Recreational Trail Use of Residents in Jasper National Park, Canada

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Abstract: This paper reports the results of a survey of recreation activities by the residents of the town of Jasper in Jasper National Park on the eastern slope of the Rockies in Canada. During the summer, residents enjoy hiking, jogging, mountain biking and horseback riding. In order to better understand the importance of trail attributes, the attitude towards encounter levels, and the possible acceptance of trail management options, a discrete choice experiment was administered in a mail survey. We identified three distinct user groups based on activity patterns, and these three groups differed significantly in their responses to most attributes in the discrete choice model. In the discussion we elaborate how the results of a discrete choice experiment can be used to simulate the affects of various management options on the three user groups. Simulating the likely recreation behaviour by the residents of Jasper produces insights for both visitor management and wildlife management.

Introduction

Over the last few decades, ecological integrity has become a growing concern for managers of Canada's national parks. In 2000, Parks Canada (2000) strengthened its commitment to maintaining ecological integrity by endorsing the report released by the Panel on Ecological Integrity which detailed the precarious state of some national parks. In this same year, ammendments to the National Parks Act declared ecological integrity the predominant concern for parks management.

While these documents make it clear that visitor enjoyment will continue as an important activity in all National Parks, human use must be managed accordingly. Therefore, studies of parks users are an integral component of proactive and adaptive parks management.

Maintaining ecological integrity while providing satisfactory recreation opportunities is a particular challenge in some of the older mountain parks for two reasons: 1) these particular parks contain settlements, and 2) the location of townsites and most human use is concentrated in the valley bottoms and low lying areas, which also contain precious ecological areas. When these settlements are of significant size, as in Jasper, Alberta, residental recreational demands augment the stresses associated with regular human use by visitors considerably.

Recreational use by residents

Important attractions for living in a park community are the high level of environmental quality and the ample recreation opportunities available around the community. Consequently, in addition to the typical park users who stay in the community for a few days and enjoy scenery, wildlife, and the recreational opportunities, residents also use these resources extensively year round. The main activities in a mountainous environment like Jasper are hiking and mountain biking, and residents also enjoy jogging and simply walking their dogs.

The recreation behaviour of these user groups has been documented in the literature extensively, by focusing on the conflict between hikers and mountain bikers (Cessford 2002, Federal Highway Administration n.d), and on crowding and encounter norms (Donelly et al. 1992, Manning et al. 1996, Manning et al. 1999), but only few studies have focused on residents' activities in a national park setting. In effect there is a rather unique array of uses in the sense that far-away tourists who visit only once-in-a-lifetime, or very sporadically, mix with frequent outside visitors from nearby urban centers, and with residents, who will partly enjoy the same activities, but also have need for the more routine daily or several-times weekly recreational activities such has dog walking, jogging or casual mountain biking.

In this paper we report on the results of a survey of Jasper residents undertaken during the summer of 2003. The purpose of the survey was to obtain human use information that is complementary to the ecological data that have been collected for the parks lands surrounding the town. The survey focused on patterns of use, motivations, and attitudes towards management options. One core component of the survey was a discrete choice experiment to explore the residents' preferences for certain trail characteristics, and their trade-offs between different management options.

Next, we briefly describe the study site, followed by a description of the survey instrument and the methods used. The presentation of results is organized using a segmentation of the respondents based on their recreation activities and focuses on the discrete choice experiment and responses to some management questions. The paper concludes with a discussion of these findings for human use management.

Study area

The town of Jasper, Alberta is on the east slope of the Canadian Rockies, located in an area of Jasper National Park known as the Three Valley Confluence (TVC). Named for the confluence of the Athabasca, Maligne, and Miette Rivers, this broad valley supports the greatest concentration of development and human use in the park (AXYS 2001, Cardiff 2000, Parks Canada 2001). Jasper National Park is one of seven Canadian national parks housing a townsite within its boundaries. As a result, in addition to the 1.6 million annual visitors, human use management in the park also needs to consider the presence of 4,800 year-round residents, which grows even larger with seasonal residents during the summer.

