

# THE SOCIAL SCIENCE COMPONENT OF ECOSYSTEM MANAGEMENT, AS APPLIED TO THE GARIBALDI – WHISTLER ECOSYSTEM

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## SUMMARY

Ecosystem management encourages managers to think beyond park boundaries when investigating ecological integrity and visitor experiences. It also suggests that effective management requires consulting with several stakeholders, including user groups within a park and interest groups involved in the use of land adjacent to parks. These approaches require the application of social science methodologies and are the focus of this paper.

The theoretical foundation of this paper is embedded in the Limits of Acceptable Change (LAC) park management framework. This necessitates determining desired conditions, which are measured using indicators (e.g., crowding) to reveal standards of quality, or thresholds at which conditions become unacceptable (e.g., 50 people seen per hour). Recent studies use photographs depicting indicator impacts to reveal respondents' norms, which are used to formulate standards. The LAC also requires consultations with various interest groups, thus it is well suited for ecosystem management. This paper examines visitors' and other stakeholders' norms for indicators of summer use on the Whistler Mountain ski hill and in adjacent areas of Garibaldi Provincial Park, B.C.

Winter activities are commonplace at ski hills. However, this paper focuses on summer recreation on and adjacent to ski hills, an issue yet to receive serious research attention. Data were collected from surveys conducted with 21 representatives of 12 companies, recreation and environmental groups, and government agencies. This is compared to results of surveys completed by 548 visitors in the study area from July to September, 2000. Respondents ranked indicators based on their potential for detecting changes related to use in the area. To establish standards, four indicators were measured using photographs. Results indicate that use, noise from motorized activities, and hiker density are important social indicators for the area. Litter, wildlife, and vegetation damage are important resource indicators. Responses to the visuals differ between stakeholders regarding acceptable standards for the social indicators (density of hikers and mountain bikers). Conversely, there is more consensus regarding the resource indicators (litter, bare ground at campsites). Implications for ecosystem management and strategies for managing the park – ski hill interface are discussed.

## 1. INTRODUCTION

Simply defined, ecosystem management involves a set of management practices and philosophies aimed at selecting, maintaining, and enhancing the integrity of an ecosystem while still providing resources and experiences for humans (1). When applied to park management, common themes of this approach include: specifying management goals and objectives, involving different stakeholders in decision making processes, addressing social (e.g., experiences) and biophysical (e.g., resources) attributes of an area, managing impacts within an entire ecosystem including those in adjacent regions that pose a threat to parks, and monitoring to ensure that management

targets are sustainable (2,3,4). Most of these attributes require applying social science methodologies.

One approach that is well suited to ecosystem management in parks and protected areas is the Limits of Acceptable Change (LAC) planning framework (5). This adaptive process has received considerable attention in the literature and offers a sophisticated approach to visitor management in natural settings (6). However, few applications can be found or have been reported, especially in Canada. In the LAC, the typical carrying capacity question of “how much use is too much” is redefined as “how much use is acceptable or should be permitted”? This focuses management attention on how much and what kinds of social and resource uses and impacts are acceptable or sustainable, as well as strategies for achieving and maintaining these conditions.

Since parks and their users create a complex milieu of interactions and impacts such as crowding and changes to facilities and biophysical landscapes, the LAC uses transactive (multi-stakeholder) input (7) to select and measure a small host of indicators to form standards of quality. Indicators are monitored to ensure that standards are not violated. A normative approach is useful for measuring and monitoring indicators (8,9).

The theoretical foundation of this paper is embedded in the LAC framework. This paper uses normative theory to measure indicators and establish standards for managing summer use on and adjacent to ski hills. Given the potential threats to parks from external commercial development (3), this paper considers impacts on the Whistler Mountain ski hill and in surrounding areas of Garibaldi Provincial Park, B.C. To devise standards, the norms of summer visitors in this region are compared to those of other stakeholder groups. This paper explains how to select and measure indicators and standards of quality and also compares standards between various stakeholders. It begins with an overview of the concepts that provide a foundation for this study.

