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Senior Supervisor
Associate Professor

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A discrete choice experiment was used to evaluate the demand of skiers to Whistler (n = 405), British Columbia, for environmentally sustainable ski hill management initiatives as a component of a ski hill's operations. The hypothetical choice sets presented thirteen ski hill attributes. Although few differences emerged between a priori segmentations (such as length of stay and place of residence), through the use of latent class segmentation it was determined that four distinct skier groups exist. Overall, the majority of skiers preferred environmentally certified ski hills, and considered an environmental surcharge to be unacceptable. Generally, skiers also preferred ski hills with greater amounts of skiable terrain, an advanced form of ski run distribution, shorter gondola wait times, and some form of backcountry access. These finding illustrate which ski hill attributes influence destination choice and show that demand exists amongst skiers for some forms of environmentally sustainable ski hill management.

: Certification, discrete choice experiment, environmental sustainability, latent class segmentation, ski hill, skier preferences, surcharge

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Never before in the history of humankind have so many people travelled, whether for leisure or business. At the start of the 21st century, roughly 700 million people travel annually (DANTE 2002). Tourism, which now directly accounts for 8.2 percent of total global employment (WTO 2003), has become a powerful force in transforming the economic, socio-cultural and physical environments of tourist destinations. The skiing industry has developed rapidly since the 1960s, and today between 15 and 20 million people (3 percent of all travellers) annually cross international borders to ski (Holden 2000).

Long thought to be a benign, or even beneficial use of land, relative to resource extraction or other heavy industries (Parkinson 1992), today there is growing global recognition that ski resorts require vast amounts of energy, water, and other materials for the production of services and experiences (Draper 1997). For ski hills, these resources are needed to create and maintain the ski hill itself, to transport on-slope skiers and provide on-slope amenities and support facilities such as slope grooming, snowmaking, night skiing, restaurants and snack bars. This consumption of natural resources has exacerbated many environmental problems[1]. It has adversely affected soil, vegetation,

[1] In the context of ski resorts, because ski hill managers have little influence on the level of sustainability associated with travel to and from ski hills, they are generally only held responsible for on-hill resource consumption.

water resources, wildlife and scenic beauty (Todd 1994; Price *et al.* 1997; Williams & Todd 1997; Wilde 1998; Wardle & Fahey 1999; Holden 2000; NSAA 2000; Simpson & Terry 2000; Pelley 2001; Waldron and Williams 2002; Wipf *et al.* 2005). Solutions to these problems must be found.

Currently, a wide variety of strategies for creating more environmentally sustainable ski hills exist (NSAA 2000; Pro Natura 2000; Colorado dept. of public health & environment & Tetra Tech 2002; BCHSSOA 2003; RMOW 2004; 05). These depend on environmentally sustainable management initiatives, such as alternative building designs, enhanced waste disposal methods, and innovative on-slope transportation and service options. Successful implementation of these initiatives also requires the support of stakeholders, including tourism operators, employees and managers, elected decision-makers, environmental organizations, year round and seasonal residents, and, the focus of this study, skiers – all of whom will be affected by changes to the ski hill.

Viewed by many as fundamentally important to ensuring the continued existence of any visitor destination (Carter 1995; Priestley *et al.* 1996; Mihalic 2000; Simpson 2001), advocates of environmentally sustainable management also argue that environmentally proactive destinations that can demonstrate environmental performance will reap long-term economic gains, while those that do not will be penalized in the market place (TIAA 1992; Hudson 2000a; Mihalic 2000; Proebstl 2006). However, despite these convictions, others argue there is little evidence to suggest visitors are interested in this form of management (Fry 1995; Holden 1998; Milne 1998; Swarbrooke 1999), and that certain demographic categories of skiers, such as the young, actually favour ski resort expansions over environmental initiatives (Fry 1995; Holden 1998).

Choosing between these diametrically opposing views is a problem currently being faced by ski hill managers. However, before a choice can be made, managers must first understand skier preferences for environmentally sustainable ski hill management as a component of a ski hill's operations. This understanding will enable managers to establish whether sufficient demand for environmentally sustainable management exists, and the types of initiatives that will prove most popular.

An additional challenge is that preferences are becoming more heterogeneous and complex (Best 2000). Therefore, ski hill managers need to be aware of differences in demand in order to more effectively tailor and promote ski hill initiatives that meet the demand of most, if not all, skiers (Andereck & Caldwelll 1994; Preece & Oosterzee 2000). For example, just because overall demand is for an environmental certification, this does not mean that all, or even most, skiers want ski hills to become environmentally certified. It is possible that this demand outcome is due to a small group of skiers whose preferences for certification are very strong. Thus, while it may seem that skiers want certification, the majority of skiers, because their preferences are more indifferent, may actually prefer ski hills with no environmental certification. Nescience of this heterogeneity may result in the implementation of initiatives that are not supported by all, or even most, skiers.

Processes and techniques for involving stakeholders (e.g., workshops, meetings, and task forces) have been successful in fostering local stakeholder support for environmentally sustainable management (Day *et al.* 2003; Frame *et al.* 2004). Surveys have also proven useful for quantitatively eliciting the demand of transitory stakeholders, such as skiers, who do not reside in or near the destination region (Morey 1981; 84; Greig

Whistler is located in British Columbia's coastal mountain range, 40 km east of the Pacific Ocean and only 120 km north of one of Canada's largest urban areas, Vancouver (RMOW 2004). At an elevation of about 668m, the town is nestled in the Whistler Valley between Green Lake in the north and Brandywine Creek in the south. Surrounded by natural beauty and defined by forests, mountains, rivers and lakes, the 16,500ha of land within the municipal boundaries features a variety of terrain, including high elevation coastal forests (~45%), alpine tundra (~9%), residential and commercial development (~8%), wetlands and riparian areas (~1%). The area pr(m)-11.30.9(udis(nd ri)37.1(e)10 7)1

In recognition of the dangers associated with unfettered growth, and the

demand and its elicitation, and the potential for using discrete choice experiments. The Third chapter reviews the theoretical background of discrete choice and latent class experiments, as well as the methodology used to develop and implement the web-based survey and decision support tool. Chapter 4 then presents and discusses the results of the survey, including skier demographics, characteristics, the basic multinomial logit model, several key segmentations, the latent class model, and the decision support tool. Finally, Chapter 5 focuses on the key implications of this study for ski hill managers in Whistler and elsewhere.

This chapter reviews literature related to environmentally sustainable ski hill management. It begins with an overview of the concept of sustainable management, followed by a description of the environmental impacts and environmentally sustainable practices of ski hills. The next section identifies the importance of understanding skier demand. The (s)6TJT*0t(s)0.0071 6(e17(of)18 .1(u)-c7(of)1o(. T)2.3(n)15.p((s)o(. T)2n((s)6TJT*n(

(Inskeep 1991; Raemakers 1991; Hunter & Green 1995; May 1995; Holden 1998; 99a; 2000; NSAA 2000; McNicol 1997; George 2004).

Realization that tourism places a strain on the surrounding environment, and thus is in danger of becoming a self-destructive enterprise, is especially warranted for destinations with a major focus on the outdoors, such as ski resorts. This is because their natural setting and scenic beauty is one of the attractions (Culbertson *et al.* 1991; Inskeep 1991; Williams & Dossa 1994; Carter 1995; Fry 1995; Priestley *et al.* 1996; Williams & Todd 1997; Mihalic 2000; Simpson 2001; Ahn *et al.* 2002). Priestley et al. (1996) summarize this circular relationship between visitor destinations, the surrounding environment, and the cumulative effects of tourism by pointing out that because visitor satisfaction is greatly dependant upon natural resources, destinations with such resources will attract greater visitation. Increased visitation will adversely affect the natural resources at the destination, and thus the destination becomes threatened by its own

numbers of visitors attracted to a small area, ski hills are not only worse for the environment than other industries, but that their impacts are permanent and extend well beyond their boundaries (Minger 1991; Banff-Bow Valley Study 1996).

Ski hills operate in mountainous areas where, due to harsh climatic conditions and ecological sensitivity, the impacts of human activities on the environment are felt much more strongly than in lower elevations (Price *et al.* 1997; Schwanke 1997; Holden 2000; Hudson 2000a). These impacts have increased in recent years as ski hills have expanded to higher altitudes, more extreme conditions, and across whole slopes (Price *et al.* 1997; Tuppen 2000). This trend is especially disconcerting because research shows that one of the driving forces behind the desire to ski is to experience the beauty of the mountains (Culbertson *et al.* 1991; Fry 1995).

The most immediate and apparent environmental impact of ski hills occurs during the construction and expansion stages (Todd & Williams 1996; Price *et al.* 1997; Holden 1998; 99a; Wipf *et al.* 2005). Beyond these initial stages, hill maintenance, on-slope skier transportation, on-slope amenities and support facilities - such as slope grooming and snowmaking - also have adverse impacts (Wingle 1991; Todd 1994; Price *et al.* 1997; Wilde 1998; Wardle & Fahey 1999; Holden 2000; NSAA 2000; Simpson & Terry 2000; Pelley 2001; Waldron and Williams 2002; Wemple *et al.* 2003; David *et al.* 2005; Wipf *et al.* 2005). These impacts can be grouped into two main categories:

- Disturbance and alteration of vegetation, wildlife and natural resources through everyday ski hill use and operation of on-slope facilities; and
- Impacts on scenic beauty through construction and use of on-hill facilities.

Damage to vegetation is most severe during times of low snow levels, since skiers flatten shrubs and snap off protruding branches (Price 1985; Fahey & Wardle 1998;

away from other developments, above the tree line, and often on the skyline, they tend to be much more visually intrusive (Raemakers 1991). While these scenic impacts may not heavily impact skiers per se, once the snow melts, these structures, and further visual impacts caused by piste development, are much more apparent (Holden 2000). Solid waste, as a result of on-slope restaurant and snack bar facilities, and littering, as a result of improper disposal by skiers, is also an eyesore[5] (May 1995; Holden 1998; 99a; 2000). This is a serious issue in the French Alps where "litter has been found even at the highest altitudes" (May 1995, pp. 273). Light and air pollution further detract from the beauty of ski hills (McNicol 1997; George 2004). The illumination of on-slope structures and floodlighting for night skiing causes light pollution, and unburned hydrocarbons and nitrogen oxides, released by on-slope transportation, motorized sports activities and maintenance vehicles, can form smog. This smog can reduce visibility and detract from a ski hill's scenic beauty. The next section describes how ski resorts and interest groups are designing solutions to mitigate the environmental impacts of ski hills around the world.

