INTERNATIONAL JOURNAL OF TOURISM RESEARCH
Int. J. Tourism Res. **6**, 421–437 (2004)
Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/jtr.504

Site-Specific Encounters, Norms and Crowding of Summer Visitors at Alpine Ski Areas

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ABSTRACT

Operating chairlifts at alpine ski areas during the summer to accommodate tourism and recreation activities (e.g. hiking and mountain biking) is increasing in popularity. Increasing summer use, however, may affect the ability of ski areas to sustain acceptable social conditions (e.g. crowding). In addition, little is known about encounters, crowding or acceptable use levels at ski areas during the summer. This article addresses these issues using data from surveys of summer visitors (n = 548) conducted at five separate sites in the Whistler Mountain ski area in British Columbia, Canada. Photographs and Likert-type scales measured visitors' encounters with others, perceived crowding and acceptance of use levels. Results showed that: (i) crowding and encounters differed among the sites; (ii) visitors at the backcountry sites rated encounters as less acceptable and possessed greater agreement regarding acceptable encounter levels compared with visitors at the more accessible sites; (iii) crowding and encounters were important indicators of summer use at each site; and (iv) visitors who felt more crowded encountered more people than their normative tolerances. Explanations for these findings and implications for managers and researchers are discussed.

Received 5 January 2004; Revised 18 September 2004; Accepted 2 October 2004

Keywords: crowding; encounters; indicators; norms; ski areas; standards of quality.

INTRODUCTION

Tourism and recreation at mountain resorts such as Vail (USA), Chamonix (France), and Whistler (Canada) have received considerable attention in the literature (Gill and Hartmann, 1992; Klenosky *et al*., 1993; Gill and Williams, 1994; Hudson and Shephard, 1998; Gill, 2000; Godde *et al*., 2000). Alpine ski areas (e.g. Aspen Highlands, USA; Blackcomb and Whistler Mountains, Canada) are focal points of tourism and recreation at mountain resorts, and activities such as skiing and snowboarding have dominated ski areas for decades. Studies have examined the social dimensions (e.g. visitor conflict) of this winter use (Williams *et al*., 1994; Ormiston *et al*., 1998; Vaske *et al*., 2000; Thapa and Graefe, 2003).

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Other researchers have examined some biophysical impacts (e.g. trail erosion, vegetation trampling) associated with *summer* use at ski areas (Price, 1983; Wood, 1987; Pickering *et al*., 2003). Saremba and Gill (1991) and Pickering and Buckley (2003) discussed activities and social impacts (e.g. crowding) related to summer use at ski areas, but their discussions were not based on empirical data. Hence, the social aspects of tourism and recreation at ski areas in the summer season have received little empirical attention.

Operating chairlifts at alpine ski areas in the summer to accommodate activities such as hiking and mountain biking is increasing in popularity. For example, 12% of the ski areas in British Columbia (BC), Canada had lifts operating in the summer of 1991. A decade later, summer operations occurred at 65% of these areas (BCALC, 2000). Many alpine ski areas worldwide now have at least one chairlift operating in the summer, with some ski areas receiving over 250000 visitors each summer (Needham *et al*., 2004).

Increasing use, however, has generated concerns about the ability of ski areas to sustain acceptable levels of social impacts (e.g. visitor crowding) during the summer season (Saremba and Gill, 1991; Pickering and Buckley, 2003; Pickering *et al*., 2003). Research suggests that to manage use in tourism and recreation settings, it is necessary to understand the: (i) number of other people that guests encounter during their visit; (ii) degree to which guests feel crowded during their visit; and (iii) conditions (e.g. use levels) that guests feel are acceptable and unacceptable (Shelby and Heberlein, 1986; Manning, 1999; Vaske and Donnelly, 2002). Little is known, however, about crowding, encounters, or the acceptability of use levels at ski areas during the summer season. This article addresses this knowledge gap using data from surveys of summer visitors at the Whistler Mountain ski area in Canada.

CONCEPTUAL BACKGROUND

Encounters, norms and crowding

The concepts of reported encounters, perceived crowding and norms have received considerable attention in the tourism and recreation literature (for reviews see Shelby and Heberlein, 1986; Manning, 1999). *Reported encounters* describe a subjective count of the number of other people that an individual remembers observing in a setting (Vaske and Donnelly, 2002). *Perceived crowding* refers to a subjective and negative evaluation that the number of encounters or people observed in an area is too many (Shelby *et al*., 1989).

Numerous studies have focused on encounters and perceived crowding in tourism and recreation settings (for reviews see Shelby and Heberlein, 1986; Shelby *et al*., 1989; Manning, 1999; Vaske and Donnelly, 2002). This research has shown that encounters and crowding can vary by location within a setting. For example, studies have revealed differences at campsites versus along trails (Patterson and Hammitt, 1990), at river put-in points versus on the river (Tarrant *et al*., 1997), and at park access points versus more remote wilderness areas (Shelby, 1981; Vaske *et al*., 1996; Cole and Stewart, 2002). Understanding visitors' reported encounters and perceived crowding, however, may not reveal maximum acceptable use levels or an understanding of how use should be managed and monitored. Norms offer a theoretical and applied basis to help address these issues.

One line of research commonly defines *norms* as standards that individuals use for evaluating activities, environments, or management strategies as good or bad, better or worse (Vaske *et al*., 1986; Donnelly *et al*., 2000). Norms help to clarify what people believe conditions or behaviour should be. Research suggests that when visitors perceive a setting to be crowded, they have at least implicitly compared the conditions they actually experienced (e.g. number of encounters) with their normative evaluation of what they feel are acceptable or unacceptable conditions (e.g. use levels) for the setting (Vaske and Donnelly, 2002).

Indicators and standards of quality

Norm theory has provided a basis for measuring various indicators and formulating standards of quality (Manning, 1999). *Indicators* (e.g. litter) are social, resource or managerial variables that define quality settings and

experiences (Shelby *et al*., 1996). Indicators can be measured to formulate *standards of quality* (e.g. two pieces of litter seen per day), or points at which indicator conditions reach unacceptable levels (Manning *et al*., 2002). Indicators can be monitored to ensure that standards are maintained. If standards are violated, management action may be necessary. This approach is central to contemporary tourism and recreation planning frameworks such as the Limits of Acceptable Change (LAC) (Stankey *et al*., 1985), Visitor Impact Management (VIM) (Graefe *et al*., 1990), and Visitor Experience and Resource Protection (VERP) (Manning, 2001). In these frameworks, the typical carrying capacity question of 'how much use or impact is too much' is redefined as 'how much use or impact is acceptable or should be allowed?' This focuses management attention on desirable conditions rather than just the amount of use and its impact. Basing decisions on how much and what kinds of uses and impacts are acceptable may allow managers to better address their clientele's attitudes, needs and wants.

