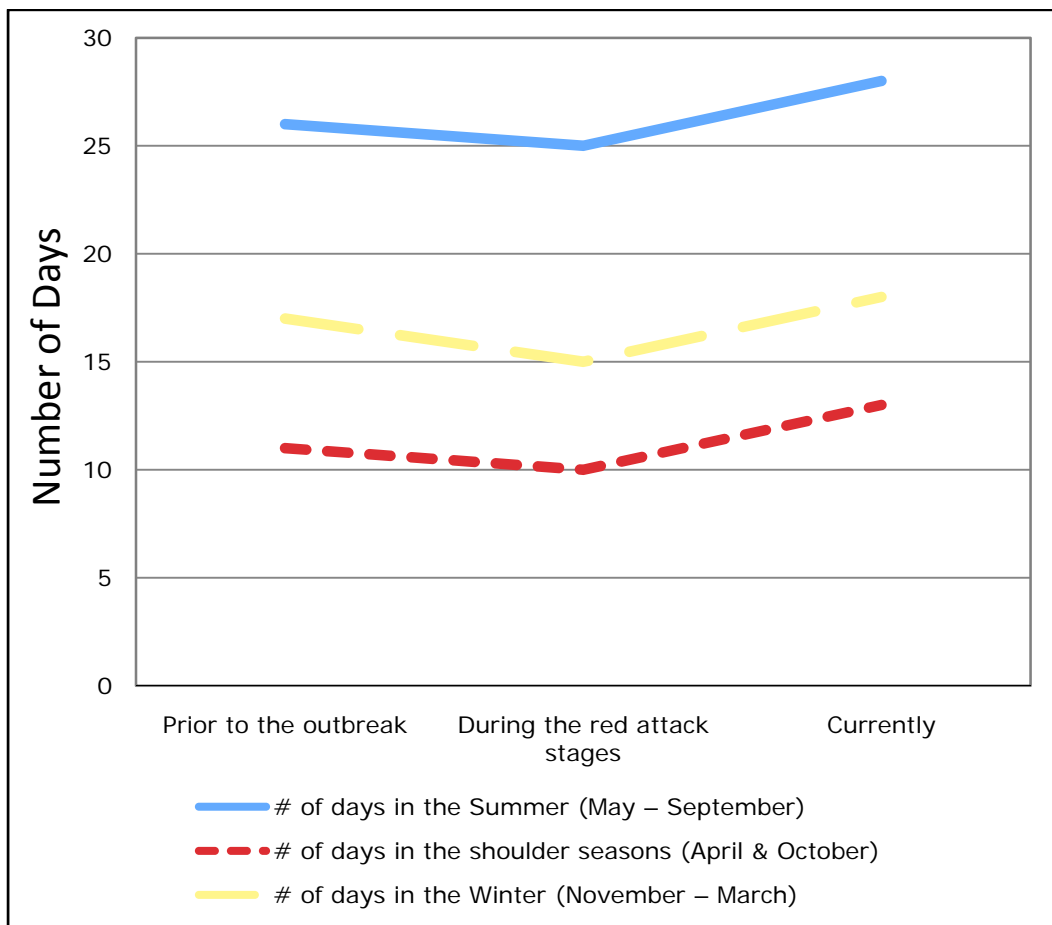
Figure 5 Change in Recreational Activity prior to, during and after the mountain pine beetle (MPB) outbreak

Based on this data, recreational activity slowed slightly during red attack stages then returned and increased slightly after this stage had passed. This result is consistent with findings displayed in Figure 1, showing a slight increase in activity frequency over the past 5 years. Potential insights into the factors influencing this behaviour can be seen in the interview responses to different MPB stages.

3.2.2 Site-Specific Recreational Frequency and Activity

When asked about recreational activity at specific places, people on average reported a slight rise in activity in specific places, in comparison with 5 years ago, as shown in Figure 6. This is consistent with data already mentioned. The bottom bar in Figure 6 shows that harvesting was considered to be moderately acceptable at those sites, as will be discussed in the next section.
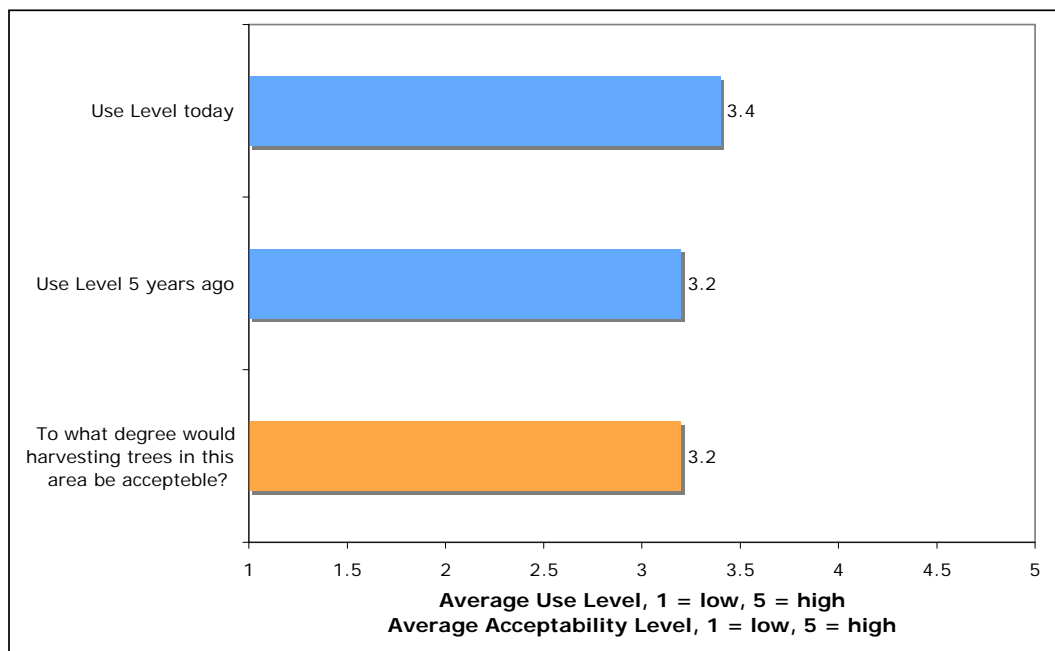

Figure 6 Average change in activity over 5 years for all sites, and Average acceptability of harvesting at same location for all sites

Figure 7 indicates the number of times each outdoor activity was selected for each site listed. Trapping, dog mushing and berry picking were added to the survey by respondents, and may be underestimated due to the fact that they were not included in the original list of possible activities. Most respondents selected more than one outdoor activity. Three or more activities were selected at 68% of the sites. Snowmobilers tended to engage in several activities at a site; 80% of sites with snowmobiling also included 5 other types of outdoor activity.
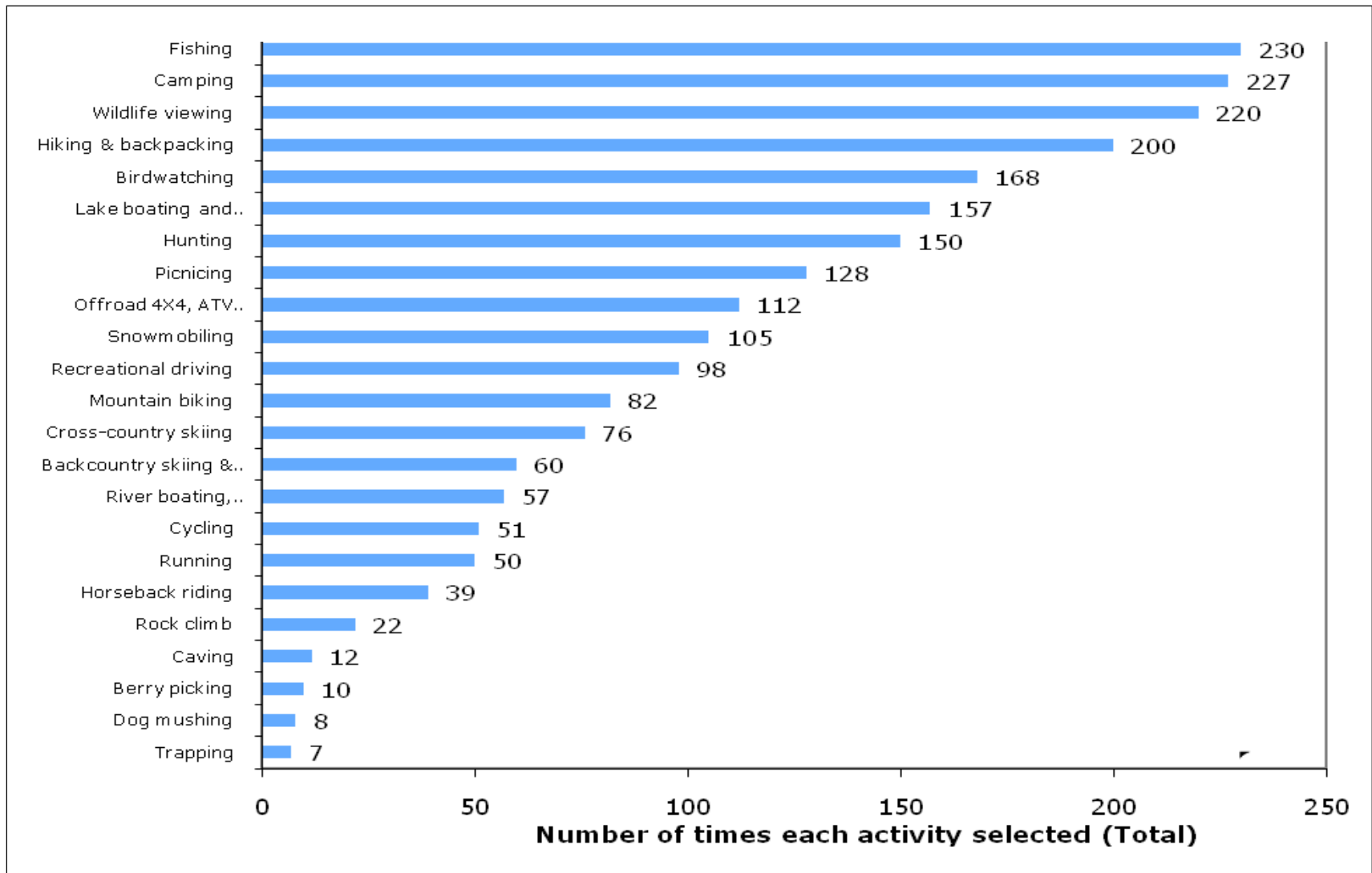
Figure 7 Recreational Activity, as indicated by specific sites

3.2.3 Acceptability of Harvesting in Recreational Areas

The average response to the question of harvest acceptability in specific sites was 3.2/5, as shown in Figure 6. To further clarify the data, Figure 8 shows the number of times people chose each rating of harvest acceptability at specific sites, on a scale of 1-5. This data shows that more respondents are strongly in favor of harvesting than strongly opposed, while on average across all responses, acceptability of harvesting varies greatly.
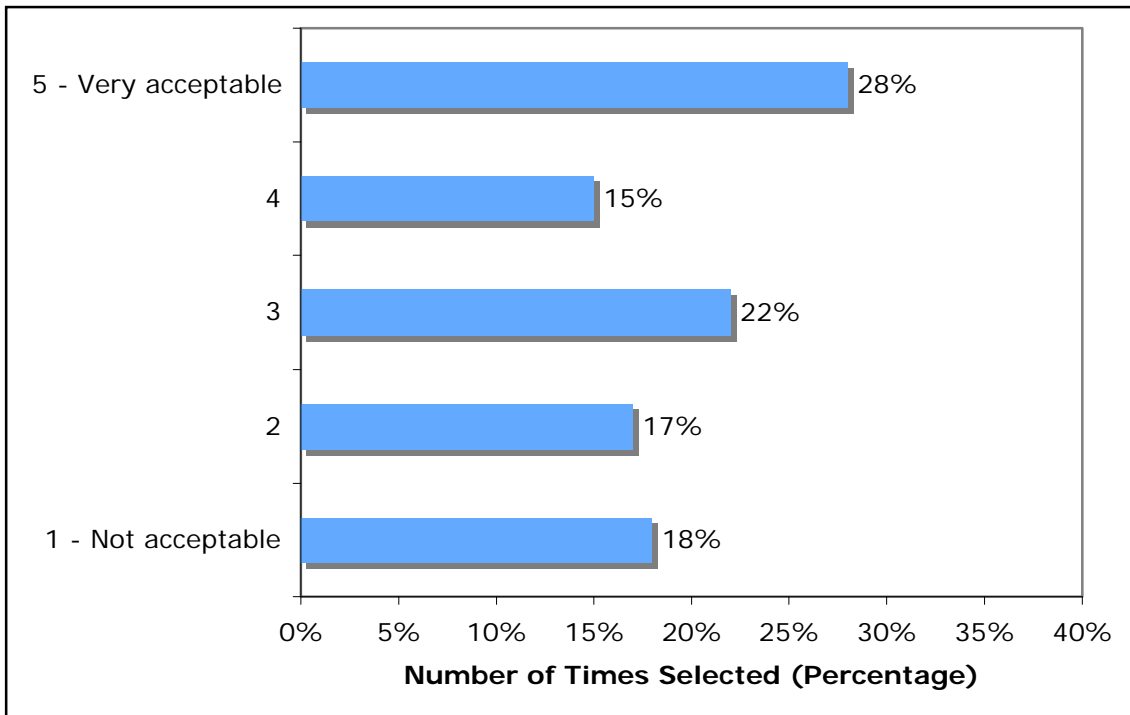

Figure 8 Distribution of acceptability ranking rating for forest harvesting at specific recreational sites

Another way of clarifying the data is by sorting for several variables. As shown in Figure 9, acceptability of harvesting was considered close to average when sorted by points, areas, and routes, as well as for motorized and non-motorized activities. Amongst communities, respondents from the community of Burns Lake more strongly supported harvesting than the other communities sampled. Respondents from the community of Vanderhoof were also slightly higher in levels of harvest acceptance.
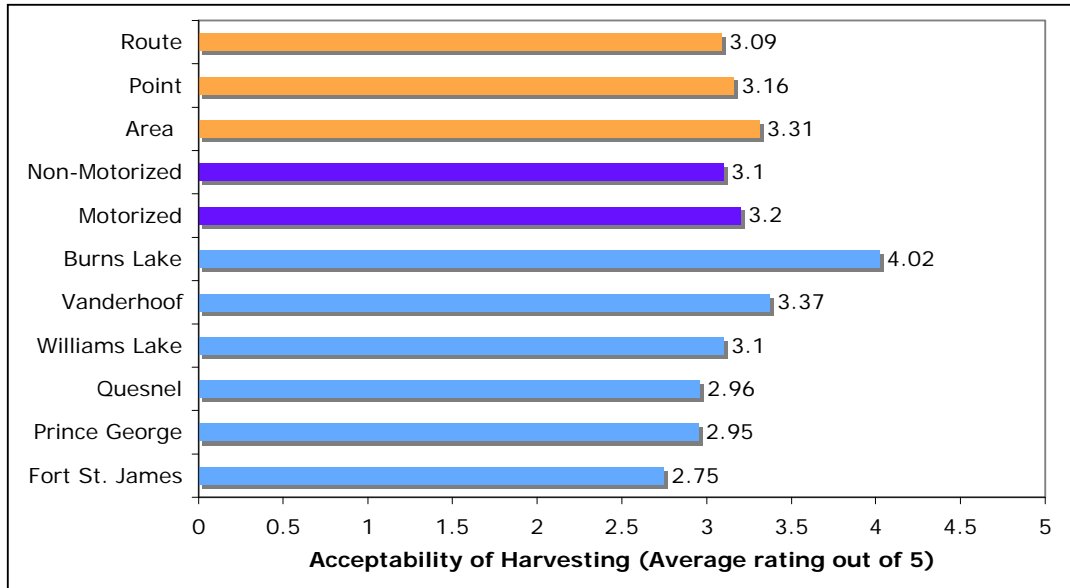
25

Figure 9 Acceptability of Harvesting by Variable

3.2.4 Timber and Non-Timber Forest Values

The following section is theme-based and refers to two sets of data. The first is Degree of Importance, where participants were asked to rate, from 1-10, the importance of 11 forest values. The second is a series of trade-off sections. Figure 17 shows all Degree of Importance responses.