Overall most implemented principles	Overall least implemented principles

Local governments and government ministries (Colorado dept. of public health & environment & Tetra Tech 2002; RMOW 2004; 2005) have also designed environmentally sustainable ski hill guidelines / procedures. In Colorado, the department

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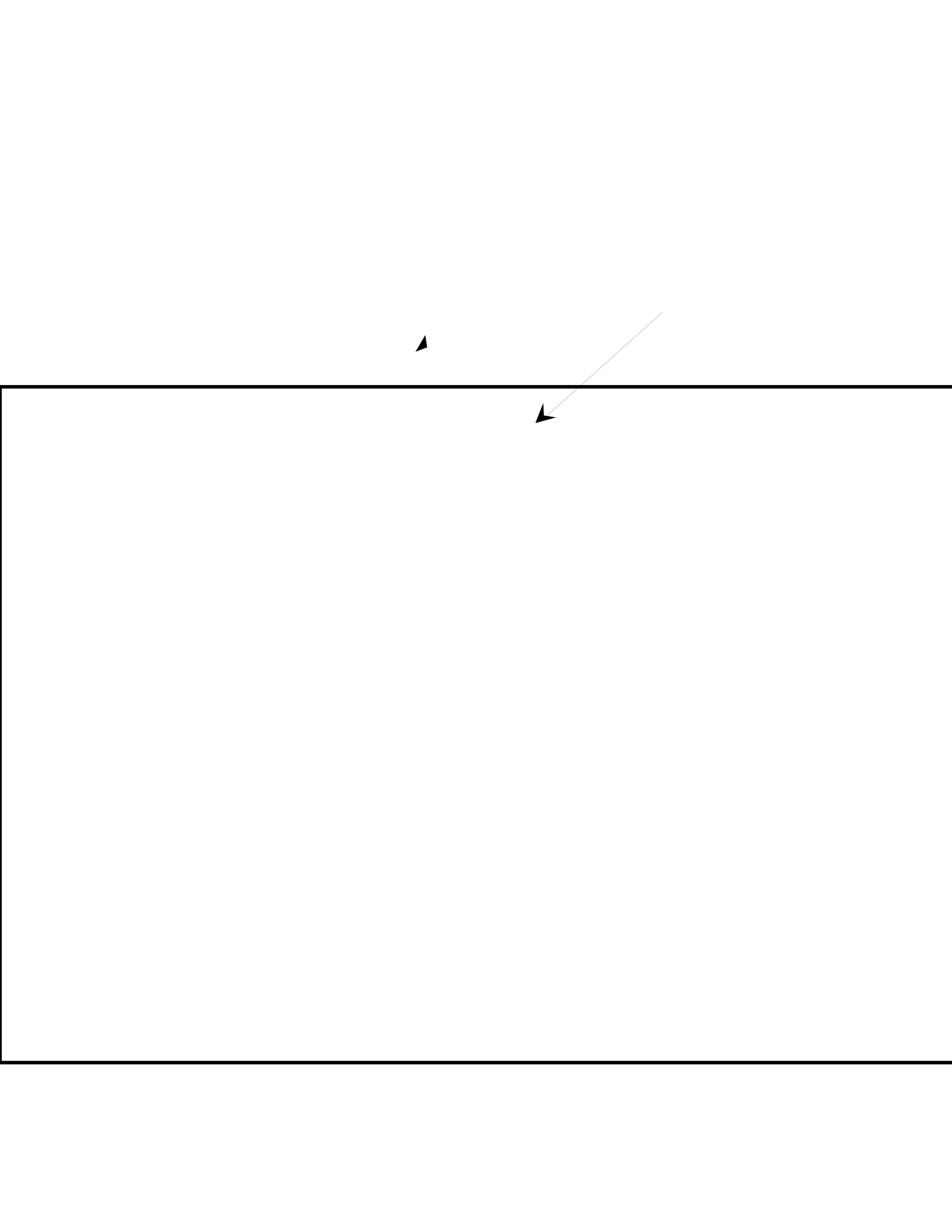
would be greatly strengthened by research showing that demand for such initiatives actually exists amongst the clients. According to Preece and Oosterzee (2000), the need to understand visitor demand is for two reasons. First, knowledge of this demand is necessary in order for ski hill managers to know how these initiatives will affect skier experience, and thus ski hill choice. Second, this knowledge is needed to develop appropriate measures to avoid, or at least minimize, potentially adverse environmental impacts. Hearne and Salinas (2002) support this belief by arguing that in order for ski hill managers to implement initiatives that facilitate nature conservation and income generation most effectively, skier demand must be understood and incorporated. Mercado

gains, while those that do not will be penalized in the market place (TIAA 1992; Hudson 2000a; Mihalic 2000; Proebstl 2006). However, despite these convictions, others argue there is little evidence to suggest visitors are interested in environmentally sustainable management (Holden 1998; Milne 1998; Swarbrooke 1999). They also suggest that certain demographic categories of skiers actually favour potentially unsustainable initiatives, such as ski area expansions, over environmental ones (Fry 1995; Holden 1998).

This choice between whether to implement environmentally sustainable management initiatives is a problem currently being faced by ski hill managers. However, before these managers can begin to implement environmentally sustainable initiatives, they m8-0.0025 Tw[(t62 0 gf-1.40ank21(y)39t62ee1)1h0.9((en)-13e)-12.6()an(en)-13evv8-0.0025 Had(

attract new skiers into the sport. Perceiving the ski hill and its operation as a tourism product in its own right, it is appropriate to introduce Levitt' (1983) product concept to the discussion. He suggests that products consist of four components or rings (Figure 2.2). The innermost of these, referred to as the *core* and *expected* components, represent the generic product and consumers' minimal expectations / purchasing conditions, respectively. Without these, Levitt (1983) argues that products would not only be



managers, elected decision-makers, year round and seasonal residents, etc. However, due to their transitory nature and the fact that they do not typically reside in, or near, the destination region, these processes and techniques have generally proven unsuccessful for visitors (Haywood 1988; Gill & Wi

criticised for not providing enough reliable information for ski hill managers to predict skier demand with confidence.

A multitude of ski specific studies have also been carried out. These range from specifically looking at skier preferences for ski hill and resort attributes, to understanding skier motivations, choice and expectations. In an early study aimed at determining what things, other than snow, attracts skiers to ski areas, Echelberger & Shafer (1970) found that depending on snow accumulation, skiers were either attracted by a resort's advertising program, or by a resort's skiable terrain, groomed area, numbers of instructors employed, and average driving time from metropolitan centres. Greig (1983), Williams & Dossa (1994), Ormiston *et al.* (1998), Riddington *et al.* (2000), Tangian (2002) and Siomkos *et al.* (2005) have also tried to ascertain what ski resort attributes are most important in influencing the quality of skier experience, and thus ski hill choice. While the specific attributes under consideration within each study varied, all five looked at the relatively tangible attributes of ski resorts, such as snow condition, skiable terrain, gondola wait time, grooming, snowmaking capacity, activities, price, level of crowding, accommodation, food services and travel time. In their results, Siomkos *et al.* (2005) concluded that the cost of lift tickets and lunch, resort access and the availability of parking were the most important attributes. Riddington *et al.* (2000) concluded that the critical factors were snow cover, cost and travel time for day visitors, and accommodation for overnight visitors. These results were similar to Tangian (2002), who concluded that cost, travel time and skiable terrain distribution were the most influential variables on ski resort choice, and Williams & Dossa (1994), who concluded that quality of terrain, snow conditions and quality of staff services were the most important factors. Greig (1983) and

Ormiston *et al.* (1998) concluded that skiers most valued snow conditions, skiable terrain, gondola wait times and groomed area. The conclusions of Greig (1983) and Ormiston *et al.* (1998) have also been argued by Morey (1981; 84), Walsh *et al.* (1983), Perdue (2002) and Mulligan (2006), who in their work on skier satisfaction, found that skiable terrain and gondola wait times played an important role in skier experience.

Klenosky *et al.* (1993) and Ferrand & Vecchiatini (2002) have also conducted studies to understand what influences skier experience and thus ski hill choice. However, these studies not only considered the tangible ski resort attributes of snow condition, gondola wait times, skiable terrain, etc, but also included intangible benefits, needs and personal values, such as fun, safety, image and social atmosphere. While Klenosky *et al.* (1993) found that the challenge, social atmosphere, fun and excitement played and equally, if not more, important role in ski hill choice than attributes such as grooming, snow condition and skiable terrain, Ferrand & Vecchiatini (2002) concluded that a good ski resort image is more important than a ski hill's attributes in attracting skiers. In other studies, Sirgy & Su (2000) attempt to predict the relationship between destination environment, destination visitor image, tourists' self-concept, self-congruity, functional

and other attempts to understand skier demand have generally relied on conventional surveys for data collection, they often suffer from a number of additional weaknesses. These include the fact that researchers can influence skier response through the wording of questions, and that it is often difficult to incorporate the multi-attribute reality of trade-offs, as Haider & Rasid (2002) suggested in other resource management applications. Traditional surveys may also ask too much of both the respondent and researcher, because they not only require the evaluation of complex management issues separately, but they also require that an overall utility value be constructed based on these responses (Haider 2002).

Due to the weaknesses of traditional survey techniques, and the fact that understanding of skier preferences for multi-attribute products such as ski hills can provide an empirical foundation for environmentally sustainable ski hill management, more systematic and reliable methods for understanding skier demand is needed. Such methods must overcome the weaknesses of previous attempts, incorporate a behavioural evaluation tool, enable ski hill managers to predict the heterogeneity of demand, and not just aggregated demand, as well as measure the importance of single attributes, such as environmentally sustainable ski hill management initiatives, in relation to others. The next section describes the advantages of one multivariate survey technique in particular, discrete choice surveys, for assessing skiers preferences for ski design and management attributes.

income), trip characteristics (e.g., number of nights, type of accommodation and accommodation location) and attitudes (e.g., reasons for travelling) of the respondent. This information can be used to segment the respondents (both a priori and post hoc) in order to assess for preference heterogeneity.

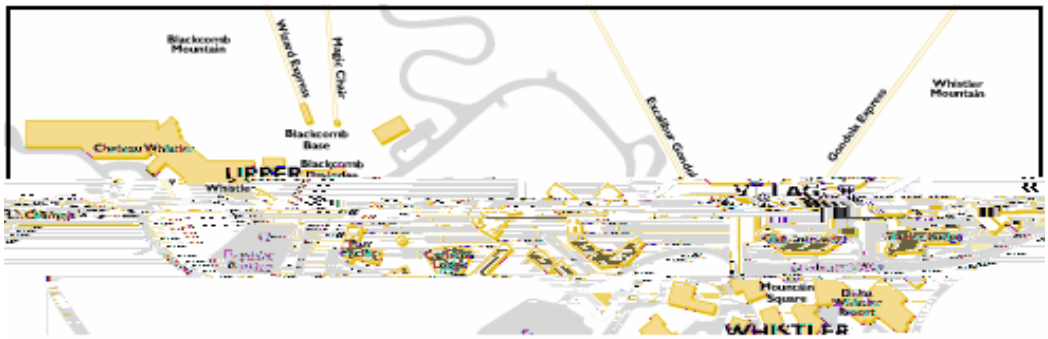
Grounded in Random Utility Theory, DCEs are more theoretically sound, rigorous and flexible than other preference modelling techniques (Crouch & Louviere 2004), such as conjoint analysis. Contrived in the 1970s as a way of quantifying buyer tradeoffs among multiattributed products and services (Green & Roa 1971; Green & Wind 1975; Louviere 1988), conjoint analysis is seen as inferior to DCEs in several ways. These include level of realism, ability to perform complex statistical modelling, and the number of attributes that can be used. Furthermore, conjoint analysis requires a greater sample size, does not allow respondents to select the base alternative (i.e., 'neither' or the status quo), requires that all alternatives must be characterized by the same attributes, and requires that these attributes have the same levels. The methods used to develop and implement a discrete choice experiment capable of eliciting skier preferences are described in the next chapter.