A simplified example may help to illustrate. The provision of opportunities for visitor solitude is a management goal in many parks and related tourism and recreation settings (Manning, 1999; Weaver, 2001; Dearden and Rollins, 2002). This goal, however, may be too general to guide management because it does not specify what constitutes solitude and how it should be measured. Indicators and standards of quality may help to resolve some of these issues. Surveys or in-depth interviews with visitors may show that the number of encounters with other people is an important aspect of solitude, suggesting that it may be one indicator of solitude. Normative research may reveal that once many visitors encounter 10 or more people in a specific area, they feel crowded and do not achieve an acceptable level of solitude. This suggests that encounters with 10 or more people may represent an appropriate standard of quality for a specific area.

The social norm curve

Much of the normative work in tourism and recreation is based on Jackson's (1965) model. This approach describes norms (i.e. evaluative standards) using a graphic device called a *social norm curve* (Manning *et al*., 1999) or an *impact acceptability curve* (Vaske *et al*., 1986). The measurement of a social norm is derived from the averages of evaluations provided by individuals within a population. This graph represents the amount of indicator change increasing from left to right along the horizontal axis (Figure 1). The vertical axis represents the evaluative responses with the most positive evaluation at the top of the axis, the most

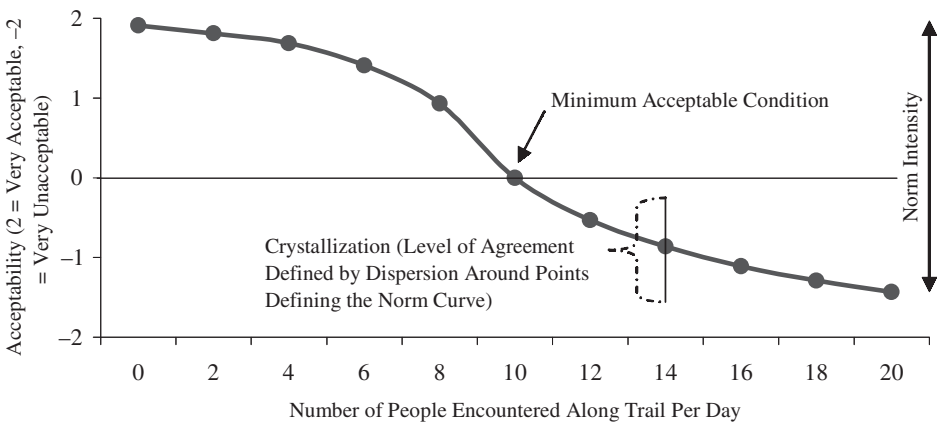

Figure 1. Hypothetical social norm curve (modified from Manning *et al*., 1999).

negative on the bottom, and a neutral category in between. The majority of tourism and recreation studies have used *acceptability* as the evaluative response (see Manning *et al*., 1999 for a list of evaluations used in other studies). The curve can be analysed for various structural characteristics including the minimum acceptable condition, intensity or strength of the norm, and degree of consensus about the norm (i.e. norm crystallization).

The *minimum acceptable condition* is the point where the norm curve crosses the neutral line and indicator conditions become unacceptable. This point usually represents the indicator conditions that 50% of respondents feel is acceptable and 50% feel is unacceptable. In most studies (for reviews see Vaske *et al*., 1993; Shelby *et al*., 1996; Manning, 1999), this point represented the standard of quality for the measured indicator.

Norm intensity (i.e. importance of the indicator to respondents) is the relative distance from the neutral line at each point on the curve, independent of the direction of the evaluation (e.g. acceptable or unacceptable) (Shelby and Vaske, 1991). Intensity is often measured as the sum of these distances across all points on the curve (Shelby and Heberlein, 1986; Vaske *et al*., 1986). The greater the cumulative distance from the neutral line, the higher the intensity. A flat curve close to the neutral line suggests that few people will be upset if a standard is violated, whereas a curve that declines sharply and remains negative implies that more people may be impacted (Shelby *et al*., 1996; Freimund *et al*., 2002).

Crystallization is a measure of normative agreement among respondents for the indicator conditions. In most studies, this is presented as the average of the standard deviations (i.e. interval around the mean containing the majority or 68% of responses) for the points comprising the curve (Shelby and Heberlein, 1986; Shelby *et al*., 1996; Ormiston *et al*., 1998). If crystallization is high (i.e. small average standard deviation), managers may have confidence in using normative data to help formulate standards (Manning, 1999).

Although acknowledging its management utility, a few researchers have criticised the normative approach in tourism and recreation, noting that conditions are unable to be enforced by sanctions and that norms require obligations or modifications of behaviour (both are central to some social psychological applications of norms). In contrast, researchers have argued that: (i) institutions and managers have a sense of obligation and behaviour that allows unacceptable conditions has clear normative components; and (ii) tourism/recreation involves emerging norms for which sanctions and obligations often have not fully evolved. These issues and this debate are beyond the scope of this article and are discussed elsewhere (e.g. Roggenbuck *et al*., 1991; Shelby and Vaske, 1991; Manning *et al*., 1999; Vaske and Whittaker, 2004). Regardless, researchers generally agree that the normative approach is useful, as it can: (i) help to define evaluative standards for specific conditions and management actions; (ii) identify situations about which people feel strongly; and (iii) describe the amount of agreement about acceptable conditions and management actions.

Normative research in tourism and recreation

The normative approach has been used in over 50 studies to understand *encounter norms*, or the maximum number of other people that visitors will accept seeing in an area (for reviews see Vaske *et al*., 1986, 1993; Shelby *et al*., 1996; Manning, 1999; Donnelly *et al*., 2000). Most of these studies have been conducted in public parks and related tourism and recreation areas in the USA, but some have occurred in Canada (Vaske *et al*., 1996; Freimund *et al*., 2002) and other countries (Saarinen, 1998; Inglis *et al*., 1999). Despite this breadth of research, few studies have applied the normative approach to commercial tourism and recreation areas (Ormiston *et al*., 1998). This article helps to address this knowledge gap by examining the norms of summer visitors at an alpine ski area.

A consistent finding in this body of research is that compared with visitors at easily accessible frontcountry settings, those at more remote backcountry areas rate encounters with other visitors as less acceptable, place higher importance on encounters as an indicator (i.e. norm intensity), and have a greater degree of

consensus (i.e. norm crystallization) regarding acceptable levels of encounters (e.g. Shelby and Vaske, 1991; Basman *et al*., 1996; Manning *et al*., 1996; Vaske *et al*., 1996; Manning, 1999; Cole and Stewart, 2002).