The TVC is not only special for the value it provides to humans, it is also of significant ecological value. This low-lying area forms part of the montane ecoregion which provides habitats for more species of plants and animals than are found at the park's higher elevations (Cardiff 2000, Parks Canada 2001).

High levels of human use in the TVC translate into significant recreational pressure. The 154 km network of day-use trails near the Town of Jasper is heavily used by both residents and visitors who enjoy hiking, jogging, mountain biking, and horseback riding in the summer, as well as cross country skiing and snowshoeing during the winter. However, not only humans enjoy access to these trails; because transportation routes cut through their travel corridors, wildlife also relies on these areas. Challenges presented by the overlap of ecological and human use values highlight the need to devise more effective strategies for managing trail use in the TVC (AXYS 2001).

While ecological research has granted park managers an understanding of wildlife movement through this area, so far little is known about the patterns of recreational use on Jasper's day-use trail system (Parks Canada 2001). The current research attempts to characterize how both residents and visitors use the trails in the TVC.

Methods

Survey

During the summer of 2003, trail use was monitored in the TVC using both trail counters and observer based counting. An intercept survey recorded the users' activities on the day of observation, their level of satisfaction with their trail experience, and asked for their participation in a more detailed mail survey. The intercept survey produced a total of 150 addresses for the later mail survey.

Questions in the mail survey explored residents' patterns of use, their motivations for using the trail network, the influences affecting their choice of particular trails, their level of satisfaction with the existing network, and their reactions to hypothetical management actions. A total of 700 mail surveys were distributed to Jasper residents. In addition to the 150 resident addresses collected through the intercept survey, 440 surveys were distributed randomly through the post office, and 110 surveys were given to specific target groups.

Stated choice model

To analyse the trade-off behaviour, stated choice models have been applied extensively in recreation research. Typically respondents are asked to make choices among alternative configurations of a hypothetical multi-attribute good (Louviere & Timmermans 1990). A strength of choice models lies in their ability to predict how the public will respond to various policy and management alternatives, including arrangements of resources, quality of visitor experiences, facilities, and/or services that may not currently exist, and avoid the problem of multicolinearity (Haider 2002). Stated choice analysis has been applied to study public preferences concerning a range of recreation-related issues such as visitor preferences for wilderness management issues (Lawson & Manning 2002, McCormick et al. 2003), tourism destination choice (Haider & Ewing 1990), beach preferences (Stewart et al. 2003), and trail characteristics preferred by mountain bikers (Morey et al. 2002).

In stated preference/choice models, alternatives are defined as combinations of a set of attributes, and each set is evaluated as a whole. The alternative profiles are constructed by statistical design principles, such as fractional factorial designs (Raktoe et al. 1981, Montgomery 2001). If respondents rate or rank each full profile separately, the technique is usually referred to as conjoint analysis (Green & Srinivasan 1978). In a discrete choice experiment (DCE), however, two or more such hypothetical profiles are combined to choice sets, and respondents choose the most or least preferred alternative (profile) from each set they are asked to evaluate (Louviere et al. 2000).

The advantages of stated choice over traditional conjoint analysis are that behaviourally, the analysis of choice – even though it is only hypothetical choice – is closer to actual behaviour than a rating or ranking task, and that the statistical analysis has a rigorous error theory included.

The theory posits that choices can be modelled as a function of the attributes of the alternatives (McFadden 1974, Ben-Akiva & Lerman 1985). Individual behaviour is considered as deterministic, but because of the inability of the research process to account for all influencing attributes and the need to aggregate individual choices across individuals, the modelling of behaviour is undertaken stochastically (Train 1986, Ben-Akiva & Lerman 1985). Therefore, it is assumed that the overall utility (U_i) contained in any one alternative is represented by a utility function that contains a deterministic component (V_i) and a stochastic component (ε_i). Selection of one alternative over another implies that the utility (U_i) of that alternative is greater than the utility of any other alternative (U_j). The overall utility of alternative i is represented as (McFadden 1974, Train 1986):

$$U_i = V_i + \varepsilon_i \quad (1)$$

Given this stochastic component, the probability of an individual choosing one alternative over another will depend on the relative sizes of the systematic components of their utilities compared with the size and sign of their random components. The larger the difference in systematic components compared with the difference in random components, the more likely is the alternative with the larger systematic component to be chosen (Louviere et al. 2000).