This chapter describes the methods used in this study. It begins with a review of the respondent recruitment procedures and the development of the web-based survey. This is followed by a description of the discrete choice experiment analysis conducted. The designing, programming, pre-testing and delivery of the survey are explained. The chapter concludes with a discussion of the data analysis.

The target population of this research was skiers at Whistler. In order to collect the emails, eight research assistants were employed to conduct short intercept surveys (Appendix 1) at the end of February and throughout March and April of 2005. These intercepts were conducted daily between 8am to 6pm. The purpose behind these surveys was twofold. First, they obtained an email address from those who partook in the intercept surveys so that a link to the survey web-site could be emailed out at a later date, thus increasing the likelihood of a response to the questionnaire. Second, they enabled the separation of full-time Whistler residents and employees from skiers. This was necessary, as the survey was only interested in skier preferences. At the same time, the intercept surveys also provided potential respondents with some background information concerning the study and why it was being undertaken.

The majority of intercept surveys were conducted at the Gondola base, where there was a high concentration of skiers. However, in order to ensure a representative

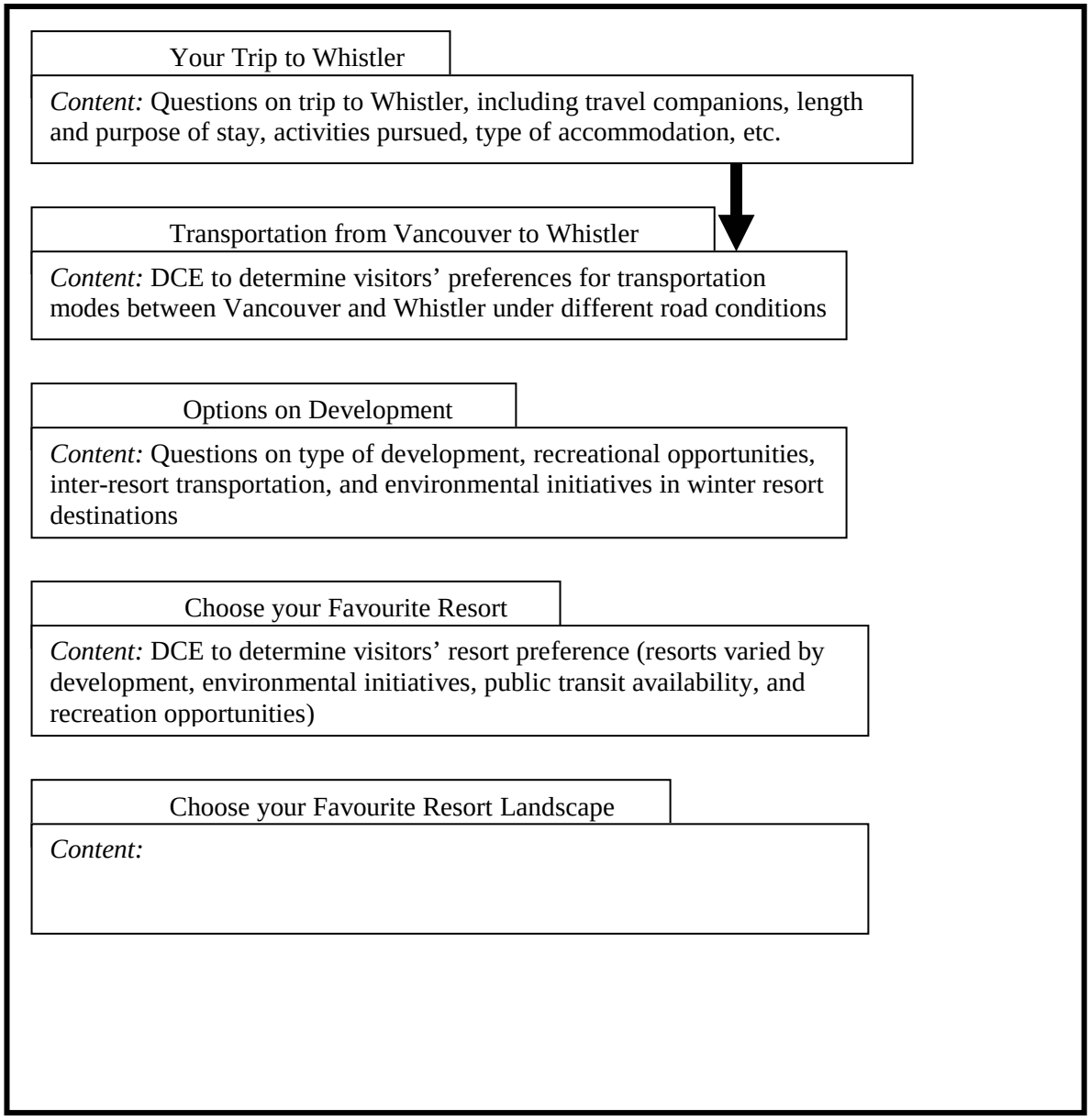
sample of Whistler skiers, surveys were also conducted in several other locations, such as Whistler Village, the parking lot, the visitor information centre, Creekside, and, when permitted, on the ski hill at the Roundhouse and Rendezvous restaurants (Figure 3.1). At each of these locations, research assistants invited one member from every third party encountered to participate in the survey. Participants were required to be at least 19 years of age and have a working email account. When more than one individual from a party showed an interested in participating, the individual celebrating his or her birthday next was selected. Everyone who completed the intercept survey was presented with a Canadian pin as a token of our gratitude. During the sampling period, a total of 1,643 email addresses were collected.



* Locations of intercept surveys

The purpose of the web-based winter survey was to examine skier preferences for ski hill design and management attributes. The specific attributes to be tested in the survey were based on a literature review, discussions with skiers, and the academic interests of the researchers involved. In April 2005, the research team drafted a final list of attribute and associated levels to be included in the survey. The ensuing task was to determine a logical order for the survey to follow.

The final survey contained six sections. These were general questions regarding the trip to Whistler - which gave basic insight into respondents' trip and were used in latent class segmentation -, environmental attitude and preference questions[9] - which provided an understanding of respondents' attitude to the environment within which they ski -, visitor demographic questions - used to conduct a priori and latent class segmentations -, and three DCEs accompanied by learning tasks - used to familiarize respondents with the attributes used in each DCE (Figure 3.2). These DCEs assessed preferences for the following: ski hill management and design (the purpose of this report),



DCEs are a stated preference method whereby respondents are asked to choose between any two or more hypothetical alternatives. Each of these alternatives must consist of the same set of attributes, although attribute levels can vary. These alternatives are constructed using statistical design principles to ensure orthogonality (Raktoe *et al.*

1981, Montgomery 2001). Once a sample of responses have been obtained, the part-worth

and captures the effects of omitted or unobserved variables. In the case of random utility theory-based choice models, several assumptions are made regarding the distribution and statistical properties of this random unobservable component (Crouch & Louviere 2000)[10]. Overall, individual *n's* utility of good *i* is

$$U_{in} = V_{in} + \mathring{U}_{in} \qquad (1)$$

Some authors take this one step further and expand equation 1 to show that both the deterministic and random error term depends both on the attributes of the alternative, A, as well as on the socio-economic characteristics of the individual decision-maker, C, (Hanley *et al.* 1998). The result of this is

$$U_{in} = V_{in}(A_{in}, C) + \mathring{U}_{in}(A_{in}, C) \qquad (2)$$

The econometric justification for this unobserved component is that the analyst may omit variables or commit measurement errors (Adamowicz *et al.* 1998b). However, because of this random component, analysts cannot ascertain all of the information used by decision makers to make their choice, and therefore can only predict the probability that a randomly selected decision maker will chose one alternative over another (Crouch & Louviere 2000). Thus the probability that alternative *i* will be selected over any another alternative is equal to the probability that the utility gained from alternative *i*, U*i*, is greater or equal to the utility of choosing any other alternative in the complete set of all possible alternatives, M,

$$\text{Prob}(i/M) = \text{Prob}\ \{V_{in} + \mathring{U}_{in} \text{ Ó } V_{jn} + \mathring{U}_{jn}\ ;\ \forall\ j \lfloor M\ \} \qquad (3)$$

[10] These are that it is not only commonly assumed to be type l Gumbel distributed, but that it is also assumed to be independently and identically distributed (McFadden 1974).

Since the common assumptions for the Ů term are known (McFadden 1974), the probability of choosing alternative *i* is equal to the ratio of observed utility index for alternative *i* to the sum of the observed utility indices for all alternatives. This closed-form specification of choice probabilities with the multinomial logit model is expressed below

Based on the earlier assumption that all random unobservable error components are independently distributed before the observable component of utility, V, can be expanded to a linear-in-parameters utility function (equation 4), the researcher must also accept the assumption of the independence of irrelevant alternatives (IIA). The IIA simply requires that all alternatives be independent of one another, so that the ratio of the probabilities of choosing one alternative over another is unaffected by the addition or deletion of alternatives (Carson *et al.* 1994; Louviere *et al.* 2000). Therefore ϐ$_0$

For Multi Nomial Logit (MNL) models, the most common technique for estimating the coefficient for each attribute ($ɓ_1$, $ɓ_2$, etc) is the Maximum Likelihood Estimation (MLE) (Ben Akiva & Lerman 1985; Louviere *et al.* 2000). This technique involves determining the value of β_k that ensures that responses are most representative of all visitors (Train 1986). The MLE is thus used to find the parameter estimates that best explain the data.