In addition, research has shown that when encounters exceed a visitor's norm for seeing others, perceived crowding is higher compared with those who encounter less than their norm. For example, a comparative meta-analysis of 13 studies involving 10697 tourists and recreationists demonstrated that when people reported less encounters than their norm, they felt 'not at all crowded', whereas those who reported more encounters than their norm felt 'slightly' or 'moderately' crowded (Vaske and Donnelly, 2002). This pattern was evident and statistically significant ($p < 0.05$) in all of the studies.

The purpose of this article is to measure reported encounters and perceived crowding of summer visitors on and adjacent to the Whistler Mountain ski area in Canada. This information is compared with visitors' encounter norms to inform standards of quality for managing summer use at various sites within this alpine ski area.

METHODS

Study area

Data for this article were obtained from summer visitors on and adjacent to the Whistler Mountain ski area. This area is located about 120 km (75 miles) north of Vancouver near the Whistler resort in southwest BC, Canada. Whistler Mountain has 16 ski lifts, but only the Whistler Village Gondola is used in the summer (July to October) to shuttle visitors from Whistler Village (652 m (2140 ft) elevation) to the Roundhouse Lodge and restaurant area (1809 m (6030 ft) elevation) on the mountain (Figure 2). Over one million skiers and snowboarders visit this mountain each winter; approximately 183700 people visited in the summer of 2000. Hikers/sightseers (74%) and mountain bikers (23%) were the main activity groups in the summer of 2000, although other activities such as helicopter tours and bear viewing tours were offered (Needham, 2002; Needham *et al*., 2004 in press). Over 225000 people visited this ski area in the summer of 2002.

Data collection

After two pre-tests, a 10-page, 37-question survey was conducted on-site (face-to-face) with summer visitors over 16 years of age at five separate sites in the study area from 1 July to 4 September 2000 (Figure 2). The survey layout followed procedures outlined by Salant and Dillman (1994). The five sites ranged from the developed (e.g. restaurants, hard-surfaced trails, ski lifts) Top of Gondola/Roundhouse area (site 1), to more remote and relatively unmodified sites such as sites 3 (Flute Summit/Musical Bumps Trail) and 4 (Russet Lake). Site 5 (Mountain Bike Park) contains over 100 km (60 miles) of trails near the base of the ski hill that are zoned solely for mountain biking.

Sampling at the five sites was alternated daily. Sites 1 (Top of Gondola/Roundhouse), 2 (Harmony Lakes) and 5 (Mountain Bike Park), which are the most heavily visited areas, were each sampled at 14 times (twice for each day of the week). The sites in the backcountry (sites 3, Flute Summit/Musical Bumps Trail, and 4, Russet Lake) were sampled at seven times each (once for each day of the week) due to the remaining snowpack that blocked the hiking trails to these sites in July and early August 2000.

In total, 651 summer visitors were approached and 548 completed the survey on-site (response rate = 84%). This sample yields a 95% confidence interval with a margin of error of ±4.2%. Sample sizes at each site were 187 at site 1 (Top of Gondola/Roundhouse) (86% response), 119 at site 2 (Harmony Lakes) (93% response), 59 at site 3 (Flute Summit/Musical Bumps Trail) (81% response), 57 at site 4 (Russet Lake) (97% response), and 126 at site 5 (Mountain Bike Park) (73% response).

Visual approach for measuring encounter norms

Each of the survey questions that asked summer visitors about their reported encounters, perceptions of crowding and encounter

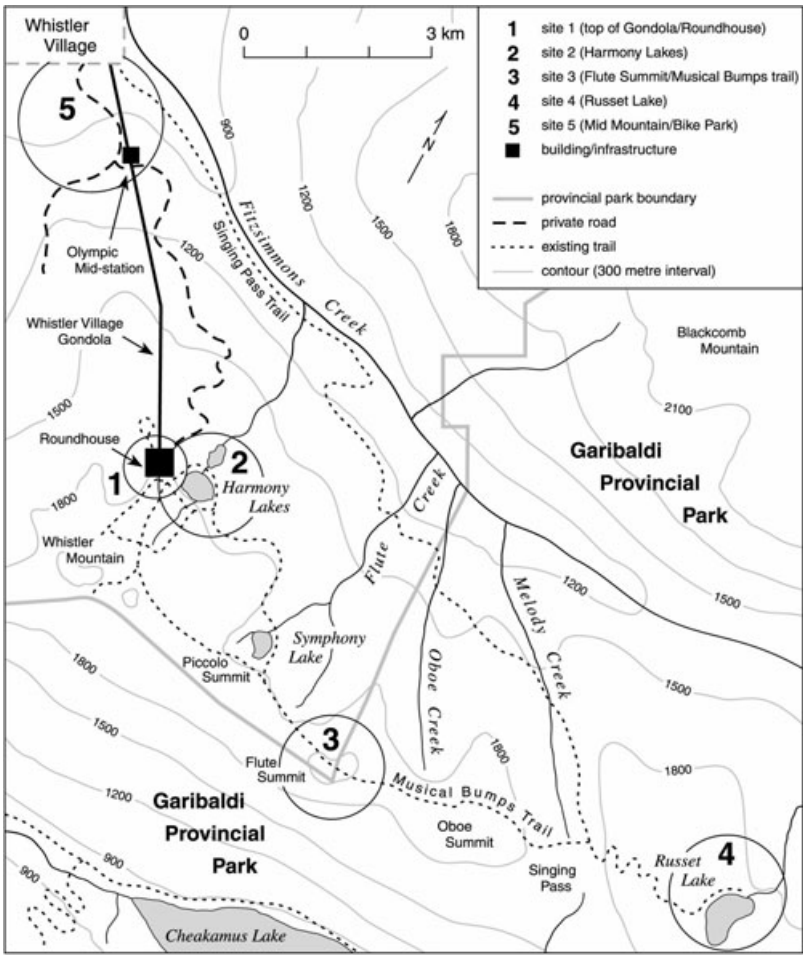

Figure 2. The five survey site locations in the study area. Scale 3 km = 1.86 miles. The 300 m contour intervals = 984 ft each. Only the Whistler Village gondola operates in the summer. There are 15 other ski lifts (not shown) that do not operate in the summer.

norms required visitors to respond 'based on your impressions of this immediate site where you have been contacted by the field researcher and are currently completing this survey'.