Protection of Views: Remote and Local

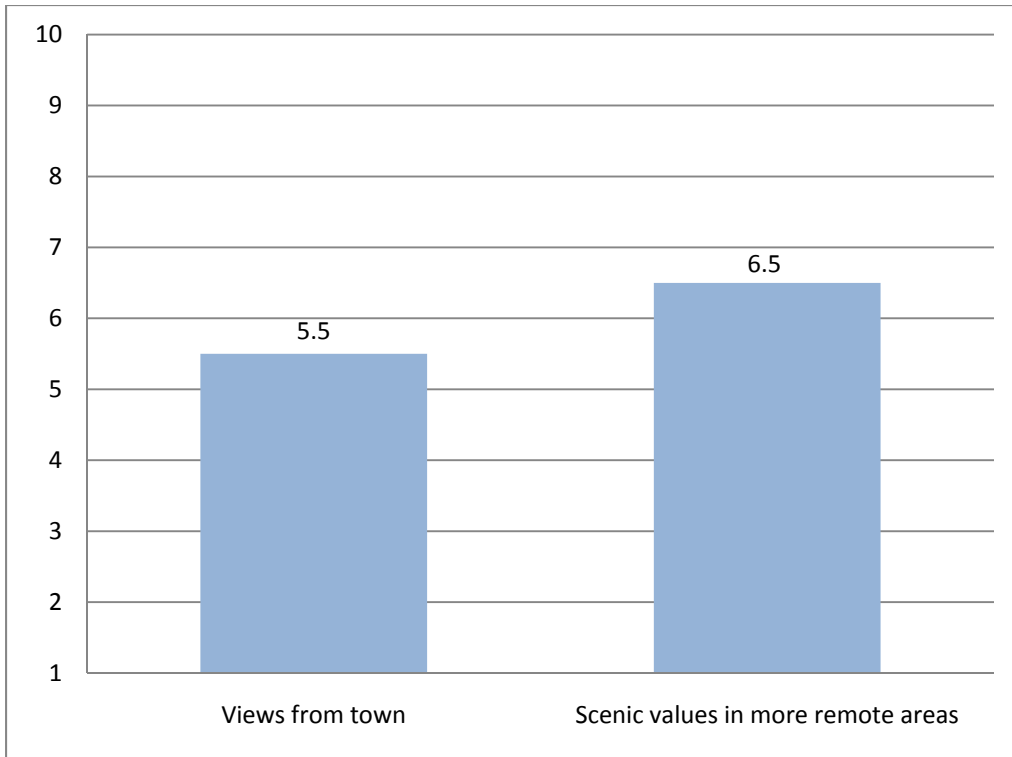Figures 10 and 11 indicate that respondents are more in favor of protecting remote views than views from town.
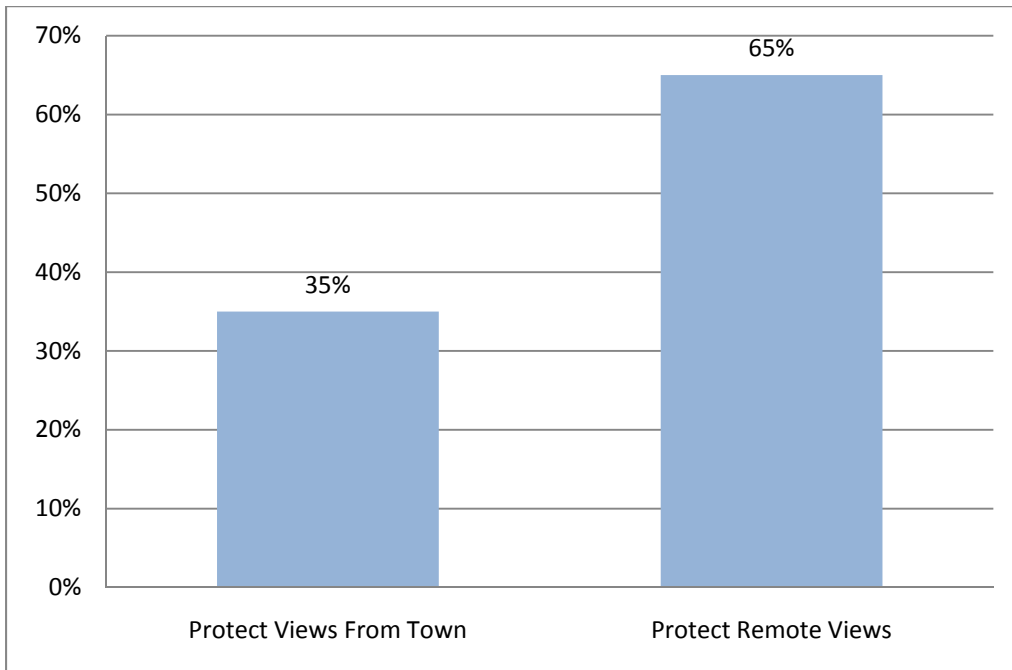
Figure 10 Degree of Importance – Views

Figure 11 Trade Off – Protection of Views

Regeneration Preferences: Harvesting, Planting and Natural Regeneration

Figure 12 shows that planting after harvest was reportedly more widely valued than was natural regeneration and planting without harvesting. Figure 13 shows tree planting was reportedly relatively more valued than harvesting, when values are specifically isolated. While natural regeneration received a lower trade-off score, it remained an important reported overall value.
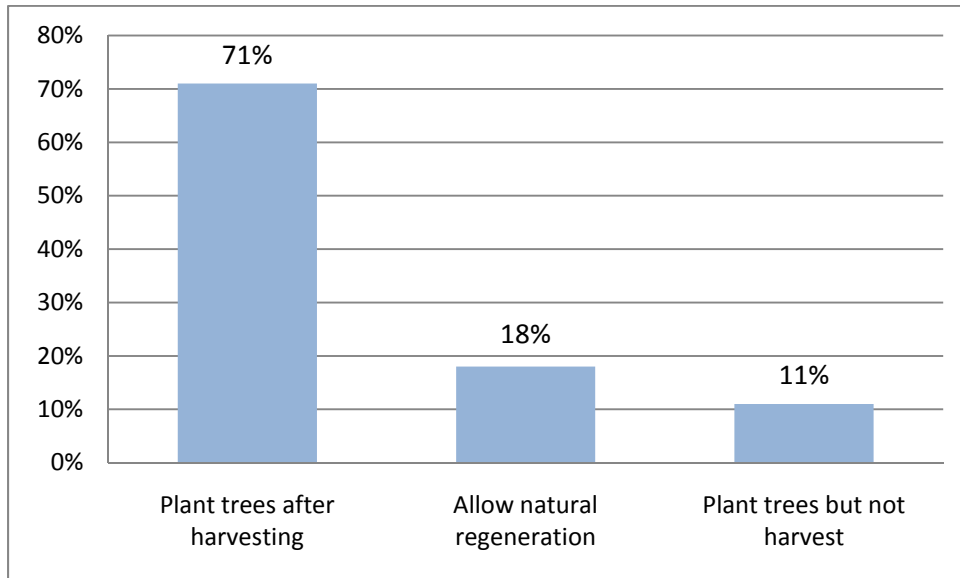

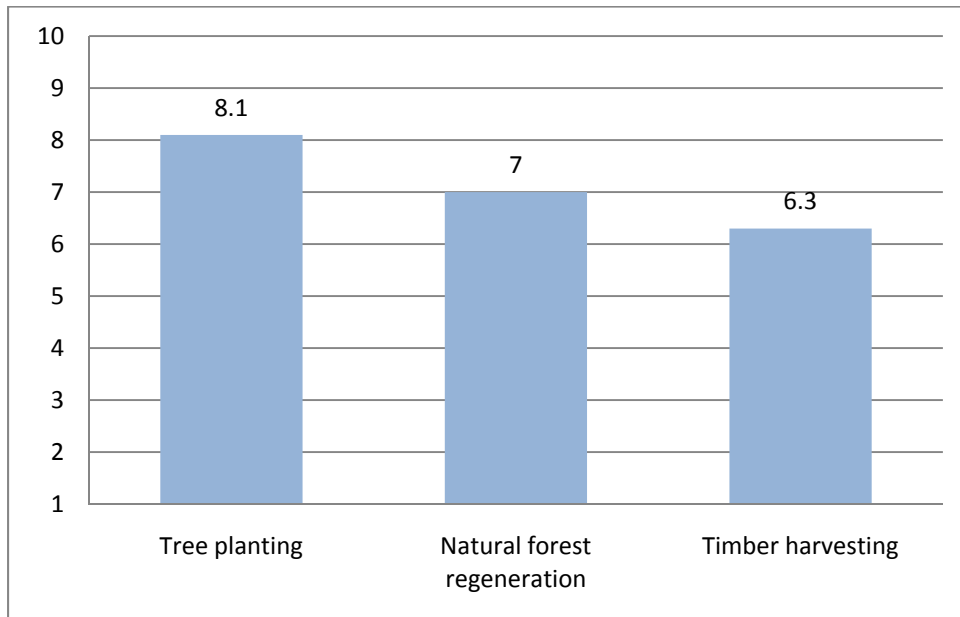**Figure 12 Trade-Off – Forest Regeneration**

Figure 13 Degree of Importance - Forest Regeneration

Relaxation of forest values to help with timber supply

Proportionately people reported feeling that, of all values listed, visual quality objectives could most be relaxed to meet timber supply. However a nearly equivalent number of people also reported feeling that none of the values should be relaxed, as shown in Figure 14. A similar distribution appears in Figure 15, where visual quality objectives were valued least and wildlife habitat and riparian areas were valued highest. Of note is the riparian category result. A number of respondents asked during the survey what the term "riparian" meant, though several others indicated they knew what it was from their forestry backgrounds.
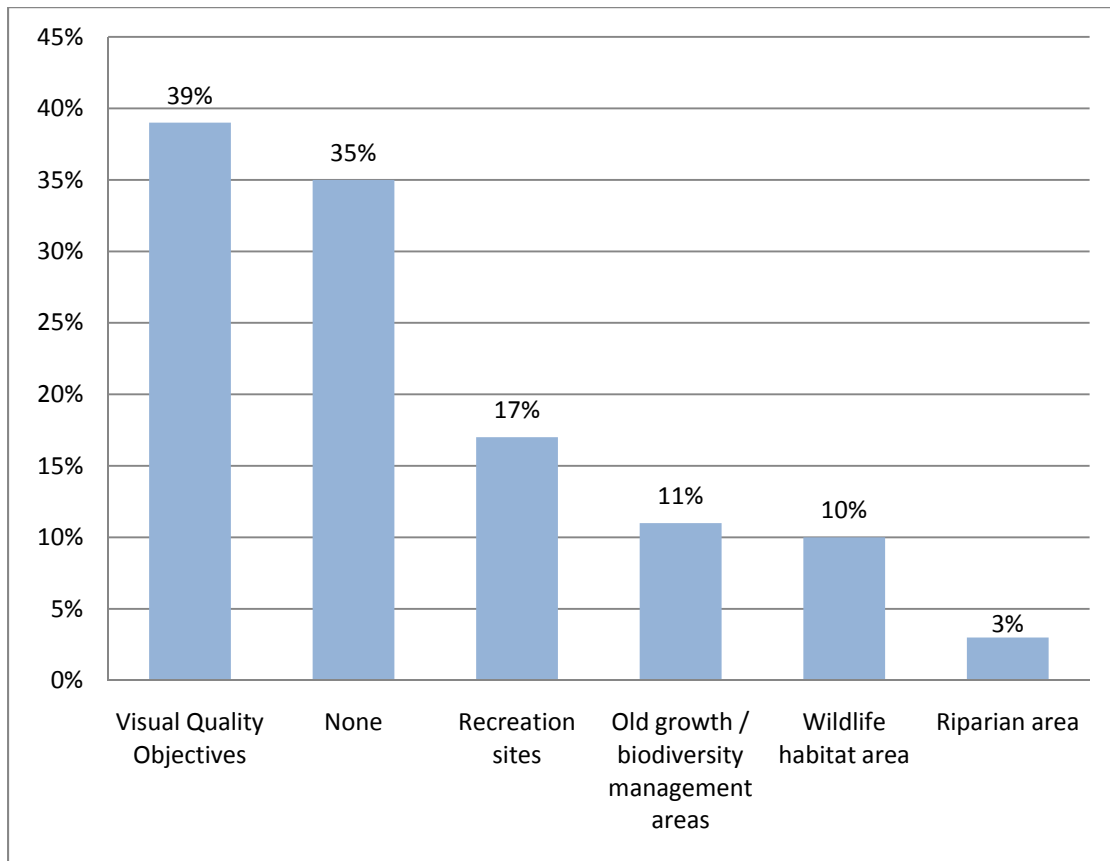

Figure 14 Preferences for relaxing forest values to help with timber supply
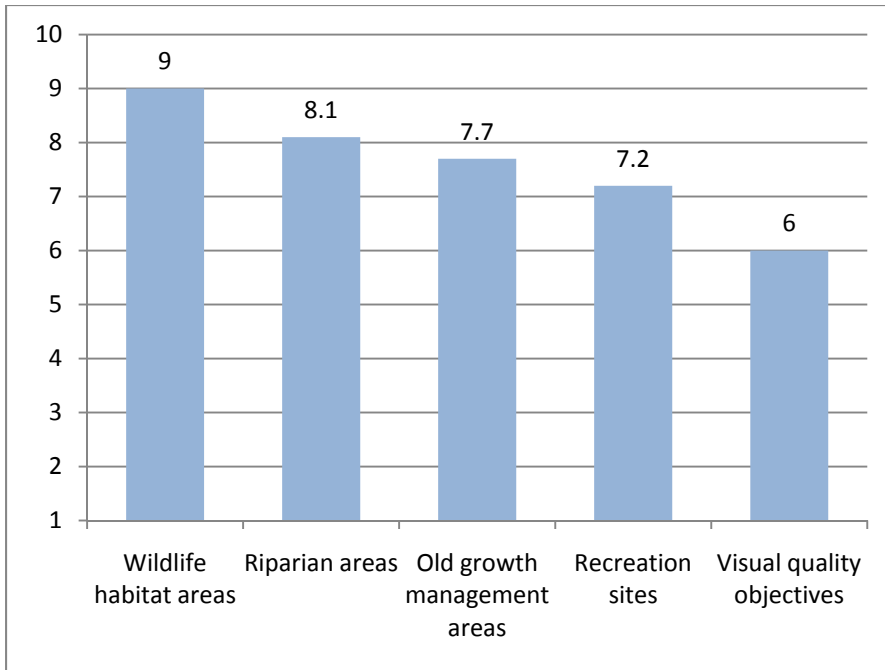
Figure 15 Degree of Importance - Forest Values