The output of primary importance from MLE procedures are parameter estimates, associated standard errors and t-values, and measures of goodness of fit for the model as a whole. The parameter estimates represent the weight of each attribute in the utility function of a particular alternative (Louviere *et al.* 2000) (i.e. $ɓ_1$ represents the weight (parameter) associated with the first attribute, X_1, in equation 5). Multiplying each parameter, ɓ, by the level of the corresponding attribute, X, produces a Part Worth Utility (PWU), which is defined as the total utility associated with a given level of an attribute (Adamowicz *et al.* 1998a). Furthermore, by combining all PWU, the relative utility for a particular alternative can be determined using equation 5 (Louviere *et al.* 2000). The t-values associated with the parameter estimates indicate the statistical significance of each estimate. While a t-value above or below + or – 1.96 clearly indicates that the parameter estimate is significant at a 5% level, most modellers generally accept t-values as low as 10% (+ or – 1.6) (Louviere *et al.* 2000). Finally, the goodness of fit provides a likelihood-ratio index that measures the goodness of fit of the MNL model (rho square). If this statistic, once adjusted to account for the degrees of freedom used to estimate the model, is between 0.2 and 0.4, then the model is considered an extremely good fit (Louviere *et al.* 2000).

During the development of the attribute list, and their associated levels, different descriptive and ski hill management attributes were discussed and considered by the

the necessary modifications were made, the design plans for the discrete choice surveys were finalized and linked to the web survey.

Through Microsoft Mail Merge, the web-based survey was delivered via email to the 1,643 intercept survey respondents. These emails were sent in two batches, on the 16th and 17th of August, 2005. A cover letter introducing the survey (Appendix 2) was personally addressed to each respondent and referred to the month of their visit to Whistler. The cover letter also contained a link to the survey. To enable the matching of respondents with their intercept data, and to allow respondents to leave the site and return at a later date, each recruited respondent was assigned a login ID and password. These login IDs and passwords were embedded directly into the link that was emailed to respondents (e.g., http://www.whistlerstudy.rem.sfu.ca/?SS=yes&pw=«Password»&di=«LoginID»). Thus, upon entering the survey the respondent was automatically logged onto the website and matched with the appropriate record in the database.

After 23 days, a reminder email containing a modified cover letter (Appendix 3) was sent to the first half of the recruited respondents who had not yet proceeded past the introductory webpage. After 37 days this reminder email was sent to the second half of the recruited respondents. This process was repeated for both groups of non-respondents after 41 and 60 days, and 47 and 72 days, respectively. These reminder emails resulted in distinct increase in response rate for a few days immediately following each delivery. Overall 345 (21%) of the emails were undeliverable. Although the exact reason for this is unknown, two possibilities are that spam filters blocked some emails, while other email

addresses may have become obsolete during the three to six month lag time between respondent recruitment and delivery of the web-based survey.

While most of the analysis was performed using SPSS, the basic MNL model, upon which much of the discussion in this paper is based, was undertaken in Latent Gold Choice 3.0.6 (Vermund and Magidson 2003). All of the continuous attributes were coded using both linear and quadratic codes. Once the model was run, insignificant estimates were removed, and the model was rerun. All of the categorical attributes were coded using effects coding[12] to allow comparison of the different attributes.

heterogeneity will be observed. One way of overcoming this problem is to use attribute data as well as individual's characteristics and attitudinal data[15] to simultaneously explain

such as covariates (McCutcheon 1988; Van der Heijden *et al.* 1996; Vermunt 1997).

To create the computerized ski hill Decision Support Tool (DST) in Microsoft Excel®[17] the Part-Worth Utility (PWU) estimates for the latent class model (Table 4.12) and day visitors (Table 4.8) were used. This DST allows the user to compare overall preference for two different ski hills by adjusting the levels of each design and management attribute for both scenarios. For the categorical attributes, such as ski run distribution and gondola wait time, the user must select one of the levels used in the DCE. For all linear and quadratic coded attributes, such as groomed area and skiable terrain, the user can select any value between the minimum and maximum values used in the DCE. Whenever users select a new attribute level, the DST calculates the probability 2.8(M)-1Tw[(uu-0.0058

This Chapter presents the results of the web-based survey and the DCE in detail. It begins with a summary of the demographic, trip characteristic, motivational and attitudinal results of the respondents. The results of the DCEs are presented next. These are the full MNL model, the a priori segmentations by length of stay and place of residence, and a latent class segmentation. As described in Chapter 3, the DCE consisted of ski hill design and management attributes. The final section contains an example application of a ski hill Decision Support Tool (DST).

The following section presents the results (Table 4.1) of the demographic questions for both the intercept and web-based surveys. Two-fifths (39%) of skiers lived in Canada, with two-thirds (69%) of these residing in British Columbia. Of the remaining skiers, one-quarter (23%) lived in the USA, one-quarter (22%) in the UK and one-sixth elsewhere. Of the Canadian skiers living outside of British Columbia, the majority (63%) came from Ontario. The most common state of residence for US skiers was Washington (23%). Two-thirds (67%) of all skiers were male, while over half (56%) of all skiers were between the ages of twenty six and forty five. About one-quarter (27%) were over the age of forty six. Most skiers were highly educated, with three-quarters (73%) attaining at least a university education. Furthermore, most skiers lived in households with high annual

incomes. About one-third (32%) earned between $50,000 and $100,000 per year, and half (48%) more than $100,000.

The demographic profile of overnight and day skiers in terms of gender, education, and, to a slightly lesser degree, age, were similar. Place of residence and

†

	Total Sample		Overnight Skiers		Day Skiers	
	Freq.	Percent	Freq.	Percent	Freq.	Percent

The results regarding frequency and purpose of visit, travel party composition and

†

	Total Sample	Overnight Skiers	Day Skiers	

To understand what motivated travel to Whistler, skiers were asked to rate the importance of sixteen motivational items on a scale ranging from 1, representing "not at all important", to 5, representing "very important" (Table 4.3). Overall, scores were high, with most items being rated by skiers as at least 'somewhat important' (mean >3). Of interest is that two of the five most important items for all skiers segments were "experiencing and seeing a mountain area" (mean = 4.1) and "visiting a place that takes good care of its environment" (mean = 4.0)[18]. These results corroborate previous research that one of the driving forces behind the desire to ski is to experience the natural beauty of mountains (Culbertson *et al.* 1991; Williams and Dossa 1994; Fry 1995).

Between overnight and day skiers, the motivations were significantly different for three motivational items, all of which overnight skiers rated more highly than day skiers. These were "visiting a place with unique and interesting restaurants", "having opportunities to shop" and "indulging in luxury, staying at first class hotels".

[18] Mean scores of four or above indicate that, on average, skiers found these statements to be important.

†

	Total Sample	Overnight Skiers	

Due to missing data total sample sizes differ for each characteristic.

†† Scale of 1 to 5, with 1 being the least important and 5 being the most important.

To understand the impact that environmentally sustainable management strategies might have on destination choice and reputation, skiers were asked to rate the importance of fifteen factors (eight for destination choice and seven for environmental reputation) on a scale of 1 to 5, with 1 indicating “not at all important” and 5 indicating “very important” (Table 4.4). Again scores were generally high, with all factors being rated by skiers as at

least ‘somewhat important’ (mean >3). The most important factors with regards to destination choice were public transit access (mean = 3.9), on-site energy efficient buildings (mean = 3.8), wildlife (mean = 3.8) and vegetation (mean = 3.7) sensitive ski trail maintenance systems. The most important factors regarding environmental reputation were minimizing the environmental effects of transportation (mean = 3.9), mitigating (mean = 3.8) and minimizing (mean = 3.8) the effects of ski run construction on vegetation, and minimizing energy and water consumption for snowmaking (mean = 3.7) and food services on the mountain (mean = 3.7)

†

†

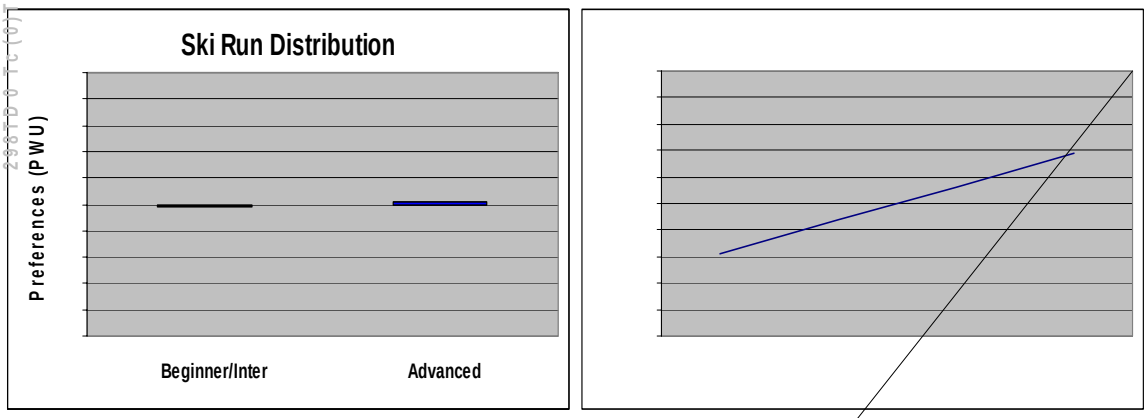
Thirteen attributes were used to describe hypothetical ski hills. Table 4.5 and Figures 4.1 and 4.2 display these attributes in two sections: those related to ski hill design (the first eight attributes); and those related to ski hill management (the last five attributes). The last row of the table shows the diagnostic statistics for the model. The intercept indicates if respondents were more likely to choose a skiing alternative over selecting not to ski. All categorical attributes were coded using effects coding and all continuous attributes using linear and quadratic codes. Any quadratic terms that were not significant at the 10% level were removed and the model was rerun. Overall, the majority of attributes were significant (nine of the thirteen). However, a smaller proportion of design (five of the eight) than management attributes (four of the five) were significant. All attribute signs seem intuitively correct, and most attributes were deemed to be relatively important by skiers (as indicated by the magnitude of the coefficients). On average the design attributes were generally deemed to have a smaller impact on skier experience than the management attributes (as indicated by smaller coefficients).