Two indicators (density of hikers/sightseers, density of mountain bikers) were used to measure visitors' encounter norms. Image capture technology (ICT) was used to measure these indicators, which involves using software to manipulate and create visuals (Lime, 1990). Visuals have become popular for depicting indicator impacts associated with tourism/recreation use (Manning *et al*., 1996, 1999; Inglis *et al*., 1999; Freimund *et al*., 2002). Respondents rate their acceptance of several photographs or video clips depicting indicator impacts (e.g. use density) varied from low to high. These acceptability ratings can be plotted on a norm curve to provide a mechanism for devising standards of quality.

Visuals provide a realistic and cognitively easy assessment of indicators, as they allow respondents to see and/or hear what conditions would be like (Hall and Roggenbuck, 2002). This is especially important in high-use areas where it may be unrealistic to expect respondents to ascertain from written descriptions of indicator conditions what would be acceptable (e.g. number of visitors, use density). There are, however, disadvantages (e.g. time consuming, increases respondent

Figure 3. Sample photographs depicting 'density of hikers/sightseers' indicator.

burden, images depict 'snapshots' of conditions at one moment in time, indicators such as noise may be difficult to measure) of this approach (see Manning *et al*., 1996; Shelby *et al*., 1996; Freimund *et al*., 2002; and Hall and Roggenbuck, 2002 for the advantages and disadvantages of ICT and using visuals to measure norms).

In this study, the *density of hikers/sightseers* indicator was measured with five photographs depicting 0 to 16 people per 20 m^2 (65 ft^2) with the number of people doubling in each image (i.e. 0, 2, 4, 8 and 16 people per 20 m^2) (Figure 3). Similar to past research then, images portraying user densities were used to measure encounter norms (Basman *et al*., 1996; Freimund *et al*., 2002). Using Adobe Photoshop 5.5 software, the photograph containing 16 people per 20 m^2 was created first and people were randomly removed to create four other visuals of different use densities. People were randomly positioned, but their age, sex, number walking in various directions, and number in the foreground and background were balanced. The density scale for the photographs was measured in the field at 20 m^2.

The *density of mountain bikers* indicator was portrayed with five photographs showing 0 to 8 riders per 15 m × 2 m (50 ft × 6.5 ft) section of trail (SOT), with the number of riders increasing by two in each photograph (i.e. 0, 2, 4, 6 and 8 riders per 15 m × 2 m SOT) (Figure 4). These visuals were created in a similar manner as those representing the density of hikers/sightseers indicator. Riders, however, were placed on a trail in linear fashion to reflect their general movement pattern given the narrow and descending nature of the trails in this ski area. The density scale for the trail section on which the mountain bikers were placed in the visuals was measured in the field at 15 m long and 2 m wide.

The colour photographs were printed in 20 cm × 15 cm (8 in × 6 in) size and shown to

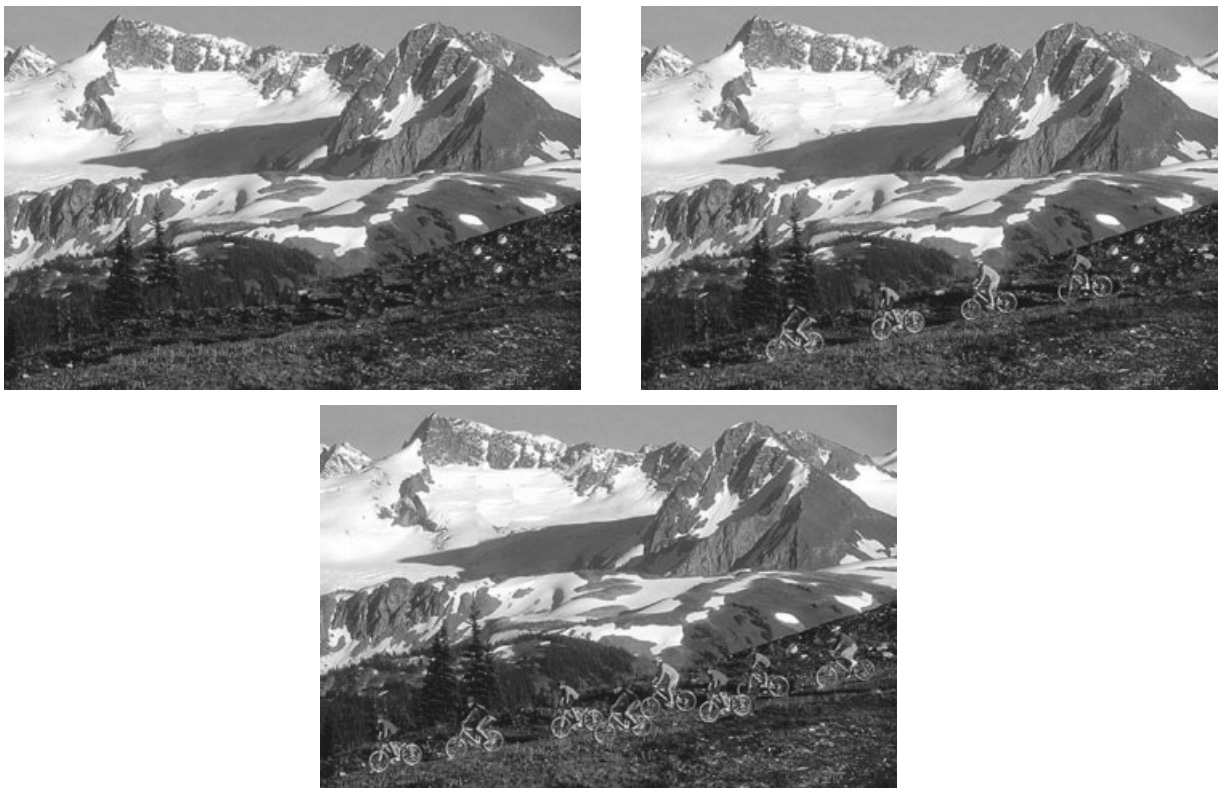

Figure 4. Sample photographs depicting 'density of mountain bikers' indicator.

respondents in cue-card fashion during survey completion (i.e. one at a time). During the two pre-tests, the visuals were presented in random order (e.g. 4, 16, 0, 8 and 2 people per 20 m^2), chronological/increasing in impact (e.g., 0, 2, 4, 8 and 16 people per 20 m^2) and decreasing order (e.g. 16, 8, 4, 2 and 0 people per 20 m^2) to check for *starting point bias* (i.e. order effects). No significant differences were observed (hiker visuals: Kruskal–Wallis H = 0.01 to 0.99, d.f. = 2, p = 0.61 to 0.99; mountain biker visuals: H = 0.62 to 4.10, d.f. = 2, p = 0.13 to 0.74), so the sets of visuals were shown in chronological order during main data collection. These results are similar to those reported by Manning *et al*. (2002), suggesting that starting point bias may not be a major concern when measuring tourists' and recreationists' norms.