Preferences for recreating at sites where there is salvage logging

In the event of salvage logging, most people would continue to recreate in the same areas and at the same specific sites, as shown in Figure 16.
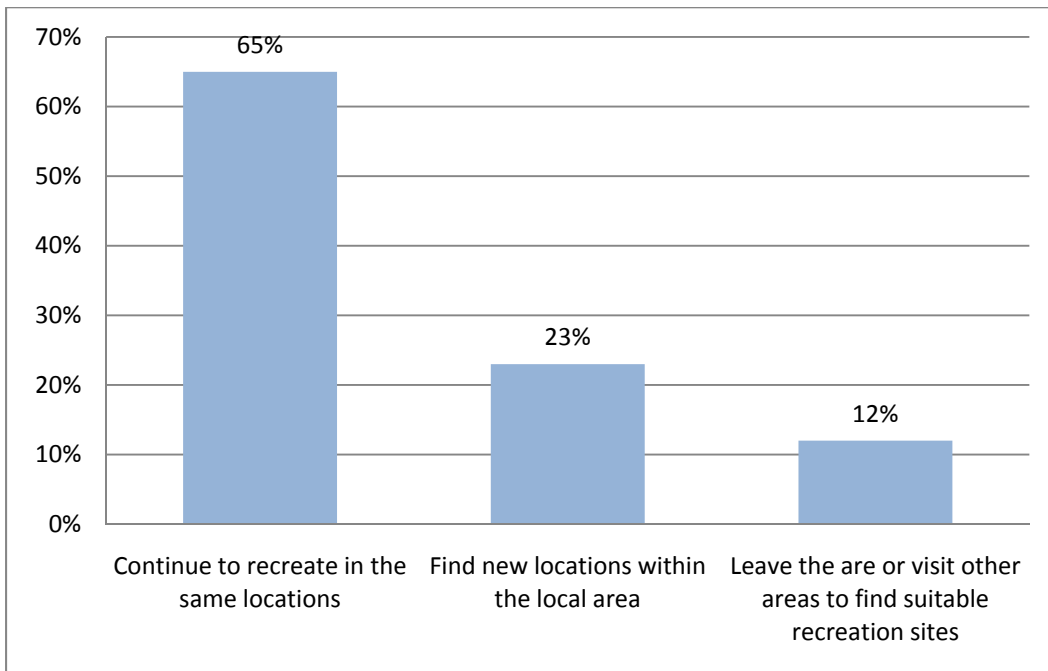

Figure 16 Preferences for recreating in sites if salvage logging is part of the restoration of the site

All forest values surveyed for degree of importance are provided in Figure 17. The highest reported values were for wildlife, fish habitat and riparian habitat, while timber harvesting, visual quality objectives and views from town were among the lowest reported values. These results may indicate that while timber harvesting is seen by many as a positive strategy for managing MPB affected forests (as indicated previously), several other non-timber values may have a higher level of overall importance for those who recreate in affected forests.
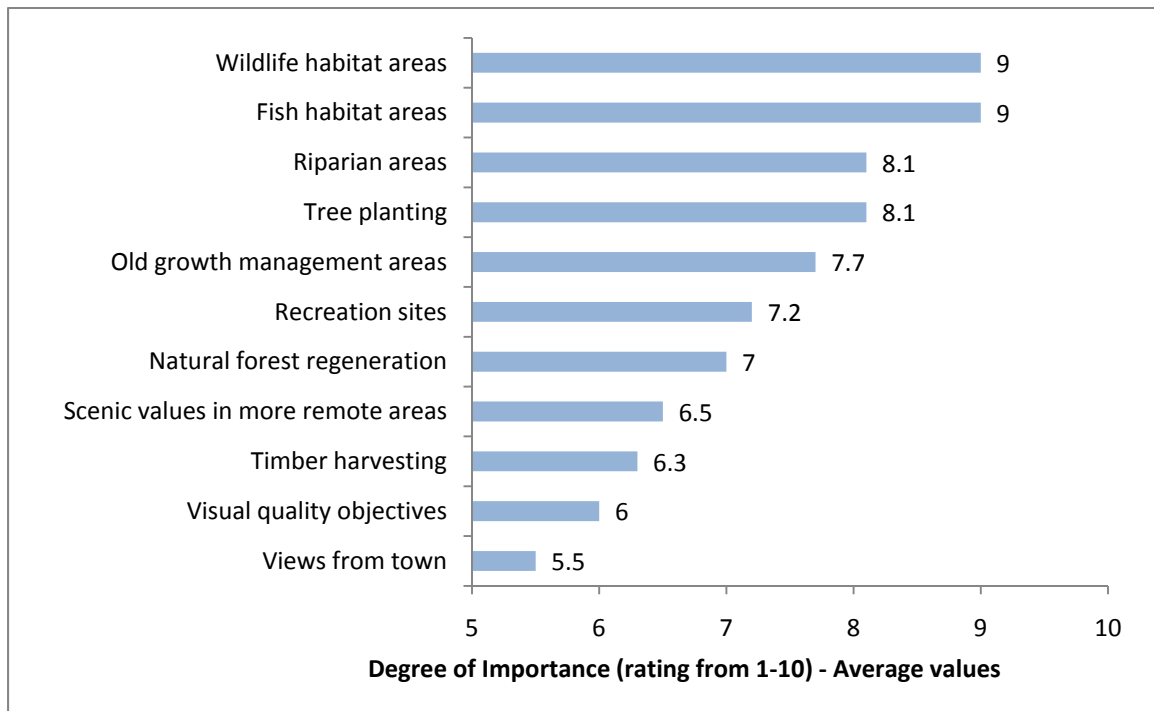
Figure 17 Degree of Importance of forest values (average values)

3.2.5 Demographics

Demographics, as shown in Figures 18 to 22, indicate that respondents were mostly male, had a fair distribution across age groups, were employed largely in non-forestry and non-recreational industries (12 people were retired and may have worked in either industry), and typically had a minimum of some post-secondary education. Figure 22 shows the distribution of surveys across communities.

Respondents by Gender

	Female	Male
	21%	79%

Figure 18 Gender

Respondents by Age

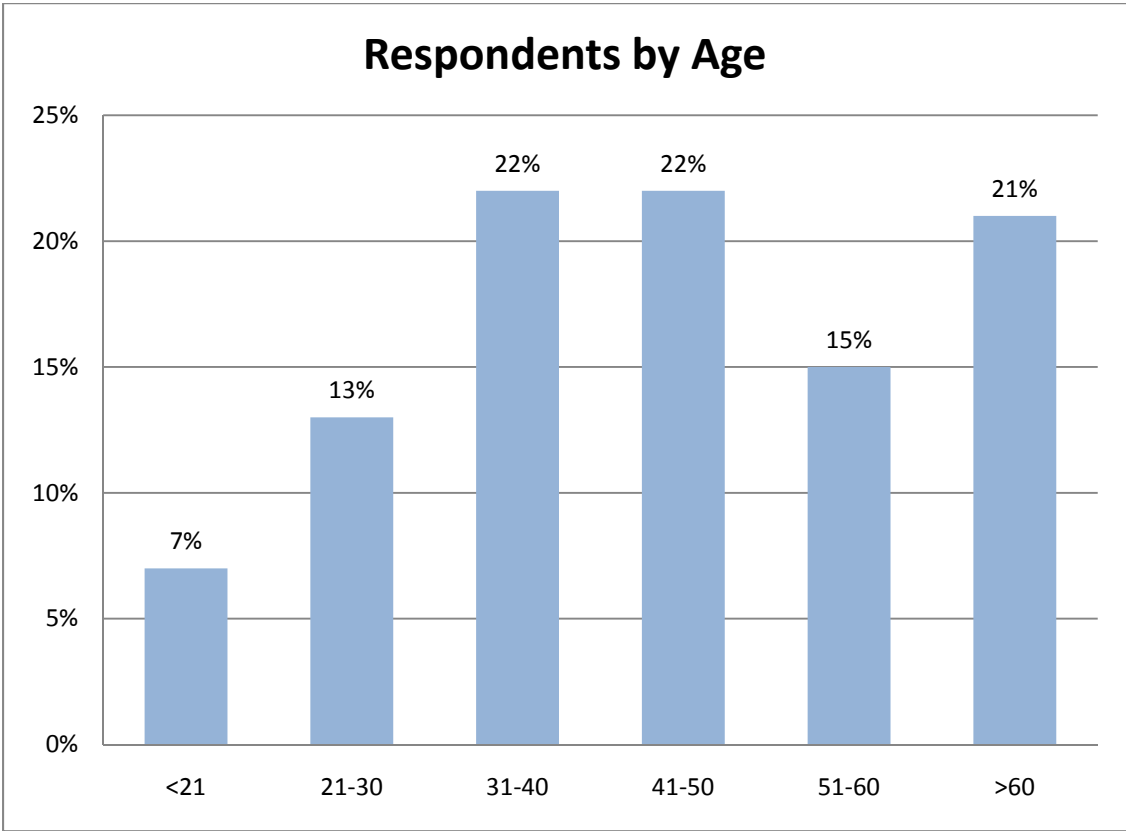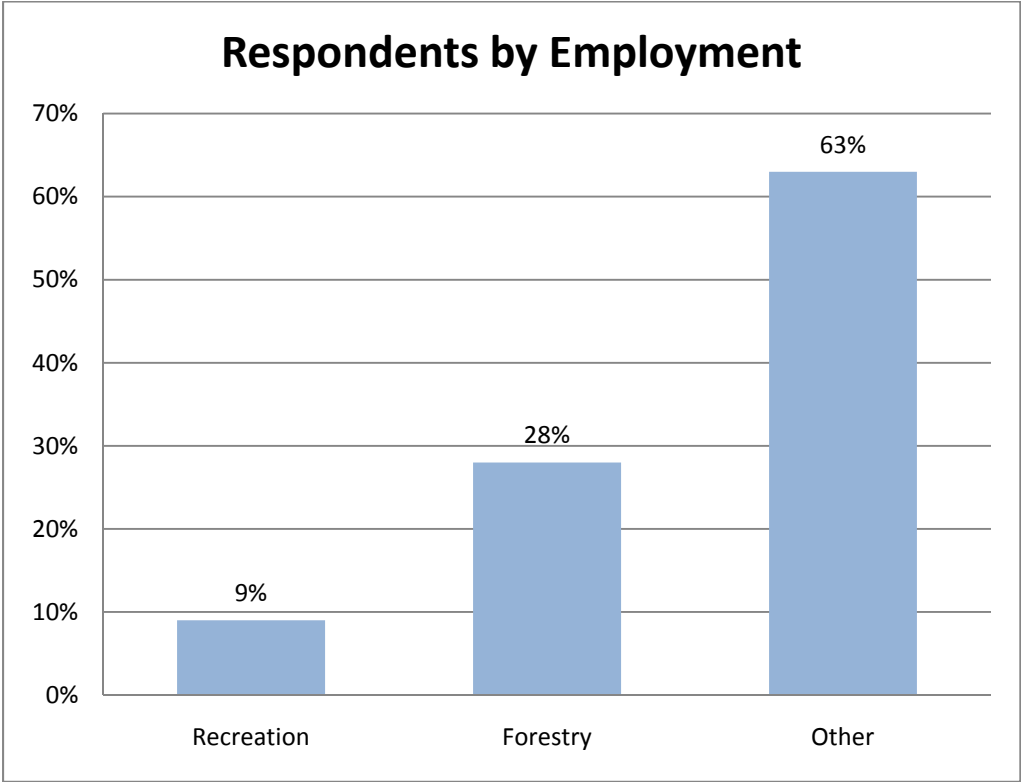| <21	21-30	31-40	41-50	51-60	>60
7%	13%	22%	22%	15%	21%
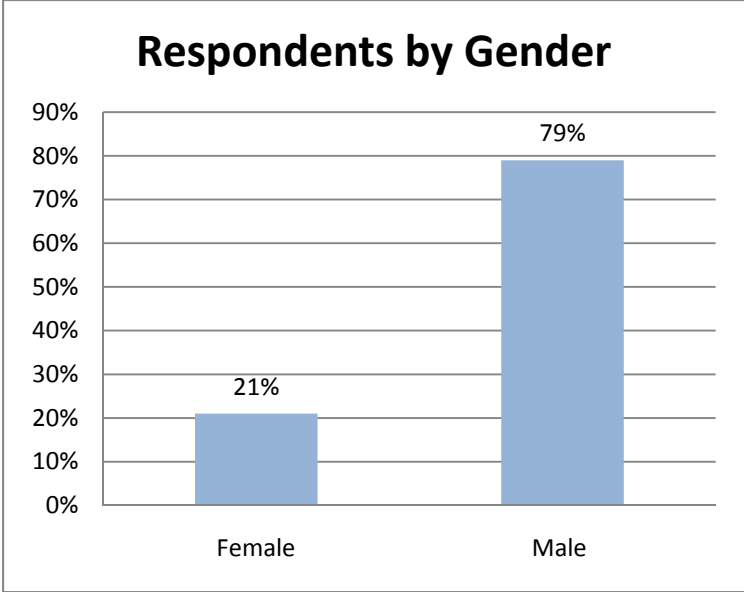
Figure 19 Age Range
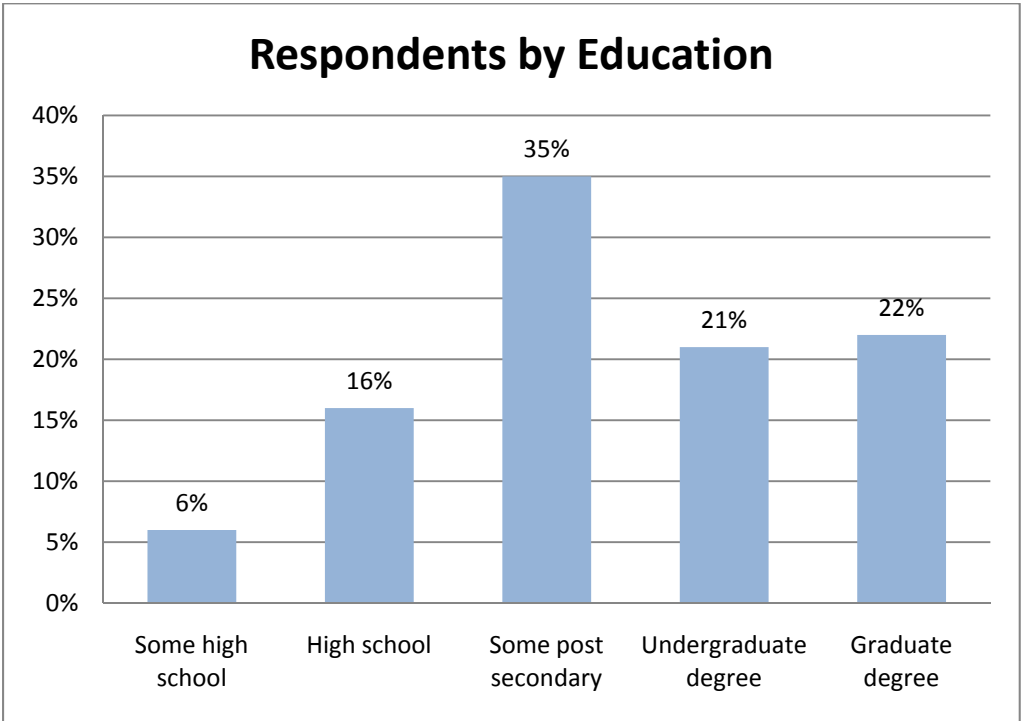
Figure 20 Employment Sector
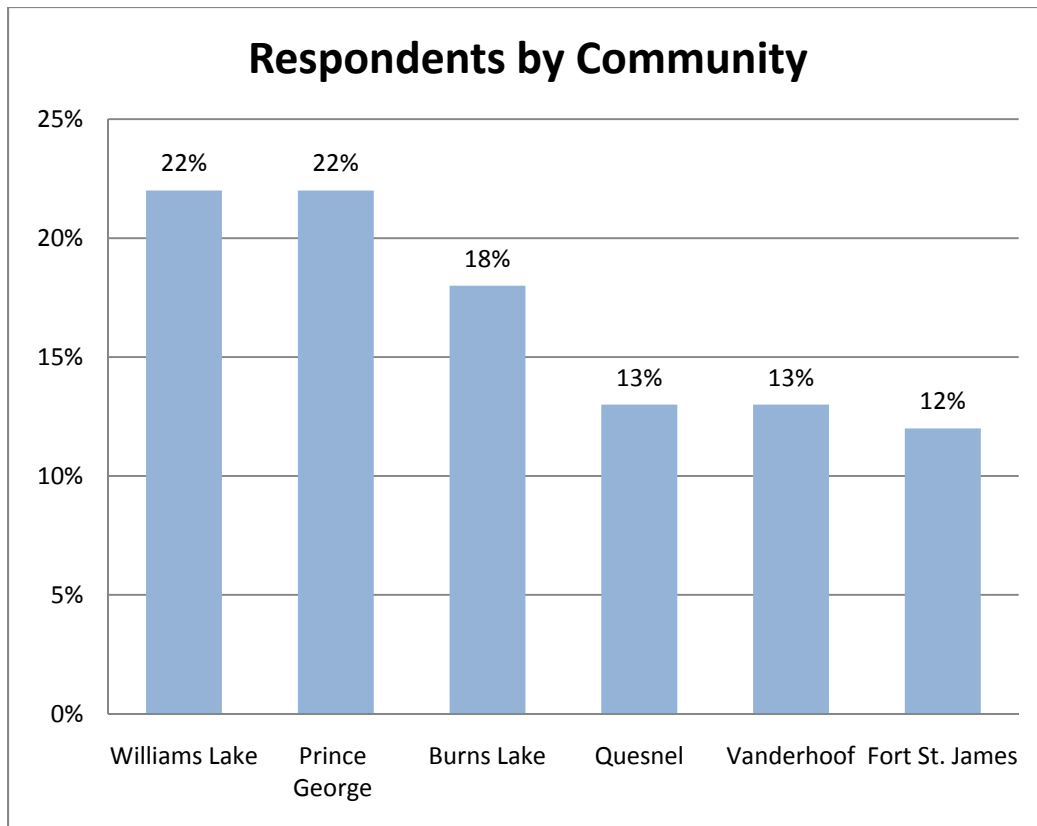