Concerning the ski hill itself, skiers demonstrated a statistically significant preference for greater amounts of skiable terrain, shorter gondola wait times, limited night skiing, fewer number of days during which the bottom half of the mountain was closed, and more on-slope restaurants. These findings are consistent with previous research concerning skier preferences for more skiable terrain (Walsh

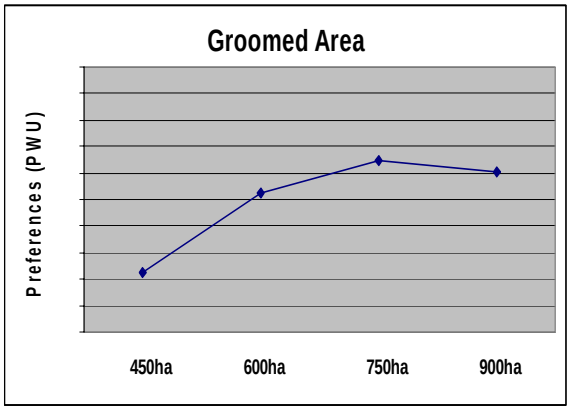
et al. 1998; Perdue 2002; Mulligan 2006). Preferences for the remaining ski hill design attributes were also predictable, although not statistically significant. While the overall sample was indifferent to ski run distribution and number of terrain parks, they showed a

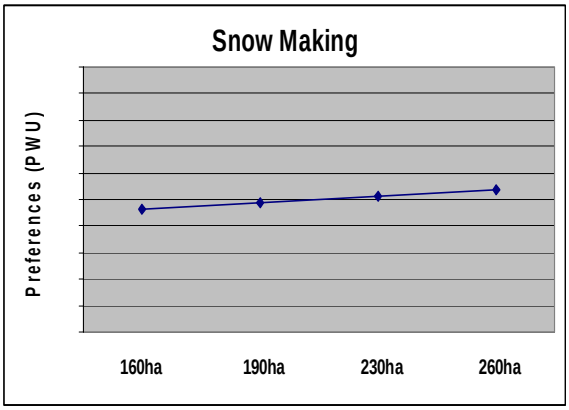
:

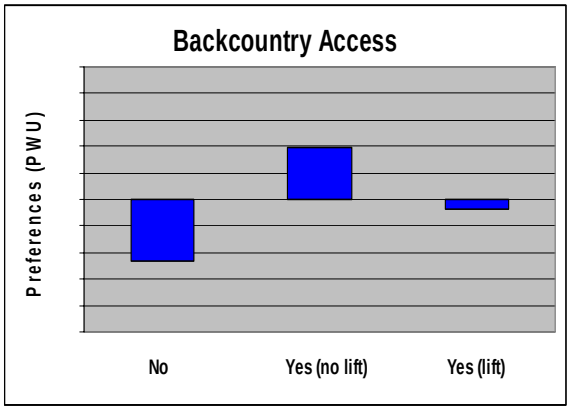
es	Full Model		Restricted Model	
	Coeff.	Std. Err	Coeff.	Std. Err

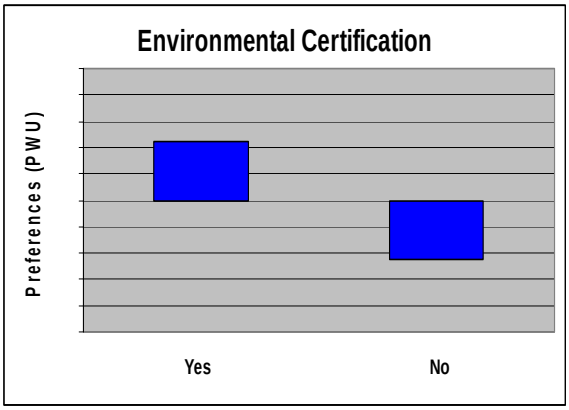

Ski Run Distribution
Preferences (PWU)
Beginner/Inter
Advanced

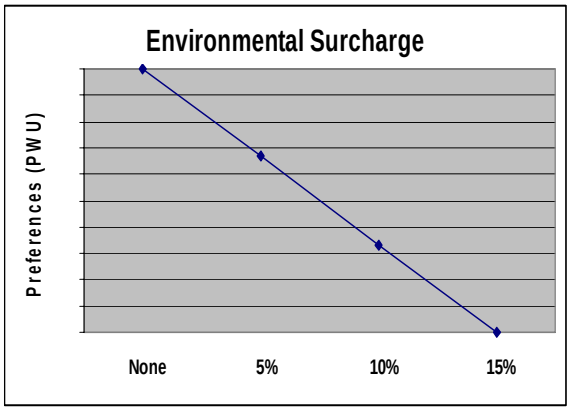
Four of the five ski hill management attributes were statistically significant (Table 4.5; Figure 4.2). As with skiable terrain, skiers demonstrated a preference for greater amounts of groomed area. Again, this finding is consistent with previous research concerning skier's preference for greater amounts of groomed area (Echelberger *et al.* 1970; Ormiston *et al.* 1998). However, preference levelled off as the amount of groomed area approached 750ha, and actually fell as it approached 900ha. Skiers also showed a preference for backcountry access without a lift. In regards to environmentally sustainable management strategies, skiers clearly preferred environmentally certified ski hills. Furthermore, skiers considered a 0% and 5% environmental surcharge to be acceptable, but higher than 5% to be undesirable. These findings lend support to previous research regarding skier's environmental consciousness (Hudson 2000a; Jesitus 2000; Mihalic 2000; The Colorado Department of Public Health and Environment & Tetra Tech 2002;







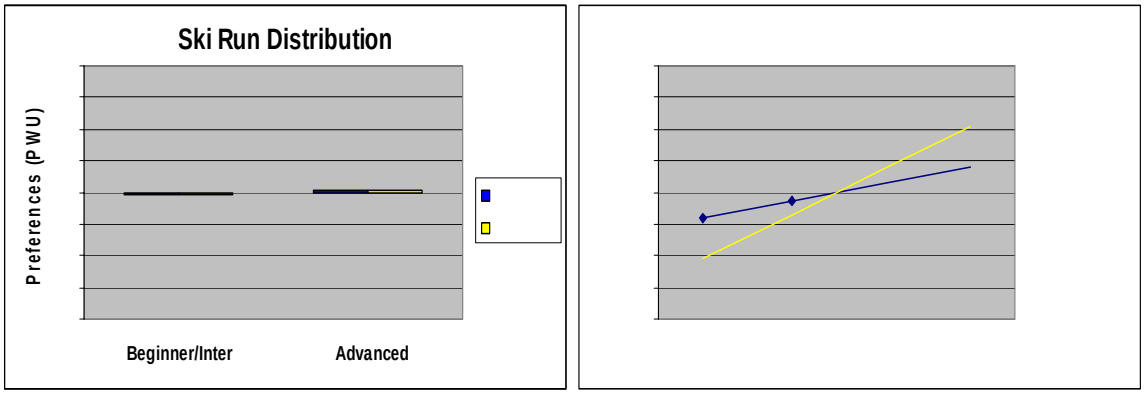




Understanding preferences of the entire sample provides only partial insights for ski hill managers. What is more revealing is to investigate the preferences of specific segments of the sample, especially when the sample contains diverse groups. The

segmentations below examines for differences in preferences between day and overnight skiers (Table 4.6; Figure 4.3), and local and non-local skiers (Table 4.7; Figure 4.4). Although these segmentations were expected to highlight several differences, few were significant.

As with the previous table and figures, Table 4.6 and Figures 4.3 and 4.4 have been organized into two sections. In addition, the t-values in the right most column


Ski Run Distribution
Preferences (PWU)
Beginner/Inter
Advanced

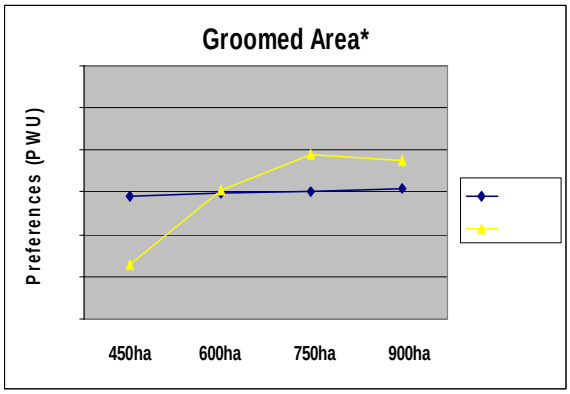
to choose a skiing alternative than out of province skiers, and thus are less likely to visit a ski hill. This difference is statistically significant. All attribute signs for both skier groups seem to be intuitively correct, and almost all attributes were deemed relatively important by both groups (as indicated by the relative magnitude of the coefficients for each skier group).

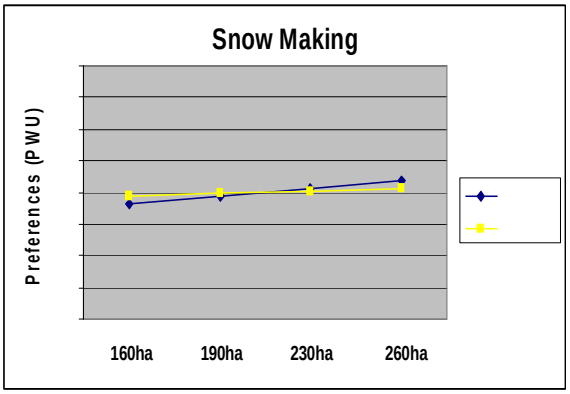
Concerning the ski hill design attributes, BC and out of province skiers had similar preferences for ski run distribution, gondola wait times, night skiing opportunities and the number of days during which the bottom half of the mountain was closed. BC and out of province skier preferences were different for skiable terrain, and the number of terrain parks, on-slope restaurants and snack bars. Although the pattern of signs for three of these variables differed between the two segments, these differences were not statistically significant. The only statistically significant difference was for skiable terrain.

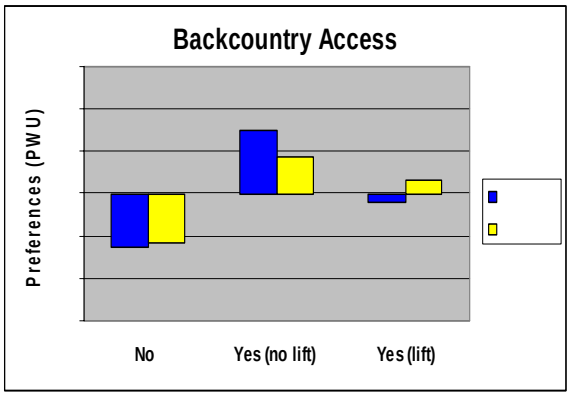
For the ski hill management attributes, BC and out of province skiers had similar preferences for snowmaking capacity, backcountry access, environmental certification and environmental surcharge. BC and out of province skier preferences were different for groomed area (BC skier preferences were highest for 900ha, while out of province skier preferences fell once groomed area reached 750ha). This difference was significantly significant.

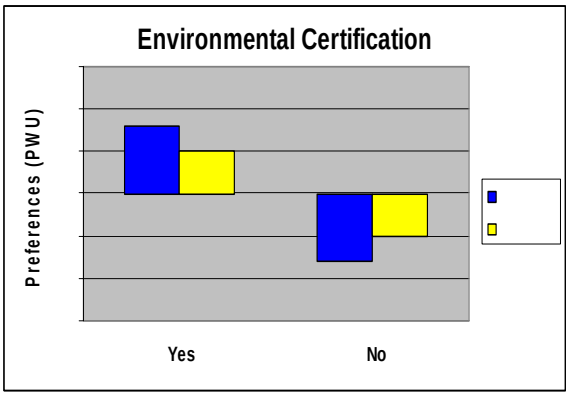
Overall, this segmentation shows that despite differences in preferences for a few ski hill attributes, BC and out of province skier preferences are generally similar. The segmentation also shows that certain environmentally sustainable management initiatives, such as environmental certification, are popular with both skier groups, while other initiatives, such as a 5% environmental surcharge, is acceptable with both skier groups.