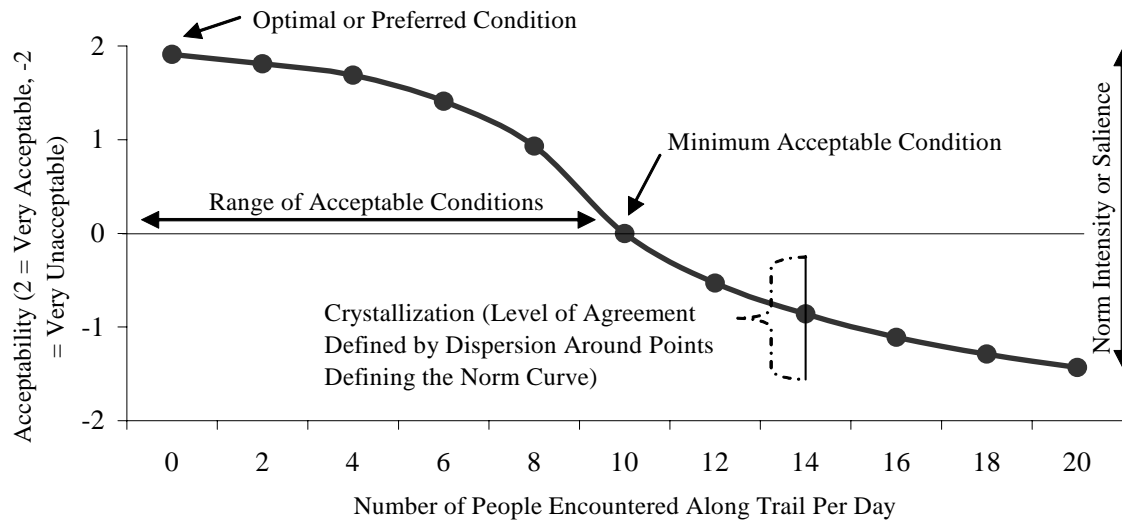
## **2. CONCEPTUAL BACKGROUND**

### **2.1 Indicators, Standards, Norms**

Indicators (e.g., litter) are specific, objective, and measurable components of the social, biophysical, or managerial settings that characterize quality surroundings and experiences (10). They are measured to reveal standards of quality, or thresholds at which impacts reach unacceptable levels (e.g., 5 pieces of litter) (6). Indicators require monitoring to ensure that standards are not being violated. If they are exceeded, actions like use limits (quotas), directional trails, restricting activities, zoning, or educating visitors may be necessary (11). Forming, monitoring, and managing indicators and standards requires descriptive and evaluative data. The descriptive component describes how settings (e.g., parks) operate and impacts from their use (12). Evaluative data concerns judgements about how much change to the setting and/or experience is acceptable (13).

The normative approach is useful for conceptualizing, collecting, and organizing data representing evaluations of park impacts. Norms are standards that individuals use for evaluating activities, environments, or management strategies as good or bad, better or worse (14). They define what conditions should be. Norms for indicator impacts are measured at the individual level and results can be aggregated to test for the existence of social norms, thereby enabling standards to be devised. Social and biophysical attributes of an area can be measured and monitored using this approach to ensure that management strategies are sustainable. This is central to ecosystem management and the LAC.

**Figure 1. Hypothetical Social Norm Curve**



## 2.2 Social Norm Curve

Respondents' norms regarding indicator impacts can be plotted on a social norm curve (15). This is used to define the norms and standards of park visitors or other stakeholders in terms of averages of individual evaluations. It is a two-dimensional graph (Figure 1) with the horizontal axis representing indicator impacts increasing from left to right. The vertical axis represents the evaluative responses with the most positive evaluation at the top of the axis, the most negative on the bottom, and a neutral category in between. In previous studies, the most common scale ranges from acceptable to unacceptable (8).

Characteristics of the norm curve include the optimal condition, which is the impact receiving the most positive evaluation (8). The range of acceptable conditions suggests the impacts that respondents will tolerate and is represented by all of the points along the curve that are above the neutral point or line of indifference. The height of the curve above and below this line defines the norm intensity/salience. This measures the degree to which the indicator is important to respondents; the larger the intensity, the stronger their feelings regarding the indicator. This suggests ramifications if the standard is violated, as a flat curve indicates that few people will be upset, whereas a curve that declines sharply and remains negative implies that more people may be impacted (16).

The minimum acceptable condition is the point where the norm curve crosses the neutral line. In many studies, this represents the standard of quality for the indicator. However, some experts contend that an additional measure called the optimal standard of quality window should be used to formulate standards (17). This contains the impacts considered acceptable by 84% to 50% of respondents, thus providing managers with leeway for establishing standards and allowing for a more precautionary approach.

Norm prevalence measures the percentage of respondents specifying a minimum acceptable condition (standard). If it is high, the indicator is relevant for respondents and the measurement technique is successful (18). Crystallization measures the agreement among respondents for the indicator impacts. It is measured by the standard deviation, or interval around the curve containing the majority (68%) of responses. A small deviation implies a high degree of consensus for the acceptability of each impact. If there is strong agreement, managers should have confidence in using the data to form standards (6).