Figure 21 Education Level

Figure 22 Distribution of Surveys by Location

3.3 Discussion

A high-level review of the results suggests that the MPB epidemic has neither extensively, nor negatively, impacted local recreational activity in the central interior of British Columbia. At the same time, recreational activity was reported to be somewhat changed, both during and after a MPB attack. Discussions with survey participants highlighted several contributing factors for this apparent discrepancy. These factors included an increase of access to new sites due to new salvage logging roads, an increase of fire hazards from dead tree stands, reduced recreation access due to fallen pine trees, population migration, and changes in other personal circumstances, such as retirement and child bearing.

The recreational activities identified in this survey appear to be largely connected with wildlife (fishing, wildlife viewing, bird watching, and hunting), which may have contributed to the high reported rating of wildlife habitat and fish habitat values. Motorized activities, such as snowmobiling and ATV-ing, ranked relatively highly, though rarely were they indicated as the only user activities for a given area. Most recreation activities, including non-motorized ones, such as cross-country skiing and hiking, were at times reported as hindered by rotting grey pines

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that had fallen across the trails. One respondent mentioned cutting through 40 fallen trees along a trail in one day.

While approximately 43% of respondents strongly or somewhat agreed with harvesting of MPB affected trees at recreation sites, areas and on routes, the balance of results was not decisive, yielding an overall midrange score of 3.2 out of 5 in favor of harvesting at specific sites. One way of understanding this response is to consider that many of the sites listed may have already included harvest affected vistas (as suggested by some participants), so a level of acceptance may have already been in existence. A more refined question in hindsight might have included a portion that queried if harvesting was already taking place at the site. Most people said they would continue to recreate in the same area or location if harvesting were to take place (about 87%).

Planting outranked timber harvesting in terms of importance, with planting in 4th place and harvesting in 9th out of 11 values. Furthermore, planting after harvesting was the most preferred regeneration strategy (71% in agreement) over natural regeneration and planting without harvesting.

When forced to choose, 39% of respondents indicated that visual quality objectives (VQO's) were most easily relaxed constraint on harvesting. In addition, views from town, when compared with remote views, were seen as less important to protect. One possible explanation for this result is that visual quality has likely already taken a fairly large hit in these areas due to MPB. Also many of the views from towns already have been affected by clear-cuts. Furthermore, in the communities of Burns Lake, Fort St. James and Vanderhoof, grey forests are also visible on highways and along hillsides viewed from town. A few respondents from Burns Lake commented verbally that harvesting and replanting would be a form of protecting their "view" in town, and they would rather reforest their views more rapidly, than maintain the current view of grey forest.

This result should however be taken with caution as 35% of respondents indicated that no values should be relaxed to help with timber supply. This is magnified by the high ranking of habitat and wildlife values observed in this study. An emerging perspective from this research is an overall desire of recreators for the protection of several ecological values, over and above "recreational values" such as protection of recreation sites, views and visual quality objectives.

4.0 Informant Interviews

To gain a more in depth understanding of the impacts of mountain pine beetle (MPB) on outdoor recreation in the area, a series of semi-structured phone interviews were conducted across the same six communities as the survey. To complement the "individual" focus of the surveys, interviews were targeted towards club directors, tourism operators and business

owners who could speak to overall trends in recreational activity, based on their contact with group populations. Questions were geared towards the impacts of MPB attack on visual quality, and usage, as well as the acceptability of harvesting. Intersecting issues of post-mountain pine beetle forest management, and general views on forest management, (such as road access and debris) also surfaced during the interviews.

4.1 Methods

Twenty-five (25) telephone interviews with identified key informants from the communities of Prince George, Quesnel, Williams Lake, Burns Lake, Vanderhoof and Fort St James were carried out.

Initial contact was made by telephone or email, and following from this telephone interviews were scheduled. Informants were emailed a consent form, and consent was confirmed verbally at the start of each interview. Interviewed key informants were also invited to fill in a survey had they not previously done so. Informants were alerted as to where they could find further information regarding the research project, should they wish.

The interviews, lasting between 30 and 90 minutes, were conducted over a fourteen-day period that ran concurrently with the survey tour of the targeted communities. This was intended to take advantage of an anticipated cross-feeding of recommendations between both survey respondents and interview informants.

Informants were drawn from a selection of people that were either put forward by the community, self identified, or identified by the research team as likely to provide useful insights into the subject of recreational usage of the targeted post-mountain pine beetle affected crown land areas.

Attempts were made to include representation from a broad spectrum of outdoor recreational users, and identified interested parties, such as environmentalists and naturalists, forestry industry workers, local businesses specializing in recreational use and activities, and local recreation officers. Priority was given to informants that would be able to give feedback beyond individual use, either as a result of their position as a user group representative, or through an employment (including voluntary) and/or a business position that includes a substantial level of recreational user interfacing. Care was taken to ensure that informants were responding from a position of one or more years of recreational linked experience in a mountain pine beetle affected location within the target area. Informants were not selected on the basis of age, gender, education, ethnicity or other general demographic factors.

4.1.1 Sample Information

Table 3 - Interview sample by affiliation

Informants by Affiliation (*)	# of Respondents	Detail
User Groups	**14**	
Hunters/sportsmen		1
Snowmobilers		1
Skiers		1
Pony/Horse clubs		2
Birders		1
Trappers		2
ATV users		1
Dog Mushers		1
Cyclists		2
Naturalists/hikers		2
Recreational Business Workers	**4**	
Retail owner/operators		1
Lodge owner/operators		3
Environmentalists/ecologists	**2**	
Recreation officers	**4**	
Commercial Forest Sector Workers	**1**	
Total	**25**	

* Overlap was noted across activities

Table 4 - Interview sample by area

Informants by Area	#
Williams Lake	2
Quesnel	7
Prince George	7
Burns Lake	2
Vanderhoof	6
Fort St James	1

4.1.2 Other Sample Information

Location Origin of Users and Clients

The majority of recreational users and clients represented were from a local or provincial catchment and responded accordingly. A small proportion of informants (primarily the ecotourism recreational lodge operators and recreation officers) reported on international recreational user behavior.

Consumptive Use

Consumptive use, as reported in our samples, was almost exclusively fishing and hunting. Most fishing was reported as motorized. Hunting was a mixture of ATV facilitated as well as on foot, the latter included trapping. A small amount of horse feeding, berry collection, birch sap collection and other forest product collection was reported as consumptive.

Motorized and Non-Motorized Usage

For the purposes of this study it was assumed that all initial access was likely to be motorized. Only actual recreation activities that involved motorized use on site were counted as motorized here.

Recreational Usage Patterns

Usage pattern, scale and seasonality of use, was reported, with seasonal impact variables in response to mountain pine beetle noted. Frequency and change of usage was also noted.

4.1.3 Limitations

Informant numbers had to be limited to fit research time scales, and it was noted that more potential informants were available than the number interviewed. It is possible that the informants we were unable to interview may have offered other perspectives on the MPB experience.

Recreational user group membership size varied extensively across our informants, as did client base across recreational business informants, with both ranging from 10 to 10,000 individuals. The wide numerical variation in represented populations presents issues of balance and weighting that would make any attempts at generalizations based on this data inadvisable.

Informant numbers across the targeted communities were also mixed, with some communities better represented by informants than others. Not all regions are equal, and extensive regional

variation, both in MPB infestation, phase, and impact, as well as community response, was noted.

It should additionally be noted that all information was self-reported. While attempts were made within interviews to verify, and where possible triangulate, recreational usage and responses, the results of these interviews should be clearly understood to be situated within a subjective qualitative context. The primary value of these interviews lies in the deep personal perspectives they are able to offer, and the potential they have to inform future research.

Finally it should be acknowledged that while informants were selected as outdoor recreation users, and included a proportion of naturalist users as well as users with an environmental outlook, they were not necessarily always well informed as to good environmental management practices, such as sustainable harvesting practices, biodiversity management, and ecosystem management principles. These views reflect those of outdoor recreational users and should be appreciated in that context. Additional information would need to be sought in order to compile a balanced portfolio of needs for forest resource management of MPB affected areas.

4.1.4 Interview Structure

The interviews took a standard qualitative semi-structured interview approach. Feedback was specifically solicited for the topics below. Informants were, however, encouraged to interject at any time with additional information or thoughts relating to the subject area.

- User group regional distribution (local-provincial-national-international)
- Represented membership/client base size
- Experience in recreation activity/business field
- Experience in area reported
- Patterns of outdoor recreation usage (days/people/ numbers) incl. seasonal variation
- Motorized/non-motorized usage
- Consumptive practices as part of recreation activity
- Current phase of MPB infestation and any local specific impacts
- General Impact of MPB (dead trees and salvage logging of trees) over the last 15 years.
- Other factors (unrelated to MPB infestation) influencing recreational activity in the area over the last 15 years
- Visual impact of MPB (dead trees and salvage logging of trees) over the last 15 years
- Location usage change due to MPB over the last 15 years
- Acceptability of relaxing visual quality constraints in response to MPB

Informants were also solicited for any additional information or thoughts they would like to offer at the end of each interview, and given the opportunity to forward on any additional information by email or post afterwards.

4.2 Results and Discussion

As is to be anticipated from in-depth qualitative interviews, the resulting data is often complex and nuanced. At the same time, this data can potentially provide both depth and understanding to the quantitative data results, especially in areas where the numerical results may be ambiguous. One could read the following detailed sections through at least three broad lenses.

The first lens is to consider the many factors informing the views of informants, such as local versus international demographics, preferences for motorized and non-motorized vehicles, activity type, and preferred season. These, along with economic realities, education and values, inform perspectives, which are sometimes held passionately.

The second lens is through the perspective of "emotional charge". One of the most emotionally charged areas to emerge was that of visual quality. This charged response was reported towards issues of MPB visual quality, forest management in general, and to regeneration/planting. This is perhaps not surprising since similar findings emerged in the survey data as well.

The third lens is through the perspective of "acceptability". One of the most nuanced topics was that of the acceptability (or non-acceptability) of harvesting MPB affected forests. For example, acceptability of harvesting seems to come with conditions. Will the trees be replanted? Will debris be removed from the trails? Will roads be left for us to recreate on or will they be decommissioned? In a way, one could say that the *way* harvesting occurs is of as much, if not more, importance, as whether or not it occurs. This has a logical bearing since the informants interviewed are both connected to forest recreation and the economy of the timber industry

4.2.1 Recreational User Specific Information

Summary of Trends

- Local usage was more impacted by local economic trends, while international usage was more affected by changes in visual quality due to MPB, harvesting, and fires.

- Road access as a result of MPB salvage logging appeared to be a polarizing issue between motorized and non-motorized users, including decommissioning.

- Loss of pine trees has impacted on winter recreation activities, due to changing effects on snow quality, pathways and visual quality. Seasonal variations in recreation may provide windows for low impact harvesting operations.

- Salvage logging can either increase or decrease recreational use, depending on the activity. Family camping has been more adversely impacted than hunting and fishing.

- Overall, users reported little change in sites used as a result of MPB, and this was attributed to factors such as site loyalty, lack of good alternatives, travel time/cost issues, as well as pragmatic acceptance of MPB impact.

User Experience Based on Location Demographics

The location in which recreational users resided was reported to have an influence on their expectations, experience, and recreational behavior. Local users were frequently perceived to have different recreational requirements, behavior and responses, to those of international or Canadian outdoor recreation visitors, and were considered to be impacted differently by the MPB experience as a result.

Local users were reported to be more influenced in their recreation habits by the local economy. Short-term local economic slumps reportedly had the power to increase local recreational usage. Less work meant more time to get outdoors, increased subsistence consumption, and encouraged local vacationing over more costly international travel. Longer-term economic slumps however were reported to have a more negative effect on local recreational usage, especially those with high costs involved, such as motorized recreation. Likewise increasing fuel prices were reported to have a negative impact on motorized local usage (boats, ATV's, snowmobiles, horse transport). These factors appeared to have little impact on Canadian and international recreational use. Local users also seemed less likely than international users to move their base in response to MPB. Whether this was due to site loyalty, the disincentive of increased cost of travel (fuel and time) to new locations, or lack of alternatives (everywhere is bad) was hard to tell. There was also a level of local user acceptance for MPB that was mentioned, which may suggest that frequent local users had perhaps come to accept the new look of their area, and may therefore be less motivated to move.

Canadian and international tourists on the other hand were much more affected by the visuals of MPB, according to recreational operators dealing with these clients. They were reportedly shocked by the distant visuals at times, as well as the "on the ground" experiences of MPB infestation and associated harvested areas. Ecotourism recreational lodge operators, as well as recreation officers, were two groups who specifically commented on their perceptions of the negative affect that MPB and associated harvesting, was having on visitors to the area and the ability of the area to continue to draw international tourism. Some ecotourism recreational lodge operators reported such a high level of fall-off in international visitors over the last ten years that a re-branding of their resort and/or operations to seek new trade from local users was necessary.