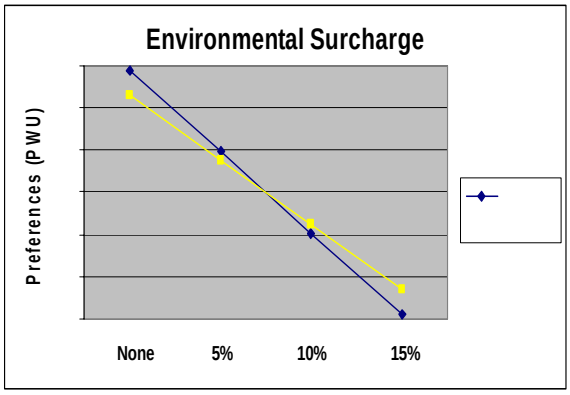
Attributes	B.C Skiers		Out of P Skiers		Differ-
	Coeff.	Std. Err	Coeff.	Std. Err	


Groomed Area*
Preferences (PWU)
450ha
600ha
750ha
900ha


Snow Making
Preferences (PWU)
160ha
190ha
230ha
260ha


Backcountry Access
Preferences (PWU)
No
Yes (no lift)
Yes (lift)


Environmental Certification
Preferences (PWU)
Yes
No


Environmental Surcharge
Preferences (PWU)
None
5%
10%
15%

certified ski hills, and considered a 5% environmental surcharge to be acceptable. These findings contribute further to previous research regarding skier's environmental consciousness (Hudson 2000a; Jesitus 2000; Mihalic 2000; The Colorado Department of Public Health and Environment & Tetra Tech 2002; NSAA 2003). Furthermore, these result highlights the fact that environmentally sustainable initiatives have a strong influence (either positive or negative) on skier experience and thus ski hill choice.

Preference heterogeneity was explored further in a latent class analysis. For the

preferences (while the BIC identifies the two class segmentation as the most parsimonious model form, the AIC identifies the three class segmentation). The following analysis is based on the three class segmentation, as this was seen to provide the most interesting insights into skier preferences.

Model	Segments	LL	BIC(LL)†	AIC(LL)†	Npar	L^2	Df	p-value	C. Err.
1	1 segment	-1507.1	3140.2	3077.1	21	2960.4	384	0.0	0.000
2	2 segments	-972.51	2194.8	2033.0	44	1945.0	248	0.0	0.348
3	3 segments	-942.56	2282.5	2025.1	70	1885.1	222	0.0	0.429
4	4 segments	-911.78	2368.5	2015.6	96	1823.6	196	0.0	0.437

Cluster II comprised the second largest portion (20%) of the sample. Skiers within this cluster viewed on-site solid waste recycling (3.1) as a somewhat important factor in their choice of ski resort, while water conservation (2.8) and pre-trip information (2.8) were seen as somewhat unimportant. Skiers in this cluster viewed minimization of energy and water consumption for snowmaking (3.4) and on-slope food services (3.4), and a reduction in energy consumption for lifts (3.4) as somewhat important initiatives for ski hills to create a more environmentally sound reputation. However, skiers were indifferent towards a reduction in energy consumption for lifts (3.0). The importance of these environmental factors and initiatives are lower than for the EIS. With respect to travel motivations, skiers in this cluster only viewed the opportunity to rest (4.1) and enjoy unique restaurants (3.8) as being important (Table 4.9). For the subsequent analysis, and due to the high level of importance placed on resting and visiting unique restaurants when compared to other motivational factors, this cluster will be referred to as the 'Pleasure Seeking Skiers' (PSS).

The final cluster, cluster III, comprised the smallest portion (15%) of the sample. Skiers within this cluster viewed on-site solid waste recycling (3.9), water conservation (3.5) and pre-trip information (3.4) as somewhat important factors in their choice of ski resort. Skiers in this cluster also viewed minimization of energy and water consumption for snowmaking (3.7) and on-slope food services (3.6), as well as a reduction in energy consumption for lifts (3.8) and by not providing night skiing (3.4) as somewhat important initiatives for ski hills to create a more environmentally sound reputation. The importance of these environmental factors and initiatives are slightly higher than for the EIS. With

the opportunity to visit a place that is family orientated (3.6), rest (4.2), enjoy unique restaurants (3.5) and view wildlife (3.5) as being important (Table 4.9). For the subsequent analysis, and due to the high level of importance placed on all but one of the motivational factors when compared to the other two clusters, this cluster will be referred to as the 'Multi-Activity Orientated Skiers' (MAOS).

Characteristics	Environ Inclined (EIS)	Pleasure Seekers (PSS)	Multi-Act Orientated (MAOS)	ANOVA	Bonferroni		
					1-2	1-3	2-3
Environmental actions							
On-site solid waste recycling	3.5	3.1	3.9	.003	.087	.095	.002
On-site water conservation	3.3	2.8	3.5	.011	.038	.751	.014
Pre-trip info on environ initiatives	3.2	2.8	3.4	.028	.107	.691	.030
Environmental Factors							
Min energy & water use for food services	3.8	3.4	3.6	.061	.067	1.00	.837
Min energy & water use for snowmaking	3.7	3.4	3.7	.139	.166	1.00	.375
Min energy use for lifts	3.7	3.4	3.8	.077	.171	1.00	.107
Reduce energy use by not providing night skiing	3.3	3.0	3.4	.053	.109	1.00	.083
Travel motivations:							
Events	2.5	2.5	3.0	.014	1.00	.013	.058
Family oriented	2.7	3.0	3.6	.002	.504	.001	.175
Resting	3.8	4.1	4.2	.003	.065	.010	1.00
Unique restaurants	3.5	3.8	3.5	.050	.046	1.00	.287
Wildlife viewing	3.0	2.8	3.5	.004	1.00	.007	.008

† Scale of 1 to 5, with 1 being the least important and 5 being the most important.

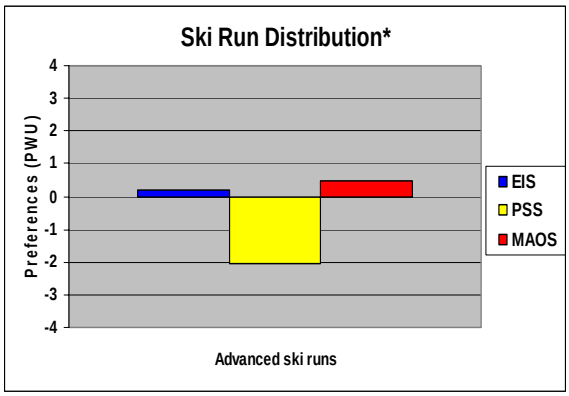
As with the previous segmentations, Table 4.10 and Figures 4.7; 4.8 have been organized into sections and show how preferences differ between the groups (far right column). Unlike the previous tables, the coefficients have been dummy coded. This type of coding, because it compares one attribute level to all other attribute levels, was used to

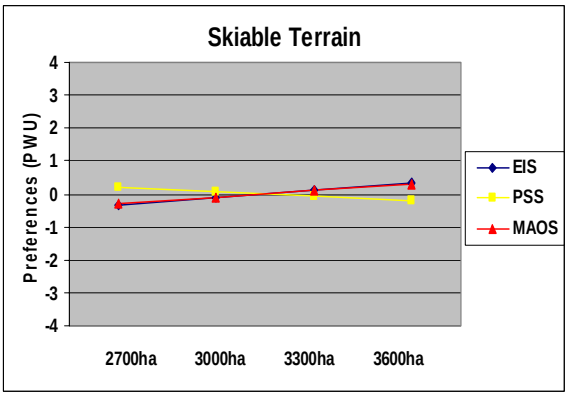
break out the environmental surcharge attribute, and allowed for a greater understanding of skier preferences for different levels of this attribute[21]. The covariates and parameter estimates associated with these covariates are also shown in Table 4.10. While only two of the covariates are statistically significant (the importance of visiting a ski resort that is family oriented / provides nightlife and entertainment, and that has unique and interesting restaurants / shopping opportunities / first class hotels / and facilitates resting and relaxing), it was found that inclusion of the other covariates created a more revealing model, and thus are kept in the model. The intercept shows that EIS were more likely to choose a skiing alternative than PSS and MAOS, and thus are more likely to visit a ski hill. This difference is not statistically significant. Most attribute signs for the skier groups seem to be intuitively correct, and almost all attributes were deemed relatively important by all three groups (as indicated by the relative magnitude of the coefficients for each skier group).

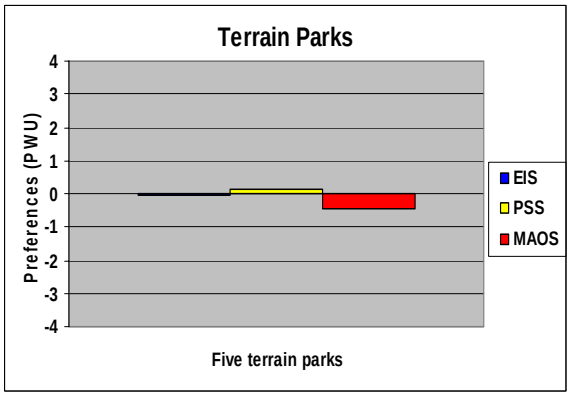
Concerning the ski hill design attributes, EIS and MAOS had similar preferences for ski run distribution, skiable terrain, number of terrain parks, gondola wait times, number of days during which the bottom half of the mountain was closed, and number of on-slope restaurants and snack bars. The only difference between EIS and MAOS preferences was for night skiing opportunities. PSS preferences were less consistent and differed from EIS and MAOS for ski run distribution, skiable terrain, number of terrain parks, and number of on-slope snack bars. For night skiing opportunities, PSS preferences were the same as MAOS. Although the pattern of signs for these variables differed between the three segments, in the end the only statistically significant differences were

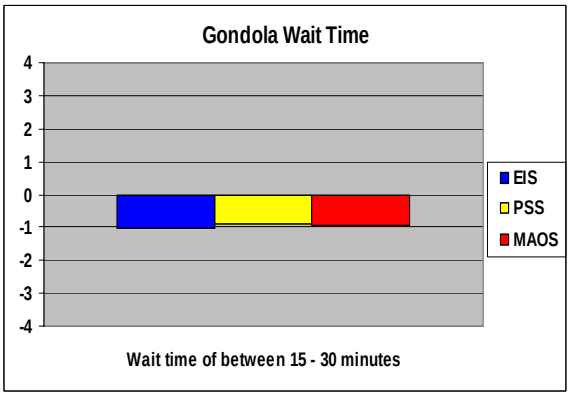
[21] For example, dummy coding allows the specific comparison of a 5% environmental surcharge to no environmental surcharge.