$$\text{Prob } \{\text{i chosen}\} = \text{prob } \{V_i + \varepsilon_i > V_j + \varepsilon_j;\ \forall_j \in C\} \quad (2)$$

where C is the set of all possible alternatives. If one assumes that, for the entire sample, the stochastic elements of the utilities follow a Gumbel distribution, the multinomial logit (MNL) model can be specified as

$$\text{Prob } \{\text{i chosen}\} = e^{Vi} / \sum e^{Vj} \quad (3)$$

The analysis produces regression estimates, standard error and *t*-values for each attribute level, which are referred to as part-worth utilities. This standard MNL model supports the estimation of parameters that allow one to express the choice probability of a given alternative as a function of the attributes comprising that alternative and those attributes of all other alternatives in the choice set.

Attributes

The purpose of the DCE was to investigate the importance of certain trail characteristics, including crowding situations by various types of users, and the reaction to certain regulations. The focus of this study was on the three most prominent user groups jointly, rather one specific user group. Therefore the attributes had to be selected in such a manner that the profiles were relevant to all user groups.

The first set of attributes related to trail management options. It simply listed the activities that would be allowed on a trail (hiking, mountain biking, horseback riding), inferring that if the activity was not listed, then the activity would not be allowed. It also stated if the trail was patrolled by wardens, and if signage was posted at trail junctions. Thereafter, trail characteristics referred to the trail surface (soil, hardened, or exposed roots), the topography (flat, many small hills, few long hills), whether the trail was actively maintained or not, and the type of forest surrounding the trail (evergreen, mixed, leafed, or mixed and unforested). Three variables referred to whether or not possible trip highlights were available along the trail, such as lake / river, viewpoints, wildlife viewing, and finally four variables were used to describe different mixes of encounter situations between the various activities (0-10 encounters with hikers; 0-6 encounters with mountain bikers; and 0-3 encounters with horseback riders) and also large groups (0-3 encounters).

The 17 variables were combined into one hypothetical trail description (profile). Three profiles were joined to one choice set (Figure 1). In each choice set, respondents evaluated three profiles and the option of pursuing their favourite activity outside of the trail network surrounding Jasper. While in most DCE applications respondents are asked to choose one alternative, in this case we asked respondents to allocate a total of ten outings among the three trail profiles, and the base alternative of going outside of the trail network served as a fourth option. Such a response task is relevant for repeat users such as seasonal and year-round residents, and provides more accurate data for the model.

The profiles and choice sets were developed by following a Resolution III main effects design plan (Raktoe et al. 1981). In order to estimate a statistically valid model a total of 64 choice sets were required. These were divided equally among eight versions of the survey instrument, so that in effect each respondent evaluated only eight choice sets.

The evaluations of the choice sets were analysed in a multinomial logit (MNL) regression, in which the aggregate frequency of responses to each alternative served as the dependent variable, and all the independent variables described above were coded with effects codes (Louviere et al. 2000). Only the encounter variables which were numerical, were coded as continuous variables with a linear and quadratic term using orthogonal polynomial coding (Louviere et al. 2000). Data analysis was undertaken in LIMDEP 7.0 (Green 1998).