Clear-cuts seemed to be a more negative visual problem for these international recreational users, than the unattractive, but natural, MPB affected dead stands.

> "The tourist base [Vancouverites, lower mainland, international] has a very negative response to cut blocks. They would much rather see dead stands than clear-cuts. Local clients are more 'cut it all now while we can' " *Recreation Officer, (5 years experience in area).*

Fire burned areas were also a negative aspect for international visitors, according to our informants in this area.

The more negative responses of international and Canadian recreation users and visitors to MPB conform to previous research results. This response may be understandable, when considered alongside local user acceptability over time. The described impact on local users of MPB infestation and salvage logging noted that the visuals for this group were at their most shocking initially. The increasing levels of acceptability over time, reported by some informants, may suggest that acceptability levels rose as users became more accustomed to the new look of their surroundings. This is consistent with perceptual findings in psychology that suggest mere exposure to stimuli elevates preference (Zajonc, 1980) as well as research that suggests that landscape preference is elevated for particular biomes the longer people live in them (Balling and Falk, 1982).

At least one informant posited the idea that large-scale signage along scenic routes and in scenic areas, aimed at explaining the MPB issue to international visitors may mitigate the negative impact. This may also be beneficial for local users.

User Experience based on Motorized and Non-Motorized Usage

The motorized and non-motorized use factor appeared to polarize views on the subject of harvesting, especially clear-cutting, and in particular around access road issues.

A number of informants commented on the increase in access roads that MPB salvage operations had brought, and the potential implications this had for traditional backcountry wilderness experiences as new areas were opened up. When active these roads offer a great potential increase in usage for motorized users especially, however they may negatively impact on many non-motorized users also.

Whether these roads should be decommissioned post-harvest, or not, was often an area of disagreement between user groups, as were the finer details of decommissioning practices. Non-motorized users generally expressed a preference for narrow access and tight trail definition, prohibiting motorized usage. Mixed usage trails seemed generally unpopular due to the hazards of mixed use between motorized and non-motorized users.

A few informants expressed the opinion that motorized recreational use was becoming more popular, as was recreational use closer to towns. Support for a variety of recreational needs,

including motorized and non-motorized usage, was discussed by informants. A need for more consultation between user groups, to find solutions, was also expressed.

User Experience based on Season

Seasonal variation also had an impact on recreation activities and experiences. Winter recreation users reported experiencing the MPB affected landscape, including clear-cutting, in a different way to summer users. Various issues specifically impacted on winter users that enjoyed a landscape covered with a layer of snow. For these users, loss of pine trees influenced wind patterns and shelter as well as snow melt rates. Route marking, and associated hazards were also impacted by loss of topographical information.

> "[Clear cuts have an impact on] ski runs, there is no differentiation of routes and lanes, it's all one big area with less diversity... there may also be a safety concern – [tree made] laneways are needed for funneling of safe numbers of skiers" *Ski club representative (8 years experience in area)*

 Skiers, as a user group, indicated a high degree of sensitivity to landscape aesthetics in general.

User Experience based on Activity

Certain recreational users were specifically identified as being more practically impacted by MPB infestation and harvesting. These impacts could be positive or negative for different users, and often tended to focus on trail use (see trail and access road clear up for more details). Responses were at times conflicting, probably reflecting the different values and practical needs that different users had for the land.

> "Salvaging dead pine doesn't reduce recreational opportunities; areas that are unsalvaged have a reduction in use…" *Forest worker and recreation user (13 years plus in area)*

> "There is no going in once its clear cut - for recreational users there's no need, or desire, to go to these areas." *Recreational fishing resort operator (7 years in area)*

Recreational campers were a group that in general were reported to be less bothered by tree presence and clear cutting, unless shade was considered a vital issue. Recreation officers had generally taken down MPB affected trees in recreation sites to address safety concerns; therefore dead tree stand options were not available to this group. It was reported that family campers as a user group had a more negative response to tree removal.

> "Family campers have dropped off, fishermen and hunters are not so bothered…Clear cutting has a negative impact on family camping, they want wind protection, green surroundings, shade in summer, an area pretty to look at. Clear cuts are aesthetically ugly, the wildlife goes, and there isn't weather protection." *Recreation Officer (5 years in area)*

User Experience Usage Patterns

General usage pattern information was discussed and showed clear concentration patterns for recreational usage of forested land. Since harvesting of MPB timber is disruptive in itself to recreational usage, this would be an area worthy of further investigation. Future research in this area may yield suggestions for harvest schedules that would minimize disruption for recreational usage, and may make harvesting more acceptable to certain users as a result.

In terms of changes as a response to MPB, information tended to be very site specific. Generally little change of usage was indicated by most informants for most local outdoor recreational activities as a result of MPB.

> "There is a loyalty to camp and recreation areas generally. People have been using them for 35 years" *Recreation officer (5 years experience in area)*

However there were some notable exceptions where use had been dramatically affected, both positively and negatively.

4.2.2 Background Attitudes to Forest Resource Use

Summary of Trends

- Commercial harvesting was considered (sometimes reluctantly) acceptable to varying degrees by local recreators with some positive factors associated with it.

- Clear-cutting was much less acceptable than selective logging among many, though low level acceptance of clear-cutting was also present.

The feelings reported towards forest resource use in general are pertinent to MPB specific harvesting, and therefore are summarized below.

Informants often described the harvesting of commercial timber as a local necessity and expressed, sometimes reluctantly, a pragmatic level of understanding for it.

> "The economies are forest based [here] and it's understood… This is landscape in evolution – there is a high level of acceptance." *Recreation officer (5-7 years experience in area)*

> "These are not nice clean habitats – most people understand this is a timber area." *Retired ministry environment/ naturalist (48 years in area)*

> "Most members don't want logging – period, [but] they regard it as a necessary evil" *Bird club representative (14 years in area)*

Perhaps for these reasons commercial harvesting was rarely ruled out entirely and some informants mentioned positive factors associated with harvesting. These reasons included a potential increase in variety of recreation landscape experience. Informants commented that continuous tree cover could be too shady in winter, relentless on long trails, and often lacked viewscape opportunities. The potential reassessment of landscape design for recreation usage was also mentioned, with harvesting allowing the opportunity to put in new trails for motorized and non-motorized usage. The issue of increased harvest access roads also was raised as allowing potential for recreational usage in both active and decommissioned states.

The details of harvesting methods were clearly important to many informants, and their represented users. When harvesting did take place selected logging, rather than clear cutting, was often preferred for recreational usage. There were a number of reasons that informants identified for this.

> "The clear-cut's impact more [than selective harvesting], they ignore trails for hiking, snow mobiling, horse riding, ATVs… we loose [entire] trail sections to clear cuts"
> *Mountain recreation user group representative (15 years experience in area)*

> There is some acceptance [among customers] but some find clear cuts very disturbing because they want wilderness" *Nature based tourism operator (8 years in area)*

Clear-cutting was sometimes described as a "greedy" forest practice, even disrespectful, since its perceived focus was on maximizing profits and minimizing costs. It was also sometimes described as a wasteful forest practice, because trees were cut en-masse, with the good wood being trucked away and the poor wood burned, resulting in unnecessary destruction.

> "In the central interior clear cutting is a way of life, a huge wastage goes up in smoke in October – there are 60 by 15tft high piles every 200 m – it's a huge heating resource, the waste makes you feel ill" *Environmentalist/biologist and recreation user (25 years in area)*

Clear-cutting in this respect was sometimes perceived as a poor long- term strategy for sustainable forest management. Clear-cutting was generally also seen as the least environmentally friendly harvesting method for wildlife and ecosystems.

> "Clear-cutting changes the environment from shade to desert and may change the whole ecology of an area" *Horseback rider (35 years experience in area)*

> "Clear-cuts are negative for hunters from the point of view of taking away cover [from the moose] – it's too easy hunting" *Traditional hunter (10 years experience in area)*

However, clear-cutting was not universally disliked. There was some low levels of acceptance/liking expressed for clear-cutting that were founded on a view that it is an efficient modern forest practice that allows for economic harvesting to take place, bringing jobs and employment opportunities for the local communities. Another pro-clear cutting view expressed

by a few informants was that concentrating clear cutting intensively in some areas enabled other areas to be left untouched.

> "Timber areas impact and reduce recreation areas available… [Therefore] timber land must be productive so as to allow recreation land to be maximized." *Pony club representative (20 years experience in area)*

4.2.3 Attitudes towards Mountain Pine Beetle (MPB) Management

Summary of Trends

- Harvesting MPB forests appeared to be more acceptable than harvesting in general.

- Reasons for increased acceptability of harvesting included faster regeneration and a desire that timber resources not be wasted. Clear-cutting however continued to have mixed acceptability.

- Several informants were in favor of leaving dead tree stands for habitat value, erosion control, river protection, snow retention, and lower fuel loading (due to dropped needles).

- Informants spoke about being the "aftermath" of MPB attack and a sense of "gold rush" salvage logging.

A variety of opinions were expressed for the management of MPB affected areas. There was a level of acceptance to MPB associated harvesting (usually clear-cutting) from informants that appeared higher than that for non-MPB harvesting levels of acceptance. This varied in scale of acceptance and enthusiasm.

> "I understand there isn't an option, I understand the trees are dead, I understand they must get some economical value while they are still useful... I can understand natural regeneration, [but] this is a logging town." *Dog musher (33 years in area)*

> "In ecologically appropriate places clear cutting is OK – it's the fastest way to deal with [the pine beetle] and great wood to use" *Horseback rider (35 years experience in area)*

> "I don't mind the cut blocks – they green up in 3-4 years – there's no resistance to cutting out dead trees" *ATV user group representative (7 years plus experience in area)*

These higher levels of acceptance were usually tied to detailed and specific conditions or circumstances. While blanket lowering of clear-cut acceptance was occasionally expressed, many informants made a point of saying that blanket lifting of harvest levels, clear cutting etc, was specifically not to be agreed to.

Some specific factors and circumstances that may positively influence acceptance of clear-cutting, as a dead tree removal technique, were identified by informants. A number of informants expressed a preference for harvesting in order to speed up forest regeneration. Other informants were pro clear-cutting specifically for reasons of forest timber resource (to maintain jobs, speed up the new planting cycle, and avoid wastage of good wood).

"Get the [pine beetle] wood out…use it for something rather than [let it] waste." *Snow-mobiler and ATV user (35 years experience in area)*

However there was also much opinion against clear-cutting expressed, and clear-cutting was sometimes viewed as a covert way to harvest other more valuable timber, standing within the pine areas, that wouldn't normally be allowable harvest.

"The cut blocks are very defined, there is no selected logging at present. They are taking at least 20% live spruce also…they lay cut blocks for pine purposely to get the spruce [with higher economic yield] in the pine." *Nature based tourism operator (8 years in area)*

There were also many informants in favor of leaving dead tree stands. MPB tree stands were identified as a useful habit, despite being dead. Some informants noted their specific uses to wildlife, such as understory habitat cover (for a large range of different species), dead wood for nesting and food, alternative live trees species, natural regenerating undergrowth, and ultimately full regeneration.

"Interior forest conditions are left [after pine beetle infestation]. Its never really 100% dead – there's still a lot of structure and habitat for birds." *Environmentalist/biologist and recreational user (25 years in area)*

In terms of regeneration dead tree stands were considered by some informants to regenerate as quickly as cut blocks, if not faster, and at less cost to wildlife and tourism than clear-cutting and replanting. This natural regeneration was sometimes seen as preferable to replanting with monoculture "fiber farms".

"Despite the majority of the pine trees having been killed in these stands, there are always a few that somehow resist the beetle and these, we presume, are genetically different. If we clear-cut, we lose these and the chance that naturally resistant strains can survive." *Biologist and ecologist*

Dead tree stands were thought by some informants to offer better erosion control and better protection for river courses and the lake habitats fed by these rivers. The poor habitat value of clear-cuts in comparison was noted, with several respondents likening clear-cuts to a desert from a wildlife perspective.

"There is some reduction [in habitat] due to the dead pines, but it's even worse after a clear cut – the habitat is eliminated. It's good for moose, but if they use herbicides on the undergrowth even this will go." *Nature based tourism operator (8 years in area)*

"I have members in areas that are being harvested and it's devastating – some have stopped trapping completely, there is no timber cover, no habitat for fur species. The animals have all died and perished, regeneration doesn't take place. It will take 40 years to recover back to conditions pre clear cut" *Recreational trapper (12-15 years in area)*

Dead tree stands were also, as previously noted, considered by skiers and snow-mobilers, to retain snow areas better than clear-cuts, which were considered vulnerable to melting as well as wind. Dead tree stands also were valued for offering markers to assist skiers and snow-mobilers in route finding.

One informant identified that dead trees, once needle drop had occurred, may be more initially combustible, but represented less of a hot fire risk than generally believed, due to their lower fuel loading. Other informants were extremely concerned about the safety aspects of increased fire risk (see safety concerns).

It was noted that views in favor of clear-cutting appeared to be slightly more common in areas with a strong timber mill industry, or where informants had more links to the industry. These informants often expressed a pro clear-cutting opinion that appeared to originate from a pragmatic belief that clear-cutting as a form of salvage harvesting might potentially be the only economically viable and safe option for certain situations; for example where the salvage timber was of low value and the cost of selective logging would be too high, or where safe practices would prohibit workers selectively logging in dangerous areas. In these cases mechanized logging may be considered as the only viable option of wood removal.

Some informants commented specifically on the changing practical impact of the management phases. In full swing the general upheaval of the MPB associated harvesting clearly impacted significantly, according to informants.

"The harvesting has had the biggest impact – it's terrible, horrible, has decimated our sport… every area is being logged that we take dogs" *Dog musher (33 years in area)*

"Currently we are seeing a rush to salvage… Without mountain pine beetle not so much harvesting would be likely" *Mountain bike user group representative (3-4 years in area)*

"Mountain pine beetle necessitates a high level rate of harvesting. The current rate blows people away, the last five years especially" *Retired ministry environment staff/ naturalist (48 years in area)*

Informants, in areas more advanced, expressed a sense of stabilization. There was a sense of a 'post-mountain pine beetle' phase expressed by many respondents that differed from their sense of the situation 5-10 years ago.

> "Pine beetle was good for logging initially, there was a huge harvesting policy. Now the wood is deteriorating and the logging has fallen off." *Nature based tourism operator (8 years in area)*

> "Now we are dealing with the aftermath, it's a steady clear up...post- crisis" *Recreation officer (6 years experience in area)*

> "[Mountain pine beetle is] old news now." *Mountain bike user group representative (7-10 years in area)*

4.2.4 Attitudes to Mountain Pine Beetle (MPB) Post Harvest Treatment Methods

Summary of Trends

- Harvest debris was a polarizing issue among informants. Trappers and hunters were in favour of leaving debris for animal habitat. Those who recreate on roads and trails were especially concerned with safety and fire risk.

- Horse and pony riders and mountain bikers desired more clean up along trails and rehabilitation of recreation areas.

- Access road clean up was a polarizing issue. Motorized users preferred access roads left, while non-motorized users disliked the extra access roads for a variety of reasons. These included the loss of wilderness experience, mixed use hazards, and a concern that the frontier of untouched landscapes was being eroded.