## **2.3 Summary of Normative Research**

Over 75 papers have been published on the normative approach and its applications in natural resource management. Reviews of this work have also been published (6,8,9,14). Advancements have been made including measuring various indicators, using different evaluations like preferences and tolerances, employing alternative question formats, and using different central tendency measures like mean and median to represent social norms (6,15,19). Also, employing Image Capture Technology (ICT), or the use of computer software to edit visuals is becoming popular for depicting multiple levels of indicator impacts (16,20). Impacts are displayed in photographs or videos, which are shown to respondents to reveal their norms. Research suggests that visuals offer a better method than written descriptions of impacts because respondents are easily able to cognitively understand and visualize the impacts, thus leading to a more realistic and accurate assessment of indicator impacts (15,19).

Most studies use the normative approach to understand encounter norms, or the maximum number of people respondents will tolerate seeing (14). There are, however, studies addressing normative standards of fire rings, bare ground, human waste, and vegetation damage at campsites (21,22,23,24); noise from aircraft and watercraft (16); trail quality (25); litter (26); wildlife management practices (27); and access fees (28).

Most normative research has been conducted in parks and wilderness areas in the United States. However, this approach has been implemented in recent studies in Canada at the Columbia Icefield (29) and Gwaii Haanas (16) and in marine and terrestrial settings in other countries (21,30). The majority of studies have also been conducted in parks and related settings, whereas few have been applied to commercial areas like ski hills or in the interface region between commercial facilities and protected areas (30). Information from these areas is important for facilitating ecosystem management approaches.

## **2.4 Interest Groups**

Studies investigating indicators and standards in parks mainly focus on visitors' norms, whereas few assess the norms of other stakeholders. The lack of multi-stakeholder input is surprising given that the LAC requires input inclusive of individuals and organizations with economic, recreational, and ecological interests. Simply defined, stakeholder groups are identifiable organized bodies representing the shared views or interests of a group (31). These include outdoor groups, environmental organizations, companies and tour operators, and government agencies.

Multi-stakeholder input is important because the normative standards of visitors, managers, and interest groups can vary (22,23). Although park managers are responsible for ensuring that standards comply with legal and jurisdictional mandates, understanding how others perceive impacts and how these influence visitors and the public is crucial if managers are to make informed and intelligent decisions. If standards are similar between stakeholders, managers could condense the number of groups they need to consider. If differences exist, they should be examined to address conflicting views.

The purpose of this paper is twofold. First, it uses input from various stakeholders to reveal indicators that could prove useful in detecting and documenting human – caused changes associated with summer use on the Whistler Mountain ski hill and in adjacent areas of Garibaldi Provincial Park. Second, the norms of these groups are measured using visuals to reveal standards of quality for four indicators of summer use in this region.

## **3. METHODS**

### **3.1 Data Collection**

The advent of operating lifts at ski hills in the summer for activities like hiking and mountain biking is increasing. In B.C., 12% of the ski hills had a lift operating in the summer of 1991. A

decade later, summer operations occurred at 65% of these areas (32). However, this dimension of mountain use has received little research attention.

Data were drawn from a larger study attaining a baseline understanding of summer use on Whistler Mountain and in adjacent areas of Garibaldi Provincial Park (33). The park largely surrounds the ski hill. This region is 100 kilometers north of Vancouver near the world-renowned Whistler resort. The Intrawest Corporation owns the facilities on the ski hill, whereas B.C. Parks has jurisdiction of the park. A 37-question survey was conducted at five locations in the study area with summer visitors. After two pilot tests, 651 visitors were contacted from July 1 to September 4, 2000. Of this, 548 completed the survey, yielding an 84.2% response rate. With this sample size, we can be 95% confident that the results are within 4.2% of the results had all 183,700 visitors been surveyed in the summer of 2000. Thus, an alpha level of .05 was used for statistical tests.

To facilitate the multi-stakeholder approach of the LAC, similar surveys were also conducted with 21 presidents and managers of 12 organizations with recreational, environmental, governmental, and economic interests in summer use in this area (Table 1). In most cases, two members from each organization participated.

### 3.2 Analysis Variables

In the surveys, respondents ranked 20 social and 21 resource indicators based on their value, importance, and feasibility for detecting change related to summer use in the study area. This is similar to previous research techniques (34). Responses were summed and ranked from lowest to highest scores, with the lowest being the most important indicator.