	Option A	Option B	Option C	Option D
Trail Management	(Trail 1)	(Trail 2)	(Trail 3)	
Activities allowed:	Hiking Mtn. Biking	Hiking Mtn. Biking Horse Use	Hiking Mtn. Biking Horse Use	
Patrolled by wardens?	Yes	No	Yes	
Signage at junctions	No	No	Yes	
Trail Characteristics				
Trail surface	Soil	Exposed roots	Hardened	
Topography	Few long hills Straight	Flat Winding	Flat Winding	I would pursue this activity on trails outside of the day-use network.
Maintained?	Yes	No	Yes	
Forest type?	Evergreen Forest	Mixed forest & Non-Forested	Leaved Trees	
Trip Highlights				
Lake/River	Y	Y	-	
Viewpoints	-	Y	Y	
Wildlife viewing	Y	-	Y	
# of each user group you meet				
Hikers/joggers	2	6	8	
Mountain bikers	6	3	1	
Horseback riders	0	1	1	
Total # groups with more than 6 people	0	1	0	
Given a total of 10 trips, how many would you allocate to each option?	____ +	____ +	____ +	____ = 10

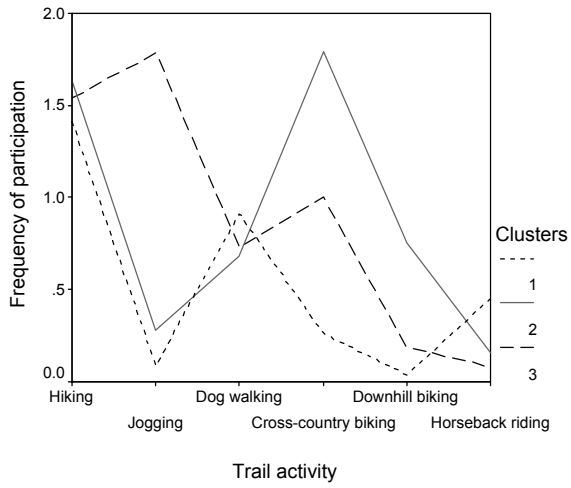
Figure 1. Example choice set.

Results

Resident recreation behaviour

Survey results indicate that Jasper residents are on the trails an average of 19.9 days each month. While almost all were able to identify a preferred activity, most residents participate in more than one trail activity.

The 92.5% of residents who reported hiking as forming part of their "top three" activities hike the trails 7.3 days each month. Cross-country biking is the second favourite trail activity, with 55.7% of respondents citing it as one of their three most preferred activities. Horseback riding is least popular, as only 13.2% of respondents consider it part of their top three activities. While hiking is considered the most popular trail activity, dogwalkers are the most frequent participants in their activity. The 42% of respondents listing dogwalking amongst their top three activities walk their dogs on the trails 9.6 days each month. In order to differentiate between different users in our analysis, a cluster analysis using the Ward method was performed to identify groups of respondents who are most similar in pursuit of their recreation activities. The responses to the frequency of participation were recoded to never, occasionally (= 1-3 times a month), and regularly (= more than 4 times a month. A highly interpretable three cluster solution (see Figure 2) showed that hiking and dog walking were enjoyed about equally by all three groups. On the other hand, participation rates in jogging and mountain biking differed significantly, with members of Cluster 2



Y axis: *0 = Not at all; 1 = 1-3 times/month*
2 = 4+ times/month

Figure 2. Frequency of trail activities by cluster.

(N=57) focused on mountain biking, and being adverse to jogging, while Cluster 3 (N=37) preferred jogging over all other activities. Cluster 1 (N=80) members hiked and dog walked as frequently as the others, but participated much less in mountain biking. This cluster also contained a few horseback riders. In the analysis of the choice responses we distinguished between these three clusters.

Choice model results

Table 1 presents the MNL parameter coefficients, their standard errors, and *t*-values each attribute level. The intercepts differ dramatically between Cluster 1 and the two other segments. The highly negative intercept for Cluster 1 indicates that the casual users are opposed to the changes that were proposed in the scenarios in one form or another. The two other groups however indicated that everything else being

Table 1. Results of MNL-model by activity clusters.