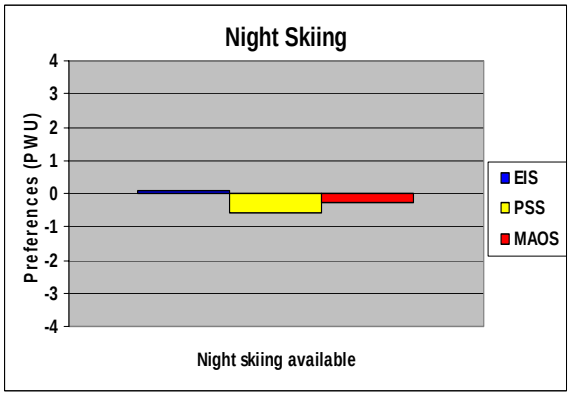
Attributes		EIS		PSS		MAOS		Difference
		Coeff.	St. Er	Coeff.	St. Er	Coeff.	St. Er	
Ski Hill Design								
Ski run Distribution	Beginner/Inter	0.00	.	0.00***	.	0.00	.	0.00***
	Advanced	0.211	0.135	-2.035***	0.546	0.468	0.398	
Skiable terrain	Liner term	0.219***	0.051	-0.143	0.169	0.183	0.178	0.13
Terrain parks	Three	0.00	.	0.00	.	0.00	.	0.70
	Five	-0.023	0.133	0.137	0.461	-0.443	0.487	

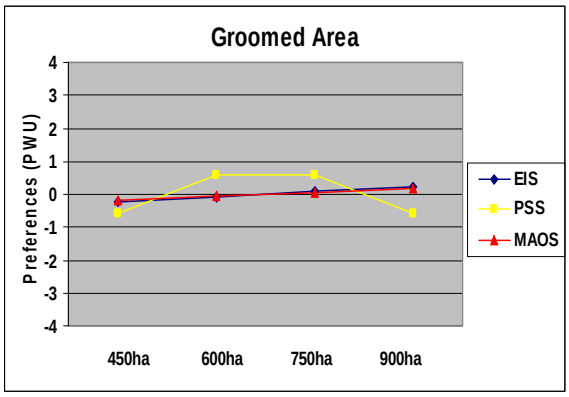

Ski Run Distribution*
Preferences (PWU)
4
3
2
1
0
-1
-2
-3
-4
EIS
PSS
MAOS
Advanced ski runs

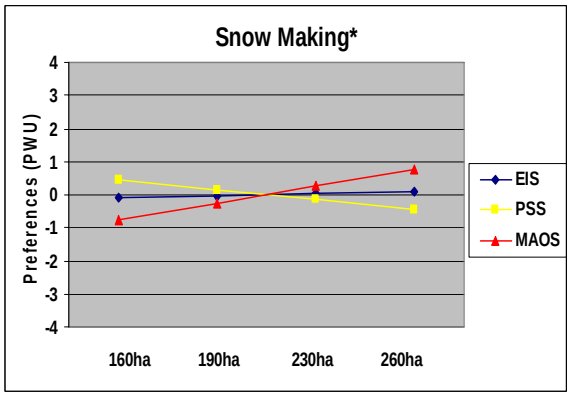

Skiable Terrain
Preferences (PWU)
4
3
2
1
0
-1
-2
-3
-4
EIS
PSS
MAOS
2700ha
3000ha
3300ha
3600ha

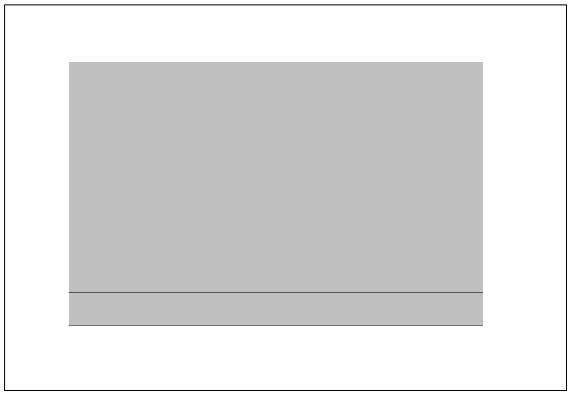

Terrain Parks
Preferences (PWU)
4
3
2
1
0
-1
-2
-3
-4
EIS
PSS
MAOS
Five terrain parks


Gondola Wait Time
4
3
2
1
0
-1
-2
-3
-4
EIS
PSS
MAOS
Wait time of between 15 - 30 minutes


Night Skiing
Preferences (PWU)
4
3
2
1
0
-1
-2
-3
-4
EIS
PSS
MAOS
Night skiing available


Groomed Area
Preferences (PWU)
4
3
2
1
0
-1
-2
-3
-4
450ha
600ha
750ha
900ha
EIS
PSS
MAOS


Snow Making*
Preferences (PWU)
4
3
2
1
0
-1
-2
-3
-4
160ha
190ha
230ha
260ha
EIS
PSS
MAOS



4.6. This ski hill DST enables the user to select any combination of design and management attribute levels used in the DCE for two different ski hills, which are then displayed side by side. Based on the levels selected, the DST calculates and displays the percentage of skiers that would select the specified alternatives. This probability essentially represents a market share, or level of support, for each ski hill. For the purpose of this study, the DST will be used to determine which of the ski hill attributes most influence market share, and how the introduction of environmentally sustainable ski hill initiatives, namely environmental certification and an environmental surcharge of 5%, will impact this share.

To illustrate how the ski hill DST functions, two random ski hill scenarios were

Attribute	Desirable Ski Hill for EI, MAO & D Skiers	Desirable Ski Hill for PS Skiers	Neither Ski Hill
Ski Hill Design			
Ski run distribution			
Skiable terrain			
Terrain parks			
Gondola wait times			
Night skiing			
Days bottom closed			
On-slope restaurant			

1 is more popular than the base scenario, receiving nine times the market share (37% as opposed to 4%). However, the market share for scenario 1 is still very low, and these

share. This increase in market share is driven by more skiable terrain (market share falls to 18% if this is 2700ha), fewer number of days during which the bottom half of the mountain is closed (market share falls to 14% if this is 27 days) and more on-slope snack bars (market share falls to 16% if this is three less). These results suggest that at least some of the attributes that DS value are represented in scenario 2, while for PSS, whichever ski hill attributes motivate them to ski are still not present.

In the third scenario, the hypothetical ski hill has the same attribute levels and thus resource consumption as in scenario 2. However, in addition, scenario 3 has also implemented an environmentally sustainable management initiative (the environmental certification of the ski hill). When compared to scenario 2, scenario 3 is more popular with EIS, MAOS and DS, receiving 60%, 66% and 46% of the market shares, respectively (scenario 2 received 47%, 56% and 28%, respectively). This increase in market share is obviously due to the attainment of an environmental certification. For PSS, scenario 3 is very slightly less popular than scenario 2, receiving only 2% as opposed to 3% of the market share. However, due to the low market shares for both of these scenarios, it is difficult to ascertain the preferences of PSS for environmental certification. Therefore, two hypothetical ski hills, based on the desirable ski hill for PSS (Table 4.11), were compared. The first of these ski hills was identical to that in Table 4.13, while the second varied only in that it had an environmental certification. Results from these ski hills show that environmental certification is slightly unpopular with PSS, as market share falls by 8% when the certification is introduced.

In the fourth and final scenario, the hypothetical ski hill has the same attribute levels and thus resource consumption as in scenario 3. However, due to the popularity of

the environmental certification, another environmentally sustainable management initiative has been implemented (a 5% environmental surcharge). When compared to scenario 3, scenario 4 is equally acceptable with EIS, and still receives 60% of the market share. This identical market share clearly shows that a 5% environmental surcharge will not affect the skiing experience for EIS. For MAOS and DS, scenario 4 is less popular than scenario 3, loosing 10% market share from both skier groups (56% and 36% as opposed to 66% and 46%, respectively). This decrease in market share is obviously due to the implementation of an environmental surcharge and occurs at the ration of 1:2 (for every 1% increase in environmental surcharge, market share decreases by 2%). For PSS, scenario 4 is very slightly less popular than scenario 3, but due to the low market share for this segment to start with, the effect of the surcharge would not really matter for the overall demand.

(brackets denote changes in market share)

Attribute	Base	Scenario 1	Scenario 2
Ski Hill Design			
Ski run distribution	Advanced	Advanced	Advanced
Skiable terrain	3600ha	2700ha	3300ha
Terrain parks	Five	Three	Three
Gondola wait times	Under 15 mins	15 – 30 mins	Under 15 mins
Night skiing	Yes	No	No
Days bottom closed	None	27	9
Restaurants	4 more	4 fewer	4 fewer
Snack bars	3 more	3 fewer	3 more
Ski Hill Management			
Groomed area	900ha	450ha	650ha
Snowmaking	260ha	160ha	210ha
Backcountry access	Yes (lift)	No	Yes (without lift)
Environ certification	No	No	No
Environ surcharge	None	None	None
Market Share		Base9	No

Due to the ecological sensitivity of the areas within which they operate, and because they attract large numbers of visitors to small areas, ski hills need to be carefully planned, developed, and managed in order to minimize their impacts on the surrounding natural environment and to stop them from becoming self-destructive enterprises. While the most immediate and apparent impacts occur during construction and expansion stages, the day-to-day use and operations of on-hill facilities also adversely impact the surrounding natural environment. These include the disturbance and alteration of vegetation and wildlife, as well as impacts on scenic beauty (Todd 1994; Price *et al.* 1997; Wilde 1998; Wardle & Fahey 1999; Holden 2000; NSAA 2000; Simpson & Terry 2000; Pelley 2001; Waldron and Williams 2002; Wipf *et al.* 2005). Increased awareness of the impacts of ski hills, and their inseparability with the surrounding environment, has resulted in demands for environmentally sustainable management initiatives. This demand is augmented by several factors, as documented by several earlier research projects. One of the driving forces behind the desire to ski is to experience the natural beauty of mountains (Culbertson *et al.* 1991; Williams and Dossa 1994; Fry 1995), a result that was echoed in Table 4.3[23], and that environmentally sustainable initiatives result in additional benefits for ski resort, such as increased skier visitation (TIAA 1992; Hudson 2000a; Mihalic 2000; Proebstl 2006), a result that was again echoed in Table

[23] One of the most important travel motivations was "experiencing and seeing a mountain area".

4.3[24]. While a few ski areas have developed their own environmentally sustainable ski hill guidelines / procedures, most have been created for ski resorts by interest groups, tourism associations, and NGOs (NSAA 2000; Pro Natura 2000; Colorado Department of Public Health and Environment & Tetra Tech 2002; BCHSSOA 2003).