Respondents rated the conditions in each visual on a scale of –2 'very unacceptable' to +2 'very acceptable' with interior narratives of –1 'somewhat unacceptable', 0 'neither', and +1 'somewhat acceptable'. Similar to past research (Basman *et al*., 1996; Freimund *et al*., 2002), respondents were told to ignore the generic backgrounds in the visuals, focus on the density of use in each visual, and assume that it was consistently occurring at the specific site where they were surveyed. On-site debriefing sessions with respondents during the two pre-tests suggested that respondents had no difficulty following these guidelines.

To avoid conflicts and ensure visitor safety, the ski area operators implemented a zoning strategy segregating mountain bikers to the Bike Park (site 5) near the base of Whistler Mountain, and hikers/sightseers to the high alpine area (sites 1 through to 4). Hikers/sightseers are prohibited in the Bike Park and mountain bikers are not allowed in the high alpine. Given that these two groups rarely encounter each other, visitors at sites 1 through to 4 only responded to the images representing

the density of hikers/sightseers indicator and visitors at site 5 only responded to the visuals for the density of mountain bikers indicator.

Analysis variables for encounters and crowding

To measure reported encounters, each respondent at sites 1 through to 4 was asked to specify which one of the five photographs for the density of hikers/sightseers indicator most accurately represented the conditions that they most often encountered during their visit to the site where they were surveyed. Each respondent at site 5 (Bike Park) specified one photograph depicting the density of mountain bikers indicator that most accurately represented the conditions that they encountered most often during their visit to this site. Visitor responses were recorded on the back cover of the survey by the field researcher.

Perceived crowding was measured using a nine-point scale ranging from 1 'not at all crowded' to 9 'extremely crowded' (Heberlein and Vaske, 1977). This perceived crowding scale has been used in many previous studies (Shelby *et al*., 1989). Respondents were asked to indicate how crowded they felt during their visit to the site where they were surveyed.

RESULTS

Table 1 shows visitors' reported encounters at each site. Most visitors reported that the photograph depicting 16 people per 20 m^2 represented the encounter level they experienced most often at the easily accessible Roundhouse area (site 1). Conversely, the majority of visitors reported encountering only 0 or 2 people per 20 m^2 at site 3 (Flute Summit/Musical Bumps Trail), which is located further into the backcountry. There was a significant (χ^2 = 692.83, d.f. = 12, $p < 0.001$) difference in reported encounters among the four high alpine sites (sites 1 to 4). The Cramer's *V* effect size was 0.53. Using guidelines from Cohen (1988) and Vaske *et al*. (2002), the strength of this difference can be characterised as 'large' or 'substantial', respectively. In addition, the average encounters differed among the sites

Table 1. Reported encounters of visitors at each site.

	Survey site location*								
Group and density	Site 1 (Top of Gondola/ Roundhouse)	Site 2 (Harmony Lakes)	Site 3 (Flute/ Musical Bumps Trail)	Site 4 (Russet Lake)	Site 5 (Mountain Bike Park)	χ^2 or *F*-value	d.f.	*p*-value	Effect size Cramer's *V* or eta (η)
Hiker/sightseer encounters† (people per 20 m^2)						692.83	12	<0.001	0.53
0	0	5	24	10					
2	4	14	43	14					
4	5	20	17	9					
8	7	37	7	34					
16	85	25	10	32					
Mean	14.32[a]	9.14[b]	3.93[c]	8.89[b]		321.84	3,418	<0.001	0.79
Mountain biker encounters† (riders per 15 m × 2 m SOT)									
0					2				
2					22				
4					23				
6					34				
8					19				
Mean					4.96				

*Cell entries are percentages unless specified as means. Means with different superscripts differ at $p < 0.05$ using Tamhane's T2 post-hoc tests.

†Respondents were asked which photograph most accurately represented the average conditions experienced at the site on their visit. Visitors at sites 1 through to 4 were asked only to choose from the 'density of hikers/sightseers' photographs because mountain biking is prohibited at these sites. Visitors at site 5 were asked only to choose from the 'density of mountain bikers' photographs because hiking is prohibited at this site. SOT = section of trail.

Table 2. Perceived crowding of visitors at each site.

Perceived crowding†	Survey site location*					χ^2 or *F*-value	d.f.	*p*-value	Effect size Cramer's *V* or eta (η)
	Site 1 (Top of Gondola/ Roundhouse)	Site 2 (Harmony Lakes)	Site 3 (Flute/ Musical Bumps Trail)	Site 4 (Russet Lake)	Site 5 (Mountain Bike Park)				
						64.15	32	<0.001	0.17
1 Not at all crowded	27	13	31	18	31				
2 Not at all crowded	17	16	32	26	27				
3 Slightly crowded	17	15	19	14	16				
4 Slightly crowded	7	9	5	12	7				
5 Moderately crowded	9	13	9	11	7				
6 Moderately crowded	20	22	5	14	8				
7 Moderately crowded	3	9	0	5	3				
8 Extremely crowded	2	3	0	0	0				
9 Extremely crowded	0	0	0	0	1				
Mean	3.32[a]	4.13[b]	2.44[a]	3.35[ab]	2.77[a]	10.61	4,539	<0.001	0.27

*Cell entries are percentages unless specified as means. Means with different superscripts differ at $p < 0.05$ using Tamhane's T2 post-hoc tests.
†Perceived crowding was measured using a nine-point scale from 1 'not at all crowded' to 9 'extremely crowded'.

($F = 321.84$, d.f. = 3, 418, $p < 0.001$). Tamhane's T2 post-hoc tests for unequal variances showed that the average number of encounters was significantly higher at site 1 (Top of Gondola/Roundhouse) compared with the other sites, whereas encounters were significantly lower in the backcountry at site 3 (Flute Summit/Musical Bumps Trail) compared with the other sites. Mountain Bike Park (site 5) visitors reported various encounter levels, although most reported encountering 4 or 6 riders per 15 m × 2 m section of trail (SOT).