- When access routes were left motorized users were in favour of minimal road deactivation, seeing deactivation measures, such as culverts, as posing a hazard.

Specific opinions were offered regarding post harvest treatment. Attitudes towards clean up of harvest debris were very polarized and there were a very wide variety of feelings expressed over how things should be left post-harvest of MPB areas. To some extent these may again replicate feelings about post-harvest areas outside of MPB affected tree stands. However there was also clearly reflected in some informants an increased desire to reset the balance and "get over" the whole MPB episode, which for many was identified as an upsetting chapter in their lives. This emotional element may be reflected in choices of post- MPB harvest treatment options and must be born in mind. Two phases were specifically identified as part of the post harvest process - clean up and regeneration. Informants advanced various responses for these phases.

General Clean up

In terms of general clean up the negative aspects of large woodpiles, burned or unburned, and unattractive access roads criss-crossing the landscape were highlighted as undesirable.

> "Some riding in cut blocks [when new] can be shocking and scary and sometimes debris prevents usage" *Pony club representative (20 years experience in area)*

Some informants expressed concern regarding the fire risk of remaining debris, also beetle spread risk. Some informants however had opposite views regarding general clean up of debris. Many informants expressed no desire for a tidy up but instead talked about the importance of leaving debris (however unattractive) for ecosystem regeneration as well as wildlife habitat.

> "A desire is often expressed not to clean it up too much… there is value in the debris for animals" *Retired ministry of environment staff/ naturalist (48 years in area)*

> "The timber that's felled makes great hotels for pine martin, they like the debris on the ground. For mice and voles it's a great habitat, the fallen wood." *Recreational trapper (12-15 years in area)*

Trappers and hunters were outspoken regarding the need for cover to be left for animals. One trapper was very definite that he considered the MPB in his area had been a massive boon for wildlife, since it meant that much more "wildlife valuable" dead woody matter was being left than had been left for the last 30 years of conventional forestry, and that this dead woody matter was vital to the health of the ecosystem. His preference was for no harvesting at all however, to leave the maximum dead tree habitat available for wildlife.

Trail Clear up

Some informants specifically wanted all debris near trails "tidied up" well, and for these users clean clear-cutting could even be considered a positive benefit to their recreation usage.

> "[Mountain pine beetle in Burns Lake] is a big success story [for mountain bike trail development]. There were no designated bike trails in Burns Lake beforehand… now we have international recognition from the mountain bike community" *Mountain bike user group representative (3-4 years in area)*

Specifically mentioned, as negative post harvest elements were unattractive piles of debris, hazardous stumps, unattractive burn piles, hazardous post harvest dead wood logs and debris left near and across trails, widespread destruction of trails and recreation areas without rehabilitation after harvesting. Users who mentioned this were horse and pony riders, and mountain bikers.

"I don't like dead trees lying around obstructing trails, it's like someone dropped a box of dry spaghetti" *Mountain bike user group representative (7-10 years in area)*

Access Road Clean up

The informants response split here was mainly between motorized and non-motorized usage patterns, with amounts of ambivalence shown at times. Many informants identified the threat that the increase of access roads put in to service MPB salvage posed to the backcountry wilderness experience, as well as to sensitive wildlife species that benefited from previous non-existent, or poor, access.

"The big increase in harvest level enables us to get to access new areas, but at the same time it's good to know that there are some hard to get at areas without road access, it's really important to feel that spiritual feeling of wilderness…. I prefer not to be able to drive to every single lake." *Environmentalist/biologist and recreation user (25 years in area)*

Some informants reported having to travel further and further to get to the "untouched" backcountry. Some informants also reported a concern that this was a negative cycle, as logging in response to MPB infestation continued to penetrate the wilderness more and more deeply. Others, especially motorized transport users, reported relishing the extra access that these roads afforded them.

"Clear cuts have opened up more areas for snowmobiling. The logging roads have opened up access…. ATV's are very popular now… they have increased 400% in the last 10 years… [In part] due to better access to back country roads" *Snowmobiler and ATV user (35 years experience in area)*

"The new access roads opened up are a bonus for ATV and hunting… the moose like the open areas" (re clear cuts and access roads). *ATV user group representative (7 years experience in area)*

Some users (snow-mobilers, ATV and 4X4 users) were able to access the logging roads while they were still active; either out of hours, out of season, or with careful precautionary driving. The hazard of encountering "wild" logging truck drivers that were "paid by the load - not the day", was mentioned a few times as prohibiting much access when roads were truly active. There were also conflict issues between recreational users, as previously detailed. Horse riders and mountain bike users were not considered to mix well with ATV users on trails and access roads.

Access Road Deactivation Methods

Opinion regarding deactivation methods best suited for these access roads was mixed. While some users reported preferences for total deactivation, others preferred roads left as they were for full access and use. Motorized users were generally in favor of minimal deactivation, and often expressed the additional concern that culverts and other deactivation measures were found to be substantial driving hazards by their user groups.

> "The water bars put in [when roads are deactivated] are a major problem… we call them "tank traps" they are a hazard, and much too extensive" *ATV user group representative (7 years experience in area)*

Regeneration

Informants generally preferred multi species replanting to single species planting. Complete natural regeneration was also mentioned as an option. Both were considered options that may prove more resistant to future MPB attack.

> "[Clear cuts] over 10 hectares should be replanted with mixed species and different seed stocks…Douglas pine, and experimental research into different strategies" *Recreation officer (5-7 years experience in area)*

Resistance to herbicide spraying (to speed up pine tree success and growth) was expressed more than once. Resistance to fertilizer use was also expressed, although some informants were in favor of it, if it would speed up regeneration.

4.2.5 Attitudes Towards the Visual Impact of Mountain Pine Beetle (MPB).

Summary of Trends

- Visual responses to landscapes in general and MPB specifically were found to be extremely emotionally charged, with a sense of devastation and loss expressed for the altered landscape.

- Perhaps because of this there was an increased acceptability expressed by some for clear-cutting and replanting if it would speed up regrowth and renewal.

- Views were mixed over responses to the MPB phases. The red phase of MPB was the most shocking phase for many. However while the grey phase had lost all aesthetic value for some, others felt the grey blended in better with surrounding green trees.

- Sensitive clear-cutting increased acceptability of clear-cuts.

- Replanting with mixed species was preferred.

Attempts were made in the interviews to separate and discuss specifically the visual aspects of MPB impact. Some informants had obvious difficulty separating visuals from other responses to MPB – when they viewed a landscape it's "look" appeared to represent more than just the surface aesthetics but also other values such as the perceived naturalness, wildness, healthiness, state of regeneration, timber resource, and habitat richness that the landscape could boast.

> "It's important to have a nice vista to ponder on a daily basis – to drink in a pleasing vista. Traditional views are very important, a sense of being part of nature. We [trappers] have 450 years of early settler experience, and remain as the eyes and ears of the landscape." *Recreational trapper (12-15 years in area)*

Many people, even pragmatic seasoned forest and resource users, appeared to have been deeply shocked by the changing face of MPB landscapes in their areas, and possibly as a result many appeared more emotional when discussing the aesthetics of affected landscapes. As a consequence informants expressed their responses to visuals using very strong emotional language at times. Sadness, as well as disappointment, was expressed towards a sense of environmental destruction, both natural and manmade.

> "Flying over it looks devastating from above, on the ground its only 50% noticeable… it's ruining our area – both dead wood and clear cuts" *Bird club representative (14 years in area)*

For some of these people the MPB impact (and to some extent the salvage harvesting also) was a destructive blight that had taken over their land, and they appeared keen to blot out the memory of it and move on as quickly as possible. This group sometimes seemed to favor regeneration that was perceived as fast, as a result. This is reflected in the increase of acceptability expressed for 'salvage log and replant' action in response to MPB.

> "There is a sea of dead trees and people don't like it… they are generally not impressed with dead trees… they'd prefer to see harvesting… they want them green again" *Forest worker and outdoor recreation user (13 years plus in area)*

In summary, visual preferences for MPB impacted landscapes appeared to be the most emotionally charged area of responses, not because people necessarily prioritize aesthetics over other values, as the survey shows the opposite may be true, but because looking at landscapes seems to provoke an emotional response by its nature, which may embody many other mixed feelings and interests. This result urges caution when interpreting low valuations of visuals when compared to other forest values as the response to impacting them will undoubtedly be felt deeply by community members and often results in a passionate response.

Informants reported that they often didn't talk outright about the visual aspects of landscapes in which they recreated, but none the less felt things deeply about aesthetic values.

> "Serenity and wild place aesthetics are important even thought they are not discussed. These are gorgeous places, there's a beauty of the area and wildness …" *Traditional Sportsman (10 years experience in area)*

> "People round here are proud of the appearance [of the landscape] and where they live, visual quality is important here" *Bird club representative (14 years in area)*

Attitudes to the Visual Impact of Pine Beetle Dead Tree Stands
Red and Dead or Ghostly Grey

While a few informants expressed a positive view of the initial red phase, finding it relatively pretty and likening it to the fall color, the majority of the informants reported finding this phase the most shocking and upsetting. This appeared to be partly because it was initially perceived to have happened quickly (sometimes within days) and was a stark contrast to the green, but also because the arrival of red-dead trees seemed to herald a significant, and perhaps ominous, change and fear for what was to come.

> "It was most upsetting at first - people were very bothered by the look, they were shocked at first by the dead wood. Now they are getting used to [mountain pine beetle visuals] and it's improving – you can now see the green… regrowing" *Recreation officer (6 years experience in area)*

> "When the trees were red it was really noticeable, stressful and upsetting." *Nature based tourism operator (8 years in area)*

However it is important to note that the feelings towards this phase are not only reported in hindsight within this report, but may also be colored by what has happened subsequently, in terms of harvest as well as fires.

The grey following needle drop appears to have had a more mixed response on a visual level. Some informants obviously disliked it visually a lot, likening it to skeletons, and feeling it had no aesthetic value remaining.

> "People do comment [about the mountain pine beetle visuals] – the red was pretty, but now it's dead sticks, its more 'oh wow, the forest is dead'" *Recreational fishing resort operator (7 years in area)*

> "Worst impact is the last 3-4 years [the red was preferred] now the needles are gone it's even worse, just grey skeletons, especially in summer – it's not pretty any more" *Snowmobiler and ATV user (35 years experience in area)*

For many the trees in this phase seemed to be pointless to keep as a result. It is possible that retention of these stands for these informants represented an uncomfortable passivity in the face of the infestation, since a strong sentiment advocating "doing something useful" with them was voiced by some informants. It is possible that a perceived lack of any value, fed by the loss of aesthetic value, may have resulted in this more favorable attitude towards harvesting of the grey dead tree stands, while the wood still had some economic value.

Other informants however appeared to feel that on a visual level the grey actually blended in better with the green of living trees, and as a result found the grey phase more acceptable than the red. This was especially true if, a few years down the line, some re-greening became visible in the understory.

> "We've been five years now in the grey phase, it blends in much better, especially in summer, and is not as dramatic as before… Considerable regrowth can be seen now under grey trees" *Nature based tourism operator (8 years in area)*

Some recreation business informants reported very little impact from the changing visuals of MPB, others reported a big shift.

> "We've had no loss of clients noticeably; our clients seem to see it as a natural occurrence." *Nature based tourism operator (8 years in area)*

Attitudes to the Visual Impact of Pine Beetle Harvesting

Clear-cut Visuals

Possibly the least favored harvesting option amongst our informants on a visual level were traditional clear-cuts, and much was discussed regarding the unattractiveness of clear-cut aesthetics in general. For some informants clear-cutting is not acceptable however it is carried out.

> "The public are insulted by clear cut blocks, they look like a virus on the planet, a disease on the landscape" *Recreation officer (5 years in area)*

> "Clear-cuts made a big ripple, people care a lot about their favorite areas. It takes 5 years to get over it – the initial shock value" *Recreation officer (5-7 years experience in area)*

When clear-cuts were accepted, it seemed that this was despite the unattractive visual quality of them. Despite dislike of clear-cuts in general there appeared to be a number of factors that were able to mitigate the negative aspects for many of our informants. One of the primary responses was how site-specific acceptability of clear-cuts was; there were certain places where informants suggested that sensitive clear-cutting may be more acceptable than others, with limitations, and dependant on what followed next.

"I am pro clear-cut if they are properly managed to regenerate [habitat], not if it's half hearted rehabilitation" *Ski club representative (8 years experience in area)*

Clear-cutting in asymmetric shapes was definitely considered more pleasing than checkerboard squares that were felt by some informants to dominate the landscape in certain areas.

"How we harvest is everything, a square cut block on the side of a mountain has a very negative response. Anyone can tell if there is respectful use, or not, by this – its visually unappealing…" *Recreation officer (5 years in area)*

Feathering of the edges of clear cuts was also favored, which was also considered better for wildlife use. Size of clear cuts was important for some informants, however some rated shape more important. There was a slight split of opinion here with some informants favoring more small openings and other favoring a larger single opening that mimicked a natural disaster event, such as fire.

Issues of visuals were very tied up with wildlife management preferences here, making the motivations hard to detangle. Modeling potential clear-cut look and impact using computer models was advocated by one informant, who drew attention to the problem that much planning happens in 2-D, when in fact the areas concerned are 3-D.

Another discussion was the look of clear-cuts in the future. While many informants voiced the opinion that a few years on clear-cuts were visually unnoticeable, other informants expressed the opinion that clear-cut visual 'damage' to the landscape could be seen for up to 40 years.

"I don't mind the cut blocks – they green up in 3-4 years." *ATV user group representative (7 years plus experience in area)*

"It's a short-term gain for industry, with huge long-term loss for recreation and tourism. It'll take 40 years before it looks natural again. Sure it will look Ok after 10 years, but you will still be able to see [the clear cuts]." *Nature based tourism operator (10 years in area)*

"Clear cuts show subtle signs for 40 years" *Nature based tourism operator (8 years in area)*

Selective Logging and Mixed Species Replanting Visuals

Unsurprisingly selective logging was considered the most acceptable harvest method from a visual perspective.

"I am not outright 'do not touch it' [beetle salvage], not against it full stop. If selective logging is an option – for sure. Even for clear cuts there is a level of acceptance, if it's done with consultation to ensure impacts are acceptable" *Nature based tourism operator (10 years in area)*

Following clear-cutting replanting with mixed species was considered not only visually more appropriate but also a better way to safeguard against future MPB attack damage, seen as more problematic in monoculture plantations.

> "[Clear cuts] over 10 hectares should be replanted with mixed species and different seed stocks… Douglas pine, and experimental research into different strategies" *Recreation officer (5-7 years experience in area)*

> "Replanted with single species… plantation, it's not as diverse a habitat - the public knows it's a monoculture. We need the diversity aspect – that's what makes it beautiful." *Recreation officer (5 years in area)*

It was accepted by some informants that the above two options might not always be possible. However in certain visually sensitive areas most respondents felt they were the only acceptable harvesting strategies.

4.2.6 Relaxing Visual Quality Constraints

Summary of Trends

- Most were strongly against relaxing visual quality objectives.

- A common sentiment was to not reduce visual quality objectives until the annual allowable cut was reached.

- The minority in favour of relaxing visual quality were also in favor of selective logging and multi-species replanting post harvest.

The most common response from informants to the question of relaxing visual quality constraints was very negative. This was clearly informed in some instances by trust issues.