Four social and resource indicators were also measured using photographs created with Adobe PhotoShop 5.5 ICT software. First, the “density of hikers” was measured with five photographs depicting 0 to 16 people/20m<sup>2</sup> with the number of people doubling in each image. Second, the “density of mountain bikers” was portrayed with five visuals showing 0 to 8 riders/15mX2m section of trail (SOT) with the number increasing by two in each image. Third, the “amount of bare ground at a campsite” resource indicator was measured using three photographs showing 2m<sup>2</sup> to 8m<sup>2</sup> of bare ground with the amount doubling in each visual. Fourth, the “density of litter” was measured with three images showing 0, 2, and 12 pieces of litter/8m<sup>2</sup>. The photographs and descriptions of how they were created are provided in other articles (17,33).

The color photographs were shown in cue-card fashion during survey completion. Respondents rated the impacts in each visual from -2 “very unacceptable” to +2 “very acceptable” with interior narratives of -1 “somewhat unacceptable,” 0 “neither,” and +1 “somewhat acceptable.” The researcher told respondents that they must focus on the impacts in each visual and assume that they were occurring in the study area during the summer. They were also required to ignore the generic backgrounds in the images and assume that the conditions were occurring in the study area.

**Table 1. Categorization of Interest Group Involvement in This Study<sup>1</sup>**

Companies & Tour Groups	Provincial & Local Government Agencies	Recreation Interest Groups	Environmental Interest Groups
Intrawest @ Whistler/Blackcomb	Garibaldi District BC Parks	WORCA	CPAWS
Canadian Snowmobile Adventures	Municipality of Whistler	Alpine Club of Canada	AWARE
Blackcomb Helicopter Tours		FMCBC	WCWC
Canada West Ski Areas Assoc.		Summer Visitors	

<sup>1</sup> WORCA: Whistler Off-Road Cycling Association; FMCBC: Federation of Mountain Clubs of British Columbia; CPAWS: Canadian Parks and Wilderness Society; AWARE: Association of Whistler Area Residents for the Environment; WCWC: Western Canada Wilderness Committee.

## 4. STUDY FINDINGS

### 4.1 Indicator Rankings

Table 2 presents the collective stakeholder rankings of indicators. The social indicators with the most potential to be measured and detect change on and adjacent to the ski hill in the summer are “number of visitors per day,” “satisfaction with noise from motorized activities,” and “density of hikers.” “Skill level” of visitors has the least potential. The most important resource indicators are “quantity of litter,” “population trends of wildlife,” and “amount of vegetation impacted.” “Trail depth” and “water quality” are the least important. These results are similar to those reported in previous research (34).

### 4.2 Norms and Standards for Social Indicators

The average stakeholder norm curves for the “density of hikers” indicator are shown in Figure 2. There are significant differences between the groups regarding the acceptability of 8 people/20m<sup>2</sup> (Kruskal-Wallis  $H=18.765$ ,  $p<.001$ ) and 16 people/20m<sup>2</sup> ( $H=26.285$ ,  $p<.001$ ) on and adjacent to Whistler Mountain in the summer. The companies accept these impacts more than the other groups do. There is a difference ( $H=19.738$ ,  $p<.001$ ) between groups regarding the minimum acceptable condition (standard). The companies will tolerate higher densities (12 people/20m<sup>2</sup>) in the area than the other groups. This is predictable because the companies consist of Intrawest and two operators that run tours on the mountain and into the park. High use densities could translate into increased profits through more lift tickets and tours being sold. Given that the government agencies (6 people/20m<sup>2</sup>) and recreation and environmental interest groups (6.8 and 7 people/20m<sup>2</sup> respectively) will tolerate about half this density level, negotiations are likely needed to reach a compromise regarding an appropriate standard of quality for this indicator.

Crystallization is also different between the groups. There is disagreement among the companies (Standard Deviation=1.60), visitors ( $SD=1.36$ ), and environmental groups ( $SD=1.40$ ). Conversely, the government members agree that the standard should be 6 people/20m<sup>2</sup> ( $SD=0$ ). This is not very useful from a management perspective because the goal of including multi-stakeholder input is not to reveal agreement within organizations, rather, it is to generate consensus between participating groups (7). However, the norm prevalence is high for each group as 80-85% of the company representatives and visitors and 100% of the other group members specified a standard for this indicator. There is a significant association (Chi-Square  $\chi^2=11.217$ ,  $p<.05$ ) between groups and whether or not they specified a standard, but the Cramer’s  $V$  effect size of .149 suggests that this is of “minimal” importance (35). Norms are also held with similarly ( $H=3.653$ ,  $p>.05$ ) high intensities in each group (7.73 to 8.17, max.=10). Taken together, these results suggest that each group feels this is an important indicator to monitor in the area in the summer.