Visitors' perceived crowding varied among the five sites. In total, 71% of the visitors felt crowded (3–9 on scale) at site 2 (Harmony Lakes), 58% and 56% felt crowded at sites 1 (Top of Gondola/Roundhouse) and 4 (Russet Lake), respectively, and less than 42% felt crowded at sites 3 (Flute Summit/Musical Bumps Trail) and 5 (Mountain Bike Park) (Table 2). There was a significant ($\chi^2 = 27.99$, d.f. = 4, $p < 0.001$) and 'typical' ($V = 0.23$) difference among the sites regarding whether or not visitors felt crowded. On average, site 2 (Harmony Lakes) had the highest level of visitor perceived crowding ('slightly' to 'moderately' crowded) and site 3 (Flute Summit/Musical Bumps Trail) had the lowest ('not at all crowded' to 'slightly crowded'). Mean levels of perceived crowding differed significantly among the sites ($F = 10.61$, d.f. = 4, 539, $p < 0.001$). The eta (η) effect size measure of 0.27 suggested that the strength of this difference can be characterised as 'typical' (Vaske *et al*., 2002). Taken together, these findings show that visitors' encounters and perceptions of crowding varied among the different sites within the study area.

The mean social norm curves of the visitors at each site are illustrated in Figures 5 and 6 and described in Table 3. As shown by the minimum acceptable condition (i.e. point where curve crosses the neutral point) on the norm curves, there was a significant ($F = 33.71$,

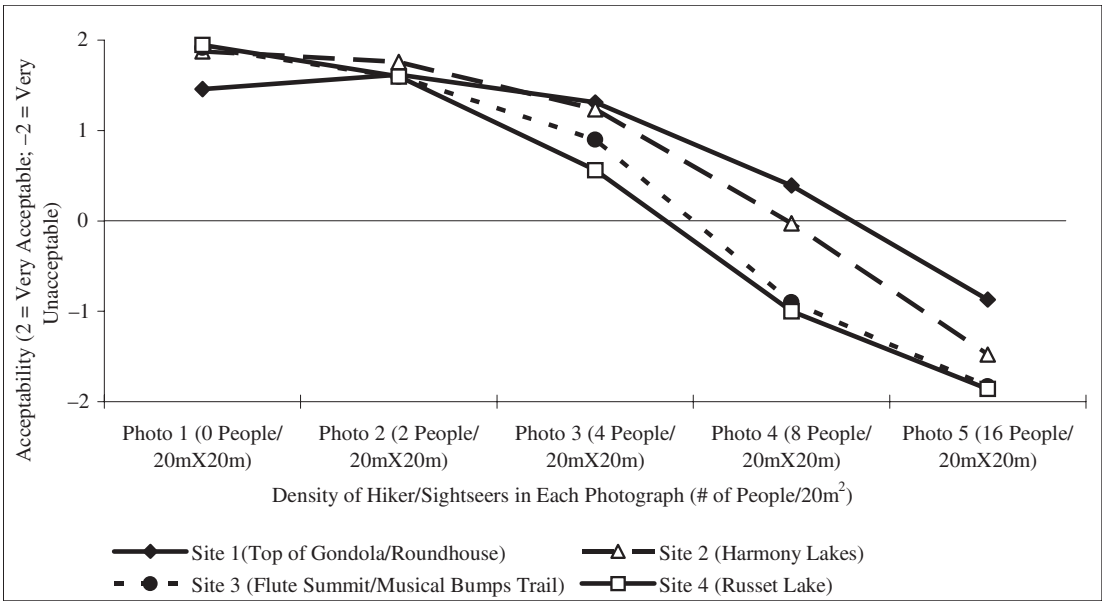

Figure 5. Mean social norm curves of visitors for 'density of hikers/sightseers' at sites 1 through to 4.

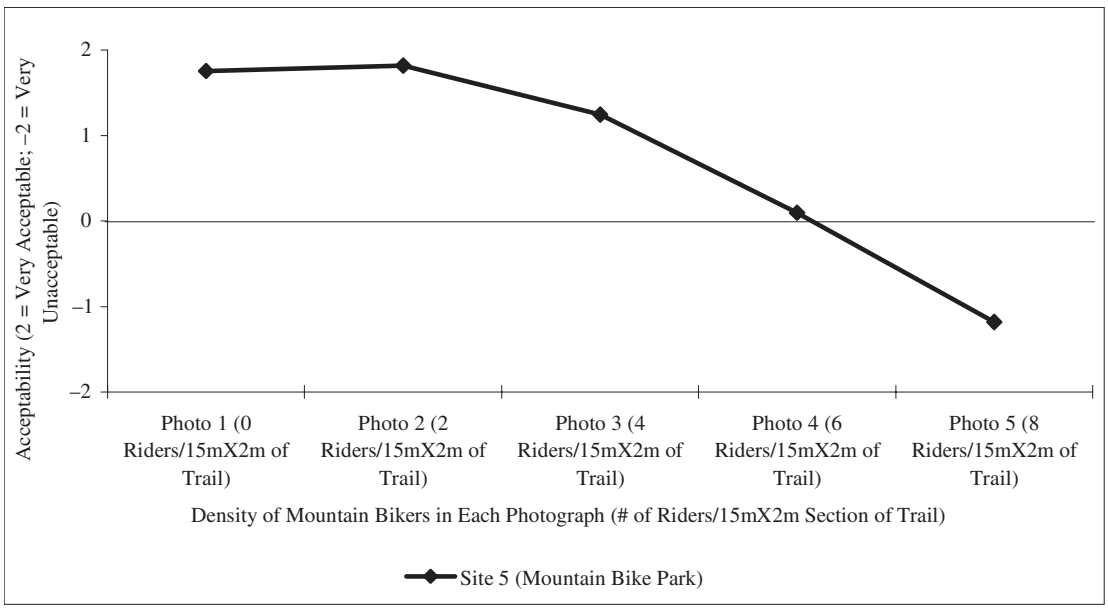

Figure 6. Mean social norm curve of visitors for 'density of mountain bikers' at site 5.

d.f. = 3, 407, $p < 0.001$) and 'substantial' ($\eta = 0.45$) difference in normative standards regarding hiker/sightseer encounters among the four high alpine sites (Vaske *et al.*, 2002). Tamhane's T2 tests indicated that visitors at sites 1 (Top of Gondola/Roundhouse) and 2 (Harmony Lakes) accepted significantly higher encounter levels than those at sites 3 (Flute Summit/Musical Bumps Trail) and 4 (Russet Lake). At site 5 (Mountain Bike Park), visitors

Table 3. Social norm curve characteristics at each site.