> "No to relaxation, in how it has been proposed so far. It's a threat to values. It's never a total impasse, but it's a definite 'no' at present" *Nature based tourism operator (10 years in area)*

> "I have a suspicion it won't be done well, it will be done for profit, not aesthetics. We've had previous examples of this with cut blocking done in sight of highways insensitively, maximizing profits… If we could be assured of more aesthetic and sensitive methods it might be more acceptable" *Mountain recreation user group representative (15 years experience in area)*

> "Having gone through the changes, we are cynical. The pine beetle has been used to lift and change regulations that protected the resource for tourism pre mountain pine beetle.

Values have been put aside in favor of salvaging before it's too late" *Nature based tourism operator (10 years in area)*

"Viewscapes are a public resource, forestry are abusing this... saying it will provide extra employment to politicians, but this just isn't true. The forest industry is a greedy industry – it sees viewscapes as lost revenue only" *Nature based tourism operator (8 years in area)*

"The biodiversity objectives and landscape use objectives must not be relaxed just so that more timber can be harvested wastefully for short term gain." *Environmentalist/biologist and recreation user (25 years in area)*

A common response to the notion of relaxing visual quality constraints was that harvesting should not be considered in these areas until the annual allowable cut has been reached elsewhere.

"Wood is available elsewhere, it's not necessary to take from these views – they're not even keeping up with harvest targets at present." *Nature based tourism operator (10 years in area)*

"I'm not in favor of relaxing visual constraints really, there is lots of other dead pine beetle about that can be salvaged. There would be a public reaction to this [relaxing constraints] – a backlash - 'stay out of these areas'. People prefer dead wood, if clear-cutting is allowed they are concerned it won't be temporary" *Retired ministry environment staff/ naturalist (48 years in area)*

Informants mentioned other reasons for not relaxing visual constraints, such as for wildlife and ecosystem protection. Informants also expressed the view that protected viewscapes were about more than just living trees - there were lakes, mountains, even sky in these locations, that all added up to an attractive setting, and continued to be a positive factor even if the trees themselves had downgraded. These informants drew attention also to the fact that dead trees were still natural.

"The general view [of public]? – They prefer it left natural and let it take its time, let nature take its course... it's a hang over from anti- clear cut feeling" *Recreation officer (6 years experience in area)*

For the few people who responded more favorably to considering relaxing of visual quality constraints, selected logging and multi species replanting was usually a criteria, as was a case-by-case site assessment.

"[Harvesting] can happen - if visual quality is recognized, and there is future planning – it doesn't have to be trees, to be pretty" *BC Parks worker and naturalist society director (17 years experience in area)*

"I am in favor [of relaxing visual quality constraints] if the logging is worth it, and as selective as possible…I think we should maintain natural viewpoints where possible, but not at all costs. If a dead forest is accessible and scenic then harvest it and live with the clear-cut, but if there is no access don't build a road just to get in" *Dog musher (33 years in area)*

However a few informants were in favor of relaxing visual constraints across the board in response to MPB.

"Personally my views take care of business. [Visual quality has] diminished anyway, that wilderness experience has gone a bit" *Mountain bike user group representative (7-10 years in area)*

In summary however the majority view was that these constraints were there for a reason. Attitudes were noticeably more negative in response to harvesting in areas where visual quality constraints existed, than to any other harvesting in response to MPB.

"We are not in favor of relaxing visual guidelines, these came through land use planning… it's still a natural viewscape even if it's dead." *Nature based tourism operator (10 years in area)*

4.2.7 Safety Concerns with remaining Mountain Pine Beetle (MPB) stands

Summary of Trends

- Fire risk from dead MPB stands was of considerable concern. A minority suggested that a lower fire risk may exist due to lower fire loading.

- Falling dead trees were considered a direct risk to recreators, and prevented access. A minority pointed out that fallen trees provided habitat to animals.

Informants mentioned a number of safety issues regarding dead MPB tree stands.

Fire Risk Posed by Mountain Pine Beetle (MPB)

Considerable concern regarding forest fire risk was shown, especially noting that the fires of summer 2010 had been very bad in some areas, with outdoor recreation halted in places for weeks due to the smoke and access issues. Beyond this there was also concern expressed about the serious threat that fires in the MPB infested dead stands had been for local communities over the last 5 years. Some informants questioned whether the threat was increasing, and

whether this alone might be a reason to harvest the dead stands as a precaution, or at minimum to retain fire access roads.

> "There are other concerns [than just visual] to pine beetle, such as fire burn. Pine beetle forests have different characteristics to natural green forests. There is a genuine concern about what happens if we don't take out the wood. It may be better to lose the aesthetic values, and not risk fires. Can we find a balance?" *Mountain recreation user group representative (15 years experience in area)*

> "We want the access roads left for recreation purposes, and fire access" *Snow-mobiler and ATV user (35 years experience in area)*

> "The most major impact is the practical side of the dead trees- safety, fire and access." *Recreational fishing resort operator (7 years in area)*

Some informants also had a serious drop off in trade (up to 50% reported) due to fires halting access for guests and making landscapes off putting. Concern was expressed for wildlife caught in the fires. On the other side one informant put forward a view that dead tree stands were actually less of a serious fire risk, due to their lower fuel loading compared to sap-rich live pine stands.

Falling Tree Risk Posed by Mountain Pine Beetle (MPB)

Falling dead trees were also an increasing concern for many informants. For many it was the direct risk of trees falling on forest users and the unpredictable behavior of MPB infested trees in this respect. Recreation officers had cut trees around campgrounds for this reason.

> "The safety hazards [of MPB] especially around recreations sites, is my biggest concern" *Recreation officer (6 years experience in area)*

Mountain bikers, horse riders, skiers and hikers also raised this concern, as did mountain rescue informants.

> "If you are out in a storm it [falling trees] can be a big safety concern, as a result I am pro cutting now" *ATV user group representative (7 years plus experience in area)*

Falling dead tree hazards that were a direct risk to recreators and wildlife were perceived to be of increasing concern as the tree rot set in.

> "Get it out before it's useless, or before it kills us…" *Traditional Sportsman (10 years experience in area)*

> "Trails are less maintained more recently, with dead fall and burned areas - the safety hazard has worsened." *Pony club representative (20 years experience in area)*

"Debris is left lying by trails, this is a hazard [for mountain bike users] - we can fall on it and impale ourselves" *Mountain bike user group representative (7-10 years in area)*

For other informants the main issue of falling trees was the access issue resulting. The necessity of carrying chainsaws was mentioned by many informants including snowmobilers.

"Falling trees are the big issue, sometimes there can be 50-60 trees across the road after a storm" *ATV user group representative (7 years plus experience in area)*

"It's changed our client base – we've lost visual people, and the trails are so blocked by trees that they aren't used in the same way. The impact has altered mostly recently – 7 years ago you could go out skiing, quad biking, on horseback… now you are getting off the bike all the time [to remove dead trees from the path]." *Recreational fishing resort operator (7 years in area).*

For non-motorized users, including horse riders, hikers, trappers and dog mushers tree falls were a serious access issue also.

"… blocked access is a big problem… right now the big problem is decay." *Dog musher (33 years in area)*

Both trapper informants however also mentioned the positive value of dead tree falls for wildlife habitat.

4.2.8 Other Influential Factors Reported by Informants

Summary of Trends

- The logging industry in smaller communities may trump recreational interests. In the more diverse economies of larger communities such as Prince George, recreation may have a louder voice.

- When consultation has occurred, it has generally been a positive way of increasing communication between user groups.

- Better communication between recreational users and forest planners could reduce conflict in the future, as well as better liaison between recreational user groups.

- A number of informants felt that timber needs appeared to trump all other concerns about forest use.

Influence of local timber based economies on outdoor recreation attitudes

Many of the targeted areas are relatively small communities with an employment base that may be heavily dependent on the timber industry, and concerns regarding this aspect were expressed.

> "People understate the clear-cut problem, logging companies influence public opinion a lot by their economic influence" *bird club representative (14 years in area)*

It was also queried by one informant if local people might not be more pro logging in outlook because they suffered from desensitization, to the 'ugly' practices of the logging industry.

One final factor mentioned was how much timber was perceived to 'trump' other users in terms of focus of attention. Tourism and other non-consumptive forest recreation usage may take second peg to the logging companies in smaller towns, according to some informants. In areas such as Prince George, where there is other employment beyond logging, then recreation usage has a higher voice in comparison, and the timber industry is considered to have less influence over forest resource use.

Consultation and Communication

A number of informants raised the issue of both consultation with and communication between the different forest resource users to avoid conflicts over different needs, highlighting issues regarding motorized recreation usage.

> "We need an access balance between users in the forest. Some [quad bike users] are very aggressive... they damage habitat and scare away wildlife" *Traditional hunter (10 years experience in area)*

> "We need designated trails for specific users, motorized (primarily summer ATV use) access is a big problem to fragile areas" *Dog musher (33 years in area)*

Informants universally felt that consultation when it had occurred had been very beneficial, and had resulted, at a minimum, in a greater understanding of the various needs of users.

A number of informants highlighted how they, as users groups, had at times successfully taken the initiative in liaising with logging companies to mitigate negative impact to their recreation use. Many informants voiced the impression that with better communication and consultation between forest industry and user groups prior to logging planning, as well as operations scheduling, much negative impact could be mitigated and may become far more acceptable as a result. There were also a few comments that better liaison between recreational user groups themselves to resolve conflict areas would also be a positive way forward, and there were instances discussed, where this has clearly happened to some extent. A fatigue was expressed by some informants with the current "them and us" situation that seemed to be prevalent in

some areas; with the logging industry on one side and all other forest user groups on the other. Alternative suggestions were advanced, and are covered in more detail in the forest management section.

General Forest Management Concerns Past, Present and Future

References were made to historic, traditional, and current forestry practices by informants. Degrees of cynicism and disappointment were expressed by some informants at the way forests were seen as managed primarily for lumber and maximizing harvest profits, rather than more holistically.

> "The new school [of forest management staff] is still not mature enough to understand non commercial values" *BC Parks worker and naturalist society director (17 years experience in area)*

Differentiation was made between the relative values of the fast cycle monoculture plantations or 'fiber farms' of modern forestry, that were relatively wildlife poor, as opposed to the natural old growth forests with complex ecosystems supporting great wildlife diversity. Attention was also drawn to the different aesthetic, environmental and wilderness experience values of the two.

> "Tree farms [plantations] are OK, but they are not natural diverse forests." *bird club representative (14 years in area)*

A number of informants motivated for a better rating of non-commercial forest values and expressed frustration that timber needs appeared to trump all other concerns of forest use.

> "We need to 'farm' forests for everything, not just tree use - other non timber uses - recreation forest products, animals… [and] reflect that mixed usage much more" *Horseback rider (35 years experience in area)*

Others were also frustrated by the perceived insensitive behavior of forestry to other users. There were repeated calls for a more holistic and integrated, as well as a more consultative, and environmentally friendly forest management.

> "Ministry of Forests must make a concentrated effort to bring people together who use the land base to talk about conflicts and resolve them. Loggers are decimating it all – it's not multi use at all" *Dog musher (33 years in area)*

> "Private [logging] companies are only interested in harvesting, increased consultation and communication would be good here, with an onus on recreation groups too…"*Mountain bike user group representative (7 years in area)*

> "We feel a lack of consultation so far. Forestry trumps all the other interests every time"
> *Nature based tourism operator (10 years in area)*

Also a feeling was expressed that a debate into how the highly mechanized monoculture forestry served the land and its communities was long overdue. These feelings have undoubtedly served to inform opinions about the management of MPB infested forest areas.

Looking ahead it is possible to see ways forward that may provide usage for timber as well as recreational users and wildlife as a result of the MPB epidemic. A few informants specifically mentioned using MPB as an opportunity for public education.

> "It's good to inform the public… harvesting mountain pine beetle damage is a good opportunity for social education" *Recreation officer (5-7 years experience in area)*

A few informants also noted the complexity of the task for forest management ahead.

> "The land has changed…animals have moved, there is an increased risk of fire hazard…the water table is rising now the trees using water are not there" *Recreation officer (6 years experience in area)*

On a positive note hope was expressed that the MPB experience may prove to be a turning point for future forest practice.

Top Ten Trends from Interview Data

1. Local recreational users reported being highly influenced in their habits by local economies and pragmatics of use, whereas international users were reportedly more affected by visual quality issues.

2. Overall, recreational users reported little change in site-specific usage as a result of MPB, which was attributed to a combination of site loyalty, and pragmatic constraints of time and costs.

3. Reported impacts (positive and negative) of MPB and salvage logging appeared to vary widely, based on type of recreational activity.

4. Visual quality was an emotionally charged and salient issue, and its influence appeared to spill into other areas. Relaxation of visual quality objectives was generally not supported especially before the annual allowable cut quota had been reached.

5. Acceptance for clear-cutting of MPB trees was higher than for unaffected trees. However selective logging was still preferred by many informants where possible.

6. Increased road access created by harvesting was a polarizing issue between motorized and non-motorized users, as was road decommissioning. Motorized users were in favour of

roads being left, while non-motorized users were in favour of decommissioning of roads and smaller trails that preserved a wilderness experience.

7. Management of harvest debris was a polarizing issue. Some users, such as trappers, hunters, and ecologists responded in favour of leaving debris for animal habitat, while other users, such as horse riders, or mountain bike riders, who recreate on roads and trails, had safety, visual and fire risk concerns.

8. The ecological value of dead tree stands was raised, as separate from visual quality issues. Several informants were in favor of leaving dead tree stands for habitat value, erosion control, river protection snow retention, and natural regeneration values.

9. Perceived hazards of dead tree stands (fire, falling trees) appeared to have an influence on harvesting acceptability. Fire risk from infested dead stands was a considerable concern. However a minority suggested a lower fire risk due to lower fuel loading. Falling dead trees were considered a direct risk to recreators and were perceived as an access issue.

10. A legacy of distrust of past forest management was discussed and appeared to have an influence on views. Enthusiasm for consultation and improved communication between different stakeholders was expressed, with a desire for more holistic and inclusive future forest management.

5.0 Conclusions

5.1 Survey

Respondents generally indicated they would not leave their sites if harvesting occurred, and that they had experienced a low level of change in activity, frequency and location in connection to MPB. Many also said they would continue to recreate in the same places if harvesting occurred (or continued) in those areas. This could be seen as an indication of high place attachment, although other factors are also possible.

Respondents also indicated that while harvesting was considered moderately acceptable at their recreation sites, and perhaps in general, re-planting was highly favorable over natural regeneration. It was also considered more favorable to harvest and plant, than to only re-plant in affected areas. Replanting was seen as potentially being beneficial for the ecosystem as well as increasing visual quality.

Visual quality appeared to be a potentially polarizing issue among respondents. Nearly an equivalent number of responses indicated they would prefer to relax visual quality versus

relaxing none of the forest values listed. While relaxing visual quality would allow for increased harvesting in some areas, and perhaps in areas that are "ghostly grey" from MPB, this view was not held across the board.

Participants rated ecological values more highly than recreational, economic and visual quality values overall. This may indicate that ecological objectives should continue to be of primary concern over more human oriented objectives. At the same time, given that harvesting is moderately acceptable, there is a sense that ecological values should be held high within the larger context of harvesting and related economies.

5.2 Interviews

Perhaps one of the most obvious themes to emerge from the interviews was exactly how frequently the "devil is in the details" view re-occurred, with informants frequently stating how the specifics of situations mattered enormously to them in their opinions and attitudes. This could be seen in the detailed responses informants gave to the various issues of post-harvest and natural regeneration. This response may be in part due to a greater degree of experience and knowledge being acquired regarding MPB, than had been previously available.