Social Indicators	Resource Indicators
1. Number of Visitors Per Day (Use Levels)	1. Quantity/Distribution of Litter (Human Garbage)
2. Noise of Motorized Activities (e.g., Helicopters)	2. Population Trends/Distribution of Wildlife/Fish
3. Density of Hikers Per Unit Area (Crowding)	3. Vegetation Ground Cover Impacted or Destroyed
4. Noise From Other People or Facilities	4. Perceptions of Being in a Low Impact Setting
5. Number of Multi-Use Trails	5. Percent of Area That is Devoid of Trails
▼	▼
16. Duration of Visitors’ Trip in Study Area	17. Fire Ring Size and Density
17. Timeshare Salespeople Encountered Per Day	18. Trail Width
18. Presence of Park Rangers/Mountain Officials	19. Air Visibility
19. Demographics and Residence of Summer Visitors	20. Water Pollution in Lakes, Rivers, Streams
20. Visitors’ Specialized/Skilled in Their Activities	21. Trail Depth

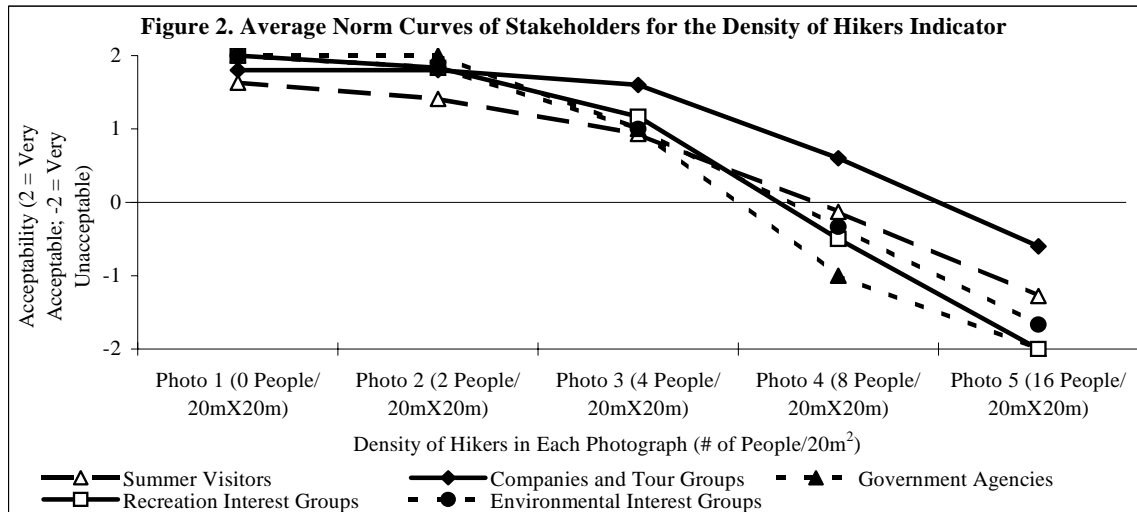


Photo 1: Kruskal-Wallis (H)=4.792,df=4,sig=.309,p>.05(ns). Photo 2: Kruskal-Wallis (H)=7.888,df=4,sig=.096,p>.05(ns). Photo 3: Kruskal-Wallis (H)=9.722,df=4,sig=.058,p>.05(ns). Photo 4: Kruskal-Wallis (H)=18.765,df=4,sig=.001,p<.001. Photo 5: Kruskal-Wallis (H)=26.285,df=4,sig=.000,p<.001. Min. Accept. Cond.: (H)=19.738,df=4,sig=.000,p<.001.

Figure 3 shows the stakeholder norm curves for the “density of mountain bikers.” The acceptability of 6 riders/15mX2m section of trail (SOT) and 8 riders/15mX2m SOT are significantly different between groups ( $H=9.879$  and  $11.939$ ,  $p<.05$  respectively). There is also a difference ( $H=20.862$ ,  $p<.001$ ) between groups regarding the minimum acceptable condition. The companies will tolerate higher densities (8 riders/20m<sup>2</sup>) than the government agencies (6.40), visitors (4.97), and environmental and recreation groups (4.50 and 3.71 respectively). Like the density of hikers, high levels of mountain bike use could result in increased profits for the companies through more lift tickets being sold. It is important to note that mountain biking is allowed on the ski hill, but is prohibited in the park. Thus, it is possible that respondents based their evaluations on mountain bike use on the ski hill rather than in the park. However, people often ride illegally along the trails in the park areas surrounding the ski hill. Given the differences between groups, consultations are needed to reach a compromise regarding an appropriate standard. A standard could be set at 3.5 riders/15mX2m SOT on the ski hill, as this falls within the optimal standard of quality window (84% to 50% acceptance) for each group (17).