	Survey site location*								
	Site 1 (Top of Gondola/ Roundhouse)	Site 2 (Harmony Lakes)	Site 3 (Flute/ Musical Bumps Trail)	Site 4 (Russet Lake)	Site 5 (Mountain Bike Park)	*F*-value	d.f.	*p*-value	Effect size eta (η)
Norm intensity (maximum = 10)	7.63	7.80	7.75	7.74	7.73	0.51	3,407	0.675	0.06
Minimum acceptable condition†	10.47[a]	7.92[b]	6.00[c]	5.44[c]	6.15	33.71	3,407	<0.001	0.45
Crystallization‡	1.05	0.78	0.65	0.66	0.88	24.83§	3,407	<0.001	

*F-statistics test for differences among sites 1 through to 4 regarding the 'density of hikers/sightseers' indicator. They are not applied to site 5 where cell entries represent the 'density of mountain bikers' indicator. Means with different superscripts differ at $p < 0.05$ using Tamhane's T2 post-hoc tests.
†Cell entries are the mean number of hikers/sightseers per $20\,m^2$ for sites 1 through to 4, and the mean number of mountain bikers per $15\,m \times 2\,m$ section of trail (SOT) for site 5.
‡Cell entries are the average standard deviations of the points comprising each norm curve.
§Represents the F-value for the Levene's test for homogeneity.

accepted a maximum of 6.15 riders per $15\,m \times 2\,m$ SOT. With the exception of site 5, as distance increased away from the easily accessible main concentration area (Roundhouse) and into the backcountry, acceptance of higher encounter levels decreased.

In addition, norm crystallization (i.e. agreement) differed among the sites (Table 3). Crystallization for hiker/sightseer encounters was higher in the backcountry at sites 3 (Flute Summit/Musical Bumps Trail) and 4 (Russet Lake). This is represented by the lower average standard deviations for the norm curves at these sites compared with sites 1 (Top of Gondola/Roundhouse) and 2 (Harmony Lakes). The Levene's test for homogeneity revealed a significant ($F = 24.83$, d.f. = 3, 407, $p < 0.001$) difference in crystallization among the four high alpine sites. Visitors reported more agreement about acceptable encounter levels at the backcountry sites. There was moderate consensus among visitors at site 5 (Bike Park) regarding acceptable mountain biker encounters.

Table 3 shows that among the four high alpine sites (sites 1 to 4), norm intensities (i.e. indicator importance) were high (7.63 to 7.80, maximum = 10), did not vary much, and there were no significant differences ($F = 0.51$, d.f. = 3, 407, $p = 0.675$, $\eta = 0.06$). This suggests that visitors felt that the density of hikers/sightseers was a relatively important indicator of summer use at each of the high alpine sites on and adjacent to Whistler Mountain. The mean intensity (7.73) for the density of mountain bikers indicator at site 5 (Mountain Bike Park) suggests that this was a relatively important indicator for this site.

Table 4 shows the relationships among encounters, crowding and norms at each site. At sites 3 (Flute Summit/Musical Bumps Trail) and 5 (Mountain Bike Park), 78% and 66% of the visitors, respectively, reported *fewer* encounters than their norm. At the other sites, between 59% and 68% of the visitors reported *more* encounters than their norm. With the exception of site 3 (Flute Summit/Musical Bumps Trail), crowding scores at each site were significantly higher ($t = 2.20$ to 3.18, d.f. = 54 to 183, $p = 0.002$ to 0.029) for visitors reporting more encounters than their norm. The point-biserial correlation effect sizes at these four sites ranged from $r_{pb} = 0.20$ to 0.26, suggesting that the strength of the relationship among encounters, encounter norms and perceived crowding can be considered 'medium' (Cohen, 1988) or 'typical' (Vaske *et al.*, 2002). Consistent with previous research (Vaske and Donnelly, 2002), these findings generally suggest that perceived crowding was highest for visitors

Table 4. Relationship among visitor encounters, norms and perceived crowding at each site.

	Reported encounters compared with norm* (%)			Mean crowding scores†					
	Sample size (n)	Fewer encounters	More encounters	Fewer than norm	More than norm	t-value	d.f.	p-value	Effect size (r_{pb})
Site 1 (Top of Gondola /Roundhouse)	185	33	67	2.66	3.65	3.18	183	0.002	0.23
Site 2 (Harmony Lakes)	110	41	59	3.79	4.61	2.20	108	0.029	0.20
Site 3 (Flute/Musical Bumps Trail)	59	78	22	2.43	2.49	0.02	56	0.991	0.01
Site 4 (Russet Lake)	56	32	68	2.53	3.64	2.39	54	0.022	0.26
Site 5 (Mountain Bike Park)	124	66	34	2.48	3.35	2.24	120	0.028	0.22

*Percent of visitors who encountered either fewer than or more than their norm.
†Mean perceived crowding scores based on a nine-point scale from 1 'not at all crowded' to 9 'extremely crowded'.

who reported more encounters than their norm (i.e. standards).

DISCUSSION

This article examined the encounters, norms and crowding of summer visitors at five sites on and adjacent to the Whistler Mountain ski area. This article applied conventional theoretical and methodological approaches to address two issues that have received limited empirical attention. First, it applied the concepts of encounters, norms and perceived crowding to a commercial tourism/recreation setting. Second, it addressed some of the social dimensions of summer use at alpine ski areas.

Results demonstrated that encounters and perceived crowding differed among the sites. This mirrors findings of previous tourism and recreation research (Patterson and Hammitt, 1990; Vaske *et al*., 1996; Tarrant *et al*., 1997; Cole and Stewart, 2002). Consistent with previous research (Shelby and Vaske, 1991; Manning *et al*., 1996; Vaske *et al*., 1996; Cole and Stewart, 2002), results also showed that visitors at the backcountry sites rated encounters with other visitors as less acceptable and possessed more agreement (i.e. crystallization) regarding acceptable encounter levels. There were no differences, however, in norm intensity among the sites, suggesting that visitors placed relatively equal importance on the density of hikers/sightseers as an indicator of summer use at each of the four high alpine sites (sites 1 to 4), and the density of mountain bikers was a relatively important indicator for the Mountain Bike Park (site 5).

In addition, findings generally paralleled Vaske and Donnelly (2002); when reported encounters exceeded visitors' encounter norms, perceived crowding was statistically higher at all of the sites except site 3 (Flute Summit/Musical Bumps Trail). Compared with the other sites, site 3 visitors reported the lowest amount of encounters and crowding and the highest agreement (i.e. crystallization) regarding acceptable encounters. The survey data limit the ability to accurately explain the lack of a statistical relationship among encounters, norms and crowding at site 3. At this site, however, the sample size (n = 59) was comparatively small and very few visitors experienced more encounters than their norm (22%, n = 13). Although statistically insignificant, the pattern among encounters, norms and crowding was still evident at site 3, as those who reported more encounters than their norm felt slightly more crowded. The statistical insignificance, however, may be a function of sample size and/or a lack of variance for each concept (i.e. encounters, norms, crowding) at this site.