Another interesting theme to emerge was the extent that ambivalence, contradiction and unease that came through within individual interviews, as well as across them. Oftentimes views were expressed only to be contradicted or mitigated later by the same informant. There also appeared at times a disconnect between shorter-term recreational usage desires and ecological preferences longer-term.

> "The general feeling is sad that the forest is wrecked, but now the impact is hindering what they want to do" *Recreational fishing resort operator (7 years in area)*

Similar conflicts were also apparent in concerns over safety issues, such as fire risk and falling trees, now posed by MPB affected timber, and how these sat alongside concerns of ecosystem and forest health. This was reflected in mixed feelings regarding the forest landscape and regeneration options.

Rather than seeing these as inconsistencies one could also take these mixed views to be indicative of the complexity that both MPB management and forest resource management in general pose. People were clearly troubled at times by the difficulty posed in trying to find a single 'right' answer.

> "I'm not against logging, but it's tough on the landscape – they may leave a few tiny patches of trees but it's too small, the wildlife dies, or moves out. [But] the dead trees are just as unfriendly to wildlife… there is no good answer" *Recreational fishing resort operator (7 years in area)*

Another interesting area was that of forest values and the continued public resistance to relaxing visual quality constraints expressed by informants. This was notably expressed in the face of deteriorating landscape visuals, and more acceptance of MPB management in general. It appeared to be informed by many complex and competing needs, including a perceived lack of trust in government, as well as fluctuating valuations of forest resources. "Natural as good", was a recurring notion that perhaps is supportive for a trend against visual quality relaxation.

The strongly emotional response towards landscape visuals expressed by many informants might also be considered an important flag as to how interwoven the issues of forest resource management and landscape preferences can be. Despite some informants voicing an acceptance of salvage logging above normal levels for non-MPB timber, there was still a substantial preference voiced for selective harvesting and replanting. This appeared to go beyond a purely anthropocentric visual appreciation of landscape, and was articulated by some informants, who expressed the view that, if the rating and trading-off of values was necessary, aesthetics were not always first priority.

> "Visual quality is a human orientated luxury" *Pony club representative (20 years experience in area)*

Other informants drew attention to the fact that dead tree stands were of crucial value as wildlife habitats, even where aesthetic value had been lost. This was in contrast to the perceived "deserts" offered to wildlife by clear-cut salvage.

In terms of variation across users it should also be observed that opinions were divided in a number of ways, and appeared to frequently pivot on the type and specifics of recreational usage or experience. Motorized and non-motorized usage polarized opinions in a number of areas in response to the MPB epidemic. Some recreational users, such as ATV riders, went as far as to comment on the benefits of MPB and/or associated harvesting to their recreational usage, while for most the MPB epidemic and subsequent management had had a negative impact on their enjoyment of their outdoor experiences, even if it had not always altered their usage patterns.

Finally it should be noted that a concern was voiced by a few informants regarding the strong focus towards gathering opinions of outdoor recreation user groups in this research. To consider the impact of MPB and its subsequent forest management for recreational users only, would be certainly be remiss. There are clearly a multitude of stakeholders affected by MPB not least the natural ecosystem, and the wildlife that inhabits it. It should be noted that it will take skilful planning and management to navigate the complexities of the situation and steer forest resource management towards a positive post-MPB future.

5.3 Overall

Recreation in post-MPB areas in the interior of British Columbia continues to be an important forest value, based on the research presented in this report. This appears to be true for motorized and non-motorized recreators alike, particularly amongst local community members. At the same time, other forest values, such as ecological health and timber quality, are not separate from recreational views. To truly understand what informs recreational values in a post-MPB context, one needs to inquire into the forest management practices that have occurred, from the time of the outbreak up to the present day. Given the high degree of place loyalty that this research suggests, what appears to have had the most salience for recreational users to date is the policy and industry response to MPB, rather than the mere presence of a natural disturbance alone.

As might be expected among recreators who spend time appreciating forest landscapes in various ways, visual quality is a core topic. In this research, a diversity of perspectives emerged regarding visual quality. In some communities, visual quality has been well explored in a forest management context, and may be more associated with harvesting practices than the visual impacts of a natural disturbance. Some recreators were noted to be community members associated with, or supportive of, local timber industries, with an interest in increasing harvest levels. At the same time, some recreators in interviews voiced a strong desire to keep visual quality objectives in place, to the extent that they were compatible with other values, such as ecological health and harvesting needs.   It was also noted that, while some flexibility exists in the minds of recreational users regarding visual quality objectives in the context of MPB affected forest environments, visual quality elicited the most emotionally charged responses.

Acceptability of timber harvesting at recreational sites, and generally in MPB-impacted areas, was found to be contingent on a number of factors. This likely explains the wide range of acceptability to harvesting found in the survey data. Three main factors appear to have influenced the acceptability of harvesting expressed. First, the way harvesting is carried out raises issues relevant to the recreational experience. These include harvesting approach (clear-cutting with retention versus selective logging), replanting after harvesting to increase green-up, clearing trails and roads of debris and increasing (or decreasing road access) after harvesting. Second, perceived risks associated with MPB, such as fire and safety hazards due to falling trees, may affect acceptability of harvesting in recreational areas for some. Third, ecological values related to MPB (either ecological benefits of post-MPB forests in their natural state, or ecological benefits of a forest in renewal due to harvesting and replanting) seem to be highly salient to the recreational experience. A number of respondents were noted to engage in activities that specifically rely upon the presence of healthy wildlife populations, such as fishing, trapping, wildlife-viewing, bird watching, and hunting.

As mentioned previously, the recreators who participated in this study generally showed a high degree of site, route and area attachment in the presence of both MPB and post-MPB

harvesting. There may be economic (time and money), social/cultural, ecological and site-based reasons for this place loyalty, and several factors were mentioned in the interviews. Place attachment may result in more deeply rooted preferences specific to the pragmatics of the activity. These deeply rooted preferences also seem to contribute to divisions, such as those between motorized and non-motorized activities, as surfaced in the interviews. Investment in sites, routes and areas may also contribute to a rich resource within the recreational community that could be tapped.

While this report focused on local recreational experiences, tourism operators that specialized in recreational tourism were also included. Local recreational users reported being highly influenced in their habits by local economies and pragmatics of use, whereas international users were reportedly more affected by visual quality issues. Education has, in the past, been suggested as a way to increase acceptability of post-MPB visual quality and related issues.

Future areas of research stemming from this initial research project could include a more in-depth focused investigation into perceptions of the post-MPB forests at a specific community level. This may allow a more nuanced examination of response variation and detail. Some communities are located "inside" post-MPB forests while others are more remote from affected forests. The surveys indicated that remote views were somewhat more relevant to recreators, although this may be uncovered to be more nuanced at the community level in a further investigation.

6.0 Acknowledgements

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8.0 Appendices

8.1 Survey

Page1

Post-Mountain Pine Beetle Recreational Usage Survey

1. In the past 5 years, has the frequency of your outdoor recreational activities
   - ☐ Greatly increased
   - ☐ Somewhat increased
   - ☐ Stayed the same
   - ☐ Somewhat decreased
   - ☐ Greatly decreased

   → To what degree was mountain pine beetle the cause of this change
   Not at all ☐1☐2☐3☐4☐5 Entirely

2. In the past 5 years, have the main locations of your outdoor recreational activities
   - ☐ Stayed the same
   - ☐ Changed somewhat
   - ☐ Changed considerably

   → To what degree was mountain pine beetle the cause of this change
   Not at all ☐1☐2☐3☐4☐5 Entirely

3. In the past 5 years, have your main outdoor recreational activities
   - ☐ Stayed the same
   - ☐ Changed somewhat
   - ☐ Changed considerably

   → To what degree was mountain pine beetle the cause of this change
   Not at all ☐1☐2☐3☐4☐5 Entirely

4. If any of the above have changed, has this been a positive or negative experience
   Negative ☐1☐2☐3☐4☐5 Positive   ☐ Not applicable

5. Please estimate your recreational usage of forest areas affected by mountain pine

	# of days in the Summer (May – September)	# of days in the shoulder seasons (April & October)	# of days in the Winter (November – March)
Prior to the outbreak			
During the red attack stages			
Currently			

In the following section, we would like you to list those places (**NOT including parks**) that are important to you for outdoor recreation in central BC and answer a few questions about these places. You can list up to 5 places in each of three categories.

1. Specific places like a campsite, fishing hole or scenic viewpoint.
2. Routes, trails or any other linear feature that you might travel along.
3. Regions or areas that are important to you for outdoor recreation.

You do not need to fill in all the spaces provided. If you have more than 5 of any type of place please only list the 5 that are most important to you.

Point Locations					Check all that apply
Place	Description/Location	Use level 5 years ago	Use level today	To what degree would harvesting trees visible from this location be acceptable?	Backcountry skiing & snowboarding / Birdwatching / Camping / Caving / Cross-country skiing / Cycling / Fishing / Hiking & backpacking / Horseback riding / Hunting / Lake boating & canoeing / Mountain biking / Offroad 4x4, ATV & motorcycle / Picknicking / Recreational driving / River boating, rafting and kayaking / Rock climbing / Running / Snowmobiling / Wildlife viewing
1					
2					
3					
4					
5					

Routes, trails, roads, rivers, etc.					Check all that apply
Place	Description/Location	Use level 5 years ago	Use level today	To what degree would harvesting trees visible from this route be acceptable?	Backcountry skiing & snowboarding / Birdwatching / Camping / Caving / Cross-country skiing / Cycling / Fishing / Hiking & backpacking / Horseback riding / Hunting / Lake boating & canoeing / Mountain biking / Offroad 4x4, ATV & motorcycle / Picknicking / Recreational driving / River boating, rafting and kayaking / Rock climbing / Running / Snowmobiling / Wildlife viewing
1					
2					
3					
4					
5					

Regions or areas

Place	Description/Location	Use level 5 years ago	Use level today	To what degree would harvesting trees in this area be acceptable?	Check all that apply
1					
2					
3					
4					
5					

Check all that apply columns: Backcountry skiing & snowboarding, Birdwatching, Camping, Caving, Cross-country skiing, Cycling, Fishing, Hiking & backpacking, Horseback riding, Hunting, Lake boating & canoeing, Mountain biking, Offroad 4x4, ATV & motorcycle, Picknicking, Recreational driving, River boating, rafting and kayaking, Rock climbing, Running, Snowmobiling, Wildlife viewing

Trade off questions (pick only one answer per question)

1. Would you rather protect
   - [ ] Views from town
   - [ ] Scenic values in more remote areas

2. For the purposes of reforesting recreation sites would you rather
   - [ ] Allow natural regeneration
   - [ ] Plant trees after harvesting
   - [ ] Plant trees but not harvest

3. If salvage harvesting were part of the restoration of recreation sites would you
   - [ ] Continue to recreate in the same locations
   - [ ] Find new locations within the local area
   - [ ] Leave the area or visit other areas to find suitable recreation sites

4. To help with the timber supply would you rather relax
   - [ ] Visual quality objectives
   - [ ] Wildlife habitat areas
   - [ ] Old growth/biodiversity management areas
   - [ ] Recreation sites
   - [ ] Riparian areas
   - [ ] None

Degree of Importance (rated 1 to 10)

Not Important (1) to Very Important (10)

	1	2	3	4	5	6	7	8	9	10
Fish habitat areas										
Old growth management areas										
Natural forest regeneration										
Recreation sites										
Riparian areas										
Scenic values in more remote areas										
Timber harvesting										
Tree planting										
Views from town										
Visual quality objectives										
Wildlife habitat areas										

Demographics

| Gender | ☐ Male | ☐ Female |

| Age | ☐ < 21 | ☐ 21- 30 | ☐ 31- 40 | ☐ 41- 50 | ☐ 51- 60 | ☐ > 60 |

| Employment sector | ☐ Forestry | ☐ Recreation (guide, lodge owner, outfitter, etc.) | ☐ Other _____ |

| Education Level | ☐ Some High School | ☐ High School | ☐ Some Post Secondary | ☐ Undergraduate Degree | ☐ Graduate Degree |

Additional Comments

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Please mail to: Dr. Michael Meitner, 2045-2424 Main Mall, Vancouver, BC., V6T 1Z4   or   fax to: 604-270-4814

8.2 Consent Forms

Consent to Participate in a Research Project

Project Title: Post-mountain pine beetle recreational usage survey

Project Funding: This study is funded by the Ministry of Forests, Mines and Lands.

Project Investigators: Dr. Michael J. Meitner (cell: 778-240-6233), Cluny South & Carissa Wieler.

Consent: By signing this form, you agree to participate in a research project of approximately 30 minutes in duration, conducted by Dr. Michael J. Meitner, Cluny South & Carissa Wieler, regarding your recreational uses in and around the study area in BC. You will be asked to fill out a brief survey and will be given an opportunity to add additional comments if you desire. If you would like the opportunity to schedule a brief follow up interview should you feel you have more to add you may do so after completion of the survey.

You will participate in the research project, subject to the following conditions:

- You will allow your responses to be entered into a computer and stored in a secure database.

- You understand that all information associated with this study will be held in confidence and only the experimenters will have access to the raw data. Each subject will be assigned a number, and that number will be on all documents rather than his/her name. You have been assured that any data resulting from this experiment will be stored in a password protected computer database and that only a sequential generated ID number will be used to identify your responses.

- A report will be delivered to the Ministry of Forests, Mines and Lands summarising the results but no information regarding your personal information will be divulged.

- You understand that you may refuse to participate or withdraw at any time.

- You have received a copy of this consent form for your own records.

- If you have any questions or concerns about the procedures used in this research, Dr. Meitner, Ms. South or Ms. Wieler has agreed to answer any questions and inquiries that you may have.

If you have any additional questions or concerns about this research project, you may contact Dr. Mike Meitner (cell: 778-240-6233).

Name (please print) _____ Signature: _____ Date: _____

Consent to Participate in a Research Project

Project Title: Post-mountain pine beetle recreational usage interview

Project Funding: This study is funded by the Ministry of Forests, Mines and Lands.

Project Investigators: Dr. Michael J. Meitner (cell: 778-240-6233), Cluny South & Carissa Wieler.

Consent: By signing this form, you agree to participate in a research project of approximately 30 minutes in duration, conducted by Dr. Michael J. Meitner, Cluny South & Carissa Wieler, regarding your recreational uses in and around the study area in BC. You will be asked to fill out a brief survey and participate in a follow up phone interview.

You will participate in the research project, subject to the following conditions:

- You will allow your responses to be entered into a computer and stored in a secure database.

- You understand that all information associated with this study will be held in confidence and only the experimenters will have access to the raw data. Each subject will be assigned a number, and that number will be on all documents rather than his/her name. You have been assured that any data resulting from this experiment will be stored in a password protected computer database and that only a sequential generated ID number will be used to identify your responses.

- Your interview will be recorded to facilitate the transcription of your comments. Upon completion of this transcription all audio recordings will be destroyed in a secure manner.

- Brief quotations may be used in the final report provided all information regarding the source is protected. No quotations that uncover an individual's identity will be used.

- A report will be delivered to the Ministry of Forests, Mines and Lands summarising the results but no information regarding your personal information will be divulged.

- You understand that you may refuse to participate or withdraw at any time.

- You have received a copy of this consent form for your own records.

- If you have any questions or concerns about the procedures used in this research, Dr. Meitner, Ms. South or Ms. Wieler has agreed to answer any questions and inquiries that you may have.

If you have any additional questions or concerns about this research project, you may contact Dr. Mike Meitner (cell: 778-240-6233).

Name (please print) _____ Signature: _____ Date: _____