With the exception of the companies, stakeholders consider this indicator to be important. The norm intensity (3.0, max.=10) and prevalence (60%) are low for the companies, but are high for the other groups (8.0 to 10.0, and 89% to 100% respectively). There is a significant ( $\chi^2=15.281$ ,  $p<.01$ ) “typical” ( $V=.289$ ) difference in prevalence between the groups. There is also a difference in intensity between groups ( $H=18.382$ ,  $p<.001$ ). These results show pronounced differences between groups regarding the acceptability and importance of this indicator. This should serve as a warning to the agencies responsible for managing this region (Intrawest, B.C. Parks) not to assume that their views are necessarily congruent with those of visitors and other interest groups.

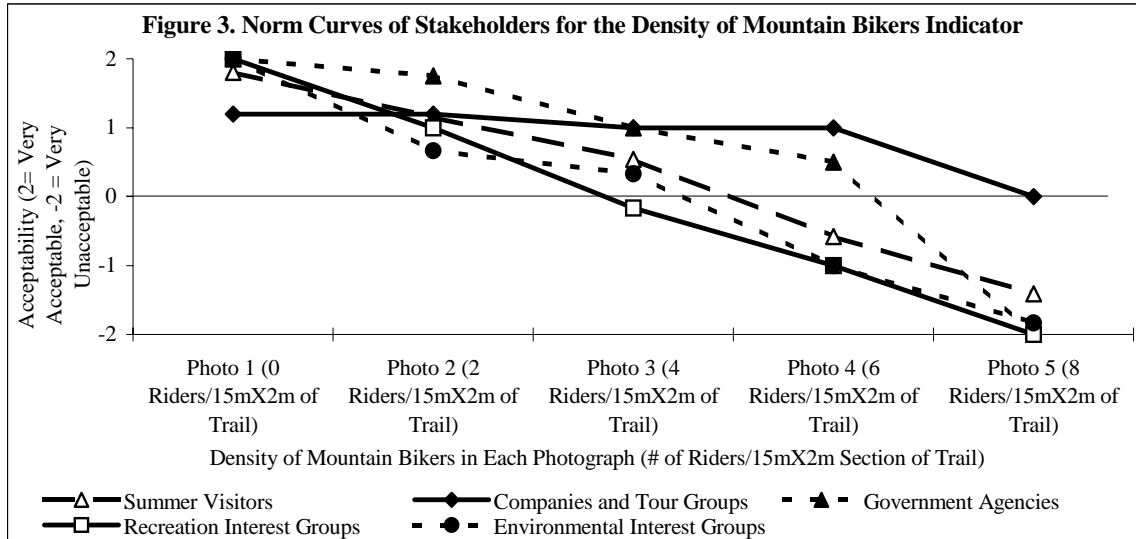


Photo 1: Kruskal-Wallis (H)=2.557,df=4,sig=.635,p>.05(ns). Photo 2: Kruskal-Wallis (H)=1.299,df=4,sig=.862,p>.05(ns). Photo 3: Kruskal-Wallis (H)=3.608,df=4,sig=.462,p>.05(ns). Photo 4: Kruskal-Wallis (H)=9.879,df=4,sig=.043,p<.05. Photo 5: Kruskal-Wallis (H)=11.939,df=4,sig=.018,p<.05. Min. Accept. Cond.: (H)=20.862,df=4,sig=.000,p<.001.

### 4.3 Norms and Standards for Resource Indicators

Currently, campsites are not present on Whistler Mountain, but they are being considered for various locales on the ski hill. Conversely, the surrounding park areas contain several campsites. Figure 4 shows that all the groups feel that 2m<sup>2</sup> campsites are acceptable, but 8m<sup>2</sup> campsites are unacceptable. The recreation groups, visitors, and companies will tolerate significantly higher standards ( $H=26.284$ ,  $p<.001$ ) regarding campsite size (5.82m<sup>2</sup>, 5.63m<sup>2</sup>, and 5.33m<sup>2</sup> respectively) compared to the environmental groups (4m<sup>2</sup>) and government agencies (3.6m<sup>2</sup>). This mirrors the findings of previous research (23).