		C1 (Casual users)			*C2 (Active bikers)*			*C3 (Active joggers)*		
Attribute and Levels		Coeff.	SE	*t*	Coeff.	SE	*t*	Coeff.	SE	*t*
Intercept		-0.465	0.035	-13.18	0.044	0.043	1.02	0.118	0.055	2.13
Trail Management										
Activities allowed - Hiking	No	-0.850			-0.068			-0.556		
	Yes	0.283	0.016	17.93	0.023	0.013	1.69	0.185	0.020	9.50
Activities allowed - Mtn Biking	No	0.254			-0.533			-0.093		
	Yes	-0.085	0.014	-6.17	0.178	0.017	10.72	0.031	0.020	1.57
Activities allowed - Horse use	No	-0.013			0.250			0.144		
	Yes	0.013	0.022	0.60	-0.250	0.025	-10.17	-0.144	0.030	-4.75
Patrolled by wardens?	No	0.019			0.017			0.088		
	Yes	-0.019	0.020	-0.91	-0.017	0.022	-0.78	-0.088	0.028	-3.10
Signage at junctions	Absent	-0.091			-0.061			0.002		
	Present	0.091	0.021	4.36	0.061	0.022	2.75	-0.002	0.029	-0.05
Trail Characteristics										
Trail Surface	Soil	0.125			0.014			-0.078		
	Eposed Roots	-0.133	0.028	-4.66	-0.083	0.030	-2.71	-0.057	0.038	-1.49
	Hardened	0.007	0.032	0.23	0.068	0.035	1.95	0.136	0.046	2.94
Topography 1	Flat	-0.160			-0.257			-0.019		
	Many Short Hills	0.052	0.029	1.79	0.101	0.031	3.27	-0.003	0.040	-0.08
	Few Long Hills	0.108	0.034	3.13	0.156	0.037	4.22	0.022	0.046	0.48
Topography 2	Straight									
	Winding	0.062	0.022	2.84	0.046	0.024	1.94	0.065	0.030	2.17
Maintained	No									
	Yes	0.079	0.022	3.56	0.138	0.024	5.62	0.089	0.030	2.95
Forest Type	Evergreen	-0.075			-0.087			0.043		
	Leafed	-0.054	0.039	-1.40	0.057	0.041	1.38	-0.109	0.052	-2.09
	Mixed Forest	0.020	0.037	0.56	0.035	0.040	0.88	0.041	0.048	0.86
	Mixed and Non-forested	0.108	0.038	2.86	-0.006	0.040	-0.14	0.025	0.051	0.49
Trip Highlights										
Lake/River	Absent	-0.094			-0.064			-0.050		
	Present	0.094	0.021	4.57	0.064	0.021	3.01	0.050	0.027	1.86
Viewpoints	Absent	-0.027			-0.047			-0.134		
	Present	0.027	0.021	1.29	0.047	0.023	2.07	0.134	0.029	4.71
Wildlife viewing	Absent	-0.035			-0.042			-0.059		
	Present	0.035	0.021	1.69	0.042	0.022	1.87	0.059	0.029	2.06
Number of Each User Group Met										
Hikers/joggers	Linear	-0.070	0.015	-4.58	-0.024	0.018	-1.32	-0.051	0.021	-2.41
	Quadratic	0.002	0.006	0.28	-0.013	0.007	-2.03	-0.004	0.008	-0.55
Mountain bikers	Linear	-0.100	0.019	-5.16	-0.051	0.020	-2.56	0.051	0.027	1.91
	Quadratic	-0.001	0.007	-0.17	-0.007	0.008	-0.89	-0.018	0.010	-1.84
Horseback riders	Linear	0.006	0.011	0.52	-0.018	0.013	-1.40	-0.007	0.015	-0.47
	Quadratic	0.002	0.004	0.48	0.002	0.004	0.54	-0.017	0.005	-3.23
Large Groups of ≥6 People	Linear	-0.029	0.007	-4.28	-0.020	0.008	-2.60	-0.050	0.009	-5.44
	Quadratic	-0.005	0.003	-1.83	-0.004	0.003	-1.37	0.016	0.004	4.09
Encounter Interactions										
Hi x Bi	Linear	0.031	0.010	3.11	-0.021	0.011	-1.95	-0.005	0.012	-0.38
Hi x Ho	Linear	-0.003	0.005	-0.59	0.008	0.006	1.27	-0.003	0.007	-0.35
Hi x LG	Linear	0.007	0.004	1.73	-0.005	0.005	-1.12	-0.015	0.006	-2.72
Bi x Ho	Linear	0.010	0.006	1.57	0.003	0.007	0.40	0.004	0.009	0.46
Bi x LG	Linear	-0.011	0.004	-2.51	-0.006	0.004	-1.46	0.017	0.006	2.93
Ho x LG	Linear	0.003	0.003	1.12	-0.002	0.003	-0.74	0.004	0.003	1.19
Hi x Bi x Ho	Linear	-0.005	0.004	-1.45	0.001	0.004	0.15	0.001	0.005	0.21
Hi x Bi x LG	Linear	0.001	0.003	0.24	0.003	0.003	1.04	0.005	0.003	1.50
Hi x Ho x LG	Linear	-0.001	0.001	-1.02	0.001	0.001	0.75	0.002	0.001	2.08
Bi x Ho x LG	Linear	-0.002	0.002	-1.03	0.001	0.001	0.85	-0.003	0.002	-1.29
Hi x Bi x Ho x LG	Linear	0.002	0.001	2.35	0.003	0.001	2.70	0.001	0.001	0.47
		Rho^2 = 0.070 Rho^2adj. = -0.152 Log Likelihood (0):-7088.12 Parameter model: -6593.38			Rho^2 = 0.040 Rho^2adj. = -0.190 Log Likelihood (0):-5420.61 Parameter model: -5643.61			Rho^2 = 0.047 Rho^2adj. = -0.180 Log Likelihood (0):-3378.01 Parameter model: -3544.75		