Despite the many convictions regarding the importance of environmentally sustainable management, and the existence of environmentally sustainable management initiatives, others still argue that there is little evidence to suggest skiers are interested in this type of management (Fry 1995; Holden 1998; Milne 1998; Swarbrooke 1999). This argument is strengthened somewhat by the fact that there has been little research into understanding the demands of skiers for environmentally sustainable ski hill management as a component of a ski hill's operations. Lack of understanding is somewhat surprising, as maintaining positive skier experiences requires understanding of how ski hill changes will affect skier preferences. Therefore, before ski hill managers can decide whether or not to implement environmentally sustainable initiatives, they must first understand skier preferences. Understanding ski preferences will enable managers to establish whether sufficient demand exists for environmentally sustainable management, and the type of initiatives that will be well received. Furthermore, it will also provides ski hill managers opportunity to differentiate their ski hill from others[25], and thus potentially gain a competitive advantage (Dalrymple & Parsons 2000; Marxt & Hacklin 2005; Siomkos *et al.* 2005).

[24] Another important travel motivation was to "visit a place that takes good care of its environment".
[25] Due to the slowing down and stagnation of market demand for skiing over the past few decades

Many researchers have suggested processes and techniques for determining the demand of various local stakeholder groups (Haywood 1988; Murphy 1988; Simmons 1994; Ashworth & Dietvorst 1995; Gill 1997; Jackson & Morpeth 1999; Simpson 2001; Day *et al.* 2003). While these have often proven successful for understanding the preferences of more permanent stakeholders, they have generally proven unsuccessful for visitors (Haywood 1988; Gill & Williams 1994). The most commonly used technique for quantitatively eliciting visitor demand has been through conventional surveys. However, while these studies have been carried out to better understand skier preferences, none have looked at preferences for environmentally sustainable ski hill management as a component of a ski hill's operations, and rarely have their conclusions been used to help better inform ski hill managers with regards to hill management. Instead, the results are often used by the marketing administration of companies as an advisory tool to help guide and develop the necessary marketing strategies to increase customer satisfaction, loyalty and retention, and thus strengthening their competitive position (Echelberger & Shafer 1970; Morey 1981; 84; Greig 1983; Walsh *et al.* 1983; Klenosky *et al.* 1993; Ormiston *et al.* 1998; Riddington *et al.* 2000; Ferrand & Vecchiatini 2002; Perdue 2002; Tangian 2002; Siomkos *et al.* 2005; Mulligan 2006). Furthermore, due to the inherent weaknesses in the surveying techniques used (Haider 2002; Haider & Rasid 2002), and the fact that understanding of skier preferences for multi-attribute products such as ski hill can provide an empirical foundation for environmentally sustainable ski hill management, more systematic and reliable methods for understanding skier demand is needed. Therefore, and because of these issues, the overall goals of this study were twofold; first, to create and develop a systematic process for empirically measuring skier preferences for ski hill design and management attributes. Once measured, these preferences were used to

investigate skier demand for environmentally sustainable ski hill initiatives through the use of a simple Decision Support Tool (DST); and second, to examine if these preferences vary between different skier groups.

Overall, this study has shown that the majority of skiers have strong preferences for certain ski hill design and management attributes, such as shorter gondola wait times and larger areas of skiable terrain, while they are indifferent towards other attributes, such as snowmaking capacity and number of terrain parks. In regards to environmentally sustainable management initiatives, the majority of skiers showed a preference for environmentally certified ski hills. This result coheres to previous research regarding

= 44), all of whom were overnight skiers, and Day Skiers (DS = 48). This chapter explores some of the implications of these findings for the environmentally sustainable management of ski hill in general, and for Whistler in particular. Following this is a discussion of the research limitations and suggestions for further research. The final section concludes the study.

This research has clearly demonstrated that DCEs can be used to effectively elicit and empirically measuring skier preferences for ski hill design and management attributes. Furthermore, it has also shown that once elicited, these preferences can be used to investigate skier demand for environmentally sustainable ski hill management. Understanding skier preferences for environmentally sustainable management through behavioural research is critical for ski hill managers to determine whether demand exists for this form of management, and the type of initiatives that will prove popular amongst skiers and thus help maintain a ski hill's market share. Additionally, ski hill managers need to be aware not only of aggregated demand, but also of any nuances in demand, such that may occur within specific skier groups. This knowledge and awareness of any heterogeneity is important since it allows ski hill managers to design and implement

recreational activities, night skiing, snowmaking, and on-slope restaurants and snack bars also contribute to wildlife disturbance and habitat destruction (Todd 1994; Price *et al.* 1997; Wilde 1998; Wardle & Fahey 1999; Holden 2000; NSAA 2000; Simpson & Terry 2000; Pelley 2001; Waldron and Williams 2002; Wipf *et al.* 2005). However, while these activities may have adverse impacts on the surrounding natural environment, they constitute the core and expected attributes of a ski hill, without which the hill would cease to exist (Levitt 1983). Therefore, ski hill managers need to be cognizant of skier preferences for these attributes in order to ensure that any environmentally sustainable management initiatives do not negatively impact those that are most popular and influential on ski hill choice.

With regards ski hill design attributes, EIS segment had the strongest preferences for an advanced ski run distribution, greater amounts of skiable terrain and shorter

Based on the above results, it may seems obvious which ski hill design and management attributes ski hill managers should introduce / increase, and which should be removed / decreased. However, in reality resources are not unlimited, and the introduction of specific attributes may occur at the detriment of others. Although this results show that demand exists for environmental certification, certification alone cannot drive the demand exorbitantly. This was clearly demonstrated in scenario 1 of the DST (Table 4.14), in which the hypothetical ski hill was potentially the most environmentally sustainable because it used the minimal amount of resources by providing the minimal amount of each ski hill attribute (i.e., the lowest level of skiable terrain, groomed area, snowmaking capacity, no backcountry access). Under this scenario, the market share for this ski hill was only 6%, 37%, 3% and 3% for EIS, PSS, MAOS and DS, respectively. While these low shares occurred for different reasons, the overall impacts were the same. Therefore, ski hill managers need to ensure that the attainment of an environmental certification for the ski hill will not negatively affect the ski hill design and management attributes that skiers view as important.

Despite the utility of this research for ski hill managers in Whistler and elsewhere, some limitations exist. Although the preferences elicited in the DCE were intended to be hypothetical, there is a slight possibility that many choices were made with a real ski hill in mind. That is, because the hypothetical ski hills were heavily based on the ski hills in Whistler, skiers were recruited in Whistler, and the survey asked numerous questions about their trip to Whistler, respondents may not have expressed their preferences for a hypothetical ski hill, but for an existing ski hill. Skiers therefore may have been thinking

important? A similar question could be asked about snowmaking. Is snowmaking capacity unimportant? Were visitors simply unable to differentiate between the different capacities, or were the levels tested too low to be important? While these issues may not be perfectly resolvable, a partial solution would be to ensure that future attribute levels are selected to ensure that different ranges are tested, regardless of possible alternatives being considered for a specific ski hill. However, despite this lack of significance, the conclusions within the attribute ranges offered are highly plausible.

This research has shown that most skiers highly value environmental certified ski hills, and that they consider an environmental surcharge to be unacceptable. Yet further research is needed into understanding the details of these preferences. First, demand for environmental certification require investigation. Do skiers have particular preferences for what constitutes these certificates, or are their preferences simply for their attainment of such certifications? The former would necessitate greater understanding to ensure that skiers both accept and approve of these certifications. A related issue regards who should be responsible for developing these certifications, and which governing body should be in charge to ensur.r w0.0091 9heer1(e)10.2(10.44.1(.1(w0.0091 (d)15.4u.44.1 en)-12.1ce(an)-121(.4u.44.1

preferences vary between different skier groups. Overall, the majority of skiers (83%) preferred environmentally certified ski hills. Skiers also showed a preference for no environmental surcharge. This result highlights the fact that while some environmentally sustainable initiatives are popular amongst skiers, not all initiatives will positively influence skier experience and thus ski hill choice. Based on these results, there is clearly a demand for the implementation of specific environmentally sustainable ski hill initiatives, while others initiatives are unpopular. Furthermore, this study has also shown that while skier preferences may seem homogenous (when segmentation is based on demographic characteristics, frequency of visits, and activities undertaken), preference heterogeneity does exist. Understanding of this heterogeneity is important if ski hill managers are to successfully implement the initiatives that will meet the demand of most, if not all, skiers. From the research, it is evident that all skiers highly value ski hills with shorter gondola wait times. It is also evident that the majority of skiers highly value an advanced form of ski run distribution (69%), greater amounts of skiable terrain (70%) and

Hi. My name is [your name] and I am conducting research with Simon Fraser University. We are trying to better understand what visitors think about future changes needed for Whistler to become a more sustainable resort destination. Would you be willing to take 2 minutes to answer a few questions?

1. Are you a full-time resident of Whistler or do you work in Whistler? ☐N [1] ☐Y [2] [terminate]

We will be conducting an Internet survey later this spring. By completing the online survey, you will be helping shape Whistler's future. By completing the online survey, you will be entered to win a number of draw prizes. Can we contact you by email in late March to complete the Internet survey? All personal information will only be used for the purposes of this study, and will not be released to any other individual or organization.

2. Email: _____ [double check!!]

3. Is there a name we could use when we contact you by email?

_____

Thank you. At this time, I have a few quick questions about your trip. Your participation is completely voluntary, and you may terminate the interview at any time.

4. Is this your first visit to Whistler?

Hi (first name),

You are one of the few individuals invited to participate in Simon Fraser University's survey on mountain resorts during your trip to Whistler in Feb, 2005. Thank you for agreeing to take part - your opinions and perspectives are very important to us.

This survey, which has been designed to find out what you think about different aspects of mountain resorts such as Whistler, will take about 25 minutes to complete. As a thank you for taking the time to complete the survey, you will be entered in a draw to win prizes including a minimum $100 gift certificate for Mountain Equipment Co-op. Be sure to get your responses in by October 31st in order to be eligible for the prize draw.

Please be assured that this survey is for research purposes only. Participation in this survey is voluntary and your responses will be kept strictly confidential in accordance

Hi (first name),

Several weeks ago, you were sent an email with a link to Simon Fraser University's web survey on visitor perspectives of mountain resorts. Our records indicate that you have not yet completed this survey. Therefore, we are sending you this reminder email because your completed response is important for us to obtain representative results that can help improve future planning decisions at Whistler and other mountain resorts. If you started the survey, but have not yet completed it, please keep in mind that you can log back into the survey and continue from where you left off.

The web survey asks about your preferences for recreation, development, transportation, and environmental initiatives at mountain resorts. The survey takes about 25 minutes to complete and requires no special knowledge.

Please submit your responses by October 31st to be entered in the draw for prizes including a minimum $100 gift certificate for Mountain Equipment Co-op. This survey is for research purposes only and your responses will be kept strictly confidential in accordance with Simon Fraser University's research ethics guidelines.

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