Intensities for this resource indicator range from 3.83 to 4.67 (max.=6), but are not significantly ( $H=9.012$ ,  $p>.05$ ) different between groups. The recreation groups possess the lowest intensity, suggesting that this is a somewhat irrelevant indicator for them. Conversely, the environmental groups have the highest intensity, likely due to the ecological impacts such as vegetation damage, brush clearing, and soil erosion commonly associated with campsites (11). However, most representatives specified a standard, as the norm prevalence ranges from 75.5% for the visitors to upwards of 100% for the other groups. There is a significant ( $\chi^2=18.010$ ,  $p<.001$ ) association between the groups and whether or not they specified a standard, but this relationship is “minimal” ( $V=.188$ ), suggesting that this indicator is at least somewhat important for each group.

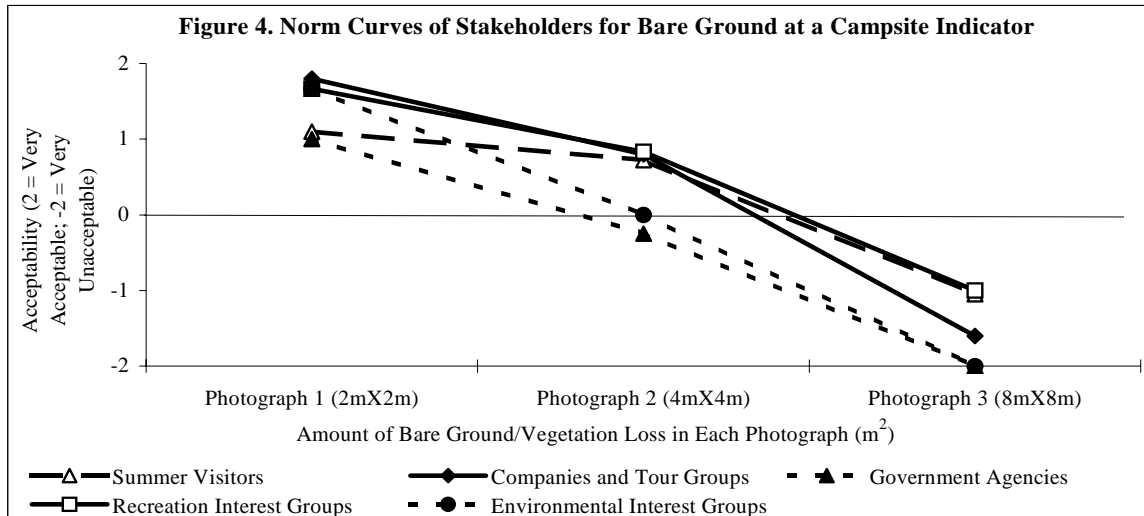


Photo 1: Kruskal-Wallis (H)=17.501,df=4,sig=.002,p<.01. Photo 2: Kruskal-Wallis (H)=17.938,df=4,sig=.001,p<.001. Photo 3: Kruskal-Wallis (H)=19.353,df=4,sig=.000,p<.001. Min. Accept. Cond.: (H)=26.284,df=4,sig=.000,p<.001.