Moreover, the findings presented here revealed moderate levels of perceived crowding, especially at sites 1 (Top of Gondola/

Roundhouse), 2 (Harmony Lakes) and 4 (Russet Lake). For example, more than 70% of the visitors felt at least slightly crowded at Harmony Lakes. In addition, the majority of summer visitors at these three sites experienced more encounters than they would accept (i.e. norm). Data from respondents' normative evaluations of use density suggest that one possible approach for ensuring that visitors' experiences are not compromised would be to establish and monitor standards of quality between 0 and 10, 8, and 5 people per 20 m^2 at sites 1, 2 and 4, respectively.

Although this potential strategy of managing standards at levels equal to or better than the minimum acceptable conditions may help to alleviate crowding at these sites, it represents a double-edged sword for managers. On the one hand, setting standards to reduce encounters and crowding may improve visitors' experiences. On the other hand, these standards may result in many visitors being restricted or displaced from an area. In addition, reservation systems and quotas, which are common for restricting visitor use and managing crowding, can be costly to enforce (Manning, 1999). Options such as increasing visitor education and implementing directional trails may be more feasible for reducing encounters and crowding and managing standards of quality at these sites.

For managers and researchers, the results presented here highlight the importance of measuring all three concepts (i.e. encounters, perceived crowding, encounter norms) to inform, establish and manage standards of quality related to visitor use. Indicators such as encounters help to describe existing conditions. Evaluative dimensions such as perceived crowding can further describe visitors' feelings about existing conditions, but by themselves do not enable standards to be set based on what is acceptable (Manning, 1999; Vaske and Donnelly, 2002). The normative approach used widely in recreation and leisure research (for reviews see Shelby *et al*., 1996; Manning, 1999; Donnelly *et al*., 2000) may facilitate an understanding of acceptable and unacceptable conditions, thereby providing a basis for formulating standards of quality that can be used, in part, to inform management actions.

Additionally, the site-specific findings presented here suggest the need for managing individual sites separately. The results also underscore the importance of tailoring survey questions to specific sites within a management area (e.g. an alpine ski area), as opposed to more general questions common in trailhead or mail surveys that often compel visitors to average their perceptions and experiences within a management area during their visit.

FUTURE RESEARCH

To increase the generalisability of these findings, the following future research considerations are offered. First, the visuals measuring the two indicators (density of hikers, density of mountain bikers) represent a subset of the possible indicators of summer use at ski areas. In addition, establishing management standards based on encounter norms may only partially mitigate crowding. Indicators such as noise, type of activity group encountered, and discourteous behaviour may be important (Tarrant *et al*., 1997; Manning, 1999).

Second, similar to previous research (Basman *et al*., 1996; Freimund *et al*., 2002), this study used generic backgrounds in the photographs and visitors were told to assume that the indicator conditions were consistently occurring at the site where they were surveyed. An improvement, however, may come from using backgrounds of the exact sites. In addition, the visuals showed different numbers of hikers/sightseers and mountain bikers per unit area (e.g. 20 m^2). One approach for translating these normative results into approximate standards of quality would be to divide a site's total area by the corresponding unit standard (e.g. 20 m^2) and then multiply by the minimum acceptable condition. However, given that people are not usually dispersed evenly across an area, managers should exercise caution when adopting this approach (Manning, 1999). Research is required, therefore, to explore the extent to which this approach can be extrapolated to a landscape level. Additionally, the photographs depicted static (i.e. 'snapshots') of indicator conditions. Research using video techniques (Freimund *et al*., 2002) and other graphic devices (Martin *et al*., 1989; Manning *et al*., 1996) may provide

a more realistic representation of potential indicator conditions.

Third, this study assessed respondents' acceptance of indicator conditions. Recent research has shown that measures such as respondents' preference and absolute maximum tolerance of indicator conditions can differ from their acceptance (Manning *et al*., 2002). Research should continue to explore the differences among evaluative response categories.

Fourth, the minimum acceptable condition (i.e. standards of quality) at each site was represented in this study as the indicator conditions where the norm curves crossed the neutral line (i.e. 50% feel is acceptable, 50% unacceptable). This is consistent with previous research (for reviews see Vaske *et al*., 1993; Shelby *et al*., 1996; Manning, 1999). An issue of debate, however, is whether standards of quality should be based on alternative points along the norm curve. For example, should standards be based on the optimal/preferred conditions, which receive the most positive evaluations from almost all respondents (e.g. highest point on the curve or 0 people per $20\,m^2$ at the high alpine sites in this study) or should standards be based on conditions that are acceptable to less than 50% of respondents? Basing encounter standards on the optimal/preferred conditions is often impractical (Manning, 1999). In this study, for example, this would result in almost all visitors being prohibited from each site. Conversely, if standards are based on impacts that are acceptable only to a small proportion of visitors, conditions may deteriorate to the point where most visitors do not return and are displaced to other tourism/recreation settings. It remains an issue for managers and researchers to determine standards of quality that provide logistically and politically feasible options for managing specific tourism and recreation settings.

Fifth, this study involved one stakeholder group — summervisitors. Management frameworks such as the LAC (Stankey *et al*., 1985), however, demand input inclusive of many individuals and organisations with economic, recreational and ecological interests. Multi-stakeholder input may be important because the normative standards of visitors, managers and interest groups can vary (Martin *et al*., 1989; Shelby and Shindler, 1992; Needham and Rollins, 2005). Other groups with interests in summer use at ski areas may include managers, government agencies, tour companies, and recreation and environmental groups. Most studies have focused solely on visitors' norms, not the norms of other groups. More research to incorporate other stakeholders' views in tourism and recreation research is needed. This may generate more informed, accountable and transparent decisions.

Finally, the findings presented here are limited to five sites within one alpine ski area. The results may not generalise to all ski areas where chairlifts operate in the summer. Given the lack of research to apply the concepts of encounters, norms and crowding to commercial tourism/recreation settings in general and to alpine ski areas in particular, the ability to compare most of the results presented here with other situations is limited. Therefore, the applicability of these findings to other activity groups, ski areas and commercial outdoor tourism and recreation settings remains a topic for further empirical investigation.

ACKNOWLEDGEMENTS

The authors thank the Intrawest Corporation at Whistler/Blackcomb and the British Columbia Ministry of Water, Land, and Air Protection for letting this study be conducted in their jurisdictions. Philip Dearden, Paul West (both at University of Victoria), and Jerry Vaske (Colorado State University) are thanked for their assistance.

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