even, they prefer the managed scenarios presented in the choice tasks over the base alternative of using trails outside the immediate Jasper trail network. All other attributes have signs in the expected directions, and most attributes have at least one significant difference in each of the three clusters. The preferences for trail activities allowed certainly reflects the main interests of the respective users. For the casual users, a hiking trail is considered extremely important, while they are adverse to mountain bikers and indifferent to horseback riders. The mountain bikers have a strong desire for mountain biking trails, and also have a positive disposition towards hiking, but are strongly opposed to horseback riding. As to be expected, the active joggers strongly desire hiking trails, and are indifferent to mountain bikers being present, but also dislike horseback riding. All groups agree in their opposition to warden patrols, although the estimates were not significant for individual segments, they were for the overall sample (estimate= -0.03; t=-2.46; not shown in table), and they all agree on the importance of trail maintenance. There is some disagreement regarding trail signage, which is desired by the casuals and mountain bikers, while the joggers are indifferent to it.

Several interesting differences also emerged in the groups' preferences for trail characteristics. They all dislike exposed roots (only for joggers insignificant), and while bikers and joggers prefer hardened surfaces the most, casual users prefer soil surfaces, obviously because walking is the most important activity for them. Joggers are indifferent to the topography (flat vs. steep), while bikers want anything but flat terrain, and the casual users prefer many short hills the most. They all agree that winding paths are preferred over straight trails.

All groups have significant positive estimates for the various trip highlights, such as lakes/rivers and seeing wildlife. Joggers are much more in search of a view than the two other groups. They also have different preferences for the forest environment, as mountain bikers really prefer deciduous trees along their trails, which are disliked by joggers; The casual users on the other hand prefer mixed and unforested trail sections.

The encounter levels with other user groups were estimated in linear and quadratic terms, and also included interactions. Therefore we graphed the results for ease of interpretation (Figure 3) as sensitivity tables by showing a different graph for each encounter type. The casual users have the steepest encounter norm curve for hikers, while the two other groups are much more accepting of hikers. This is interesting, because the members of the casual group are most likely to be hikers themselves. Casual trail users are also more opposed to mountain bike