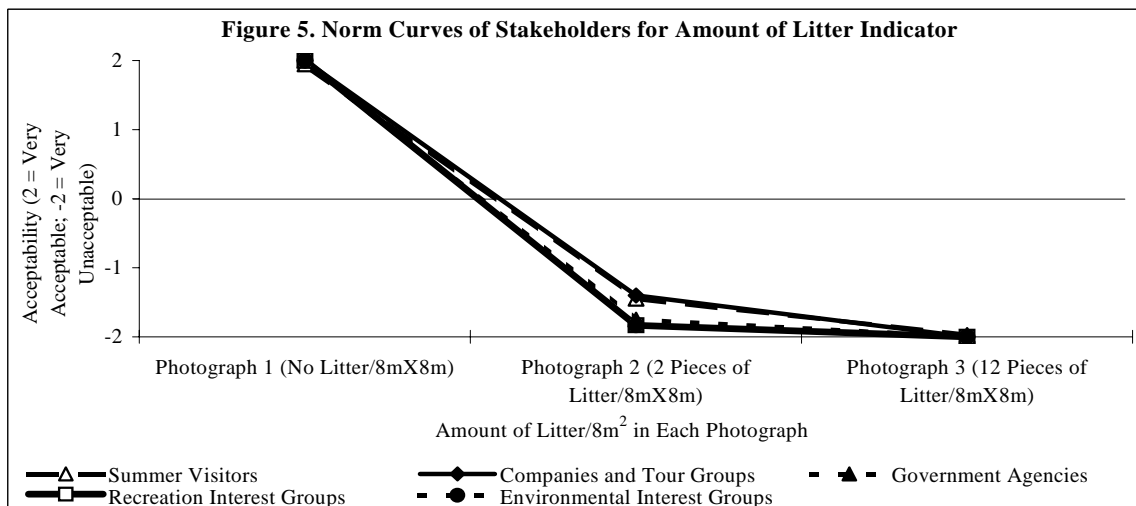


Photo 1: Kruskal-Wallis (H)=1.125,df=4,sig=.890,p>.05(ns). Photo 2: Kruskal-Wallis (H)=3.093,df=4,sig=.542,p>.05(ns). Photo 3: Kruskal-Wallis (H)=0.553,df=4,sig=.968,p>.05(ns). Min. Accept. Cond.: (H)=2.563,df=4,sig=.633,p>.05(ns).

Unlike the norms and standards for the other three indicators, there is little variation between the stakeholder groups in their responses to the “amount of litter” indicator (Figure 5). There is no tolerance for any litter as all respondents report that any garbage is unacceptable. There are no significant ( $H=.553$  to  $3.093$ ,  $p>.05$ ) differences between the groups for the three litter conditions and the minimum acceptable condition (standard) ( $H=2.563$ ,  $p>.05$ ). The norm intensities are extremely high for all of the groups as they range from 5.88 (max.=6) for visitors to 6.0 for the other groups. Also, all of the representatives specified a standard, indicating 100% norm prevalence across groups. There is a high degree of consensus among the groups that this is an important indicator and the study area should be monitored to ensure that it is devoid of litter at all times.

## 5. CONCLUSIONS AND IMPLICATIONS

This represents the first major study addressing the use and management of ski hills in the summer season. Several conclusions and implications can be derived from the results. First, use levels, noise from motorized activities, and hiker density are ranked as the most important social

indicators for Whistler Mountain and adjacent areas of Garibaldi Park in the summer. Litter and vegetation impacts are important resource indicators for this area.

Second, the stakeholders agree that litter is unacceptable and the study area should be monitored to ensure that no litter is present. However, the norms and standards for the density of hikers and mountain bikers and amount of bare ground at a campsite indicators vary considerably between groups. The different norm curve shapes likely reflect the different characteristics and philosophies of the organizations. In other words, the groups have different lenses through which they evaluate impacts. The agencies that manage this region should be aware that their views are not always congruent with those of visitors and other interest groups. By acknowledging the views of interest groups and their clientele, managers may be able to make more informed, intelligent, accountable, and transparent management decisions.

Third, the companies will tolerate high summer use densities in the area. This is not surprising given that higher use could translate into greater profits. Conversely, the government agencies that manage the land around Whistler Mountain generally have the least tolerance for increased densities and resource impacts. This is predictable because many Canadian government and parks agencies have experienced financial cutbacks for on-site management (36). If use increases in Garibaldi Park or on Whistler Mountain thus causing some of it to possibly “spill over” into the park, social and resource impacts may rise. This could increase management demands on these government agencies.

Fourth, the norm prevalence and intensity levels for each indicator are similar between the groups, but increased impacts tend to provoke the most extreme reactions from environmental interest groups. This is likely because impacts associated with high use such as trampling, as well as resource impacts like vegetation removal and litter can be detrimental to the ecological integrity of a setting (11).

Fifth, this paper argues that although the norms of park users should continue to be measured, more attention needs to be devoted to the norms of other interest groups. This will ensure more complete applications of the LAC and will provide data to allow more informed decisions in parks and protected areas. Multi-stakeholder input is also central to ecosystem management. More attention also needs to be directed at addressing impacts at a broader ecosystem level, which includes threats to parks from external developments like ski hills. This paper attempts to address this issue as it assesses impacts in the park – ski hill interface. However, the applicability of the findings to other commercial areas, parks, and protected areas remains a topic for further investigation.

Finally, this paper demonstrates the value and utility of applying the LAC framework and using the normative approach to measure indicators and standards. This provides a useful technique for facilitating the social science component of ecosystem management. Using multi-stakeholder input, addressing impacts from external sources, and selecting, measuring, and monitoring indicators and standards aids decision making and allows park managers to tackle relatively complex ecosystem management issues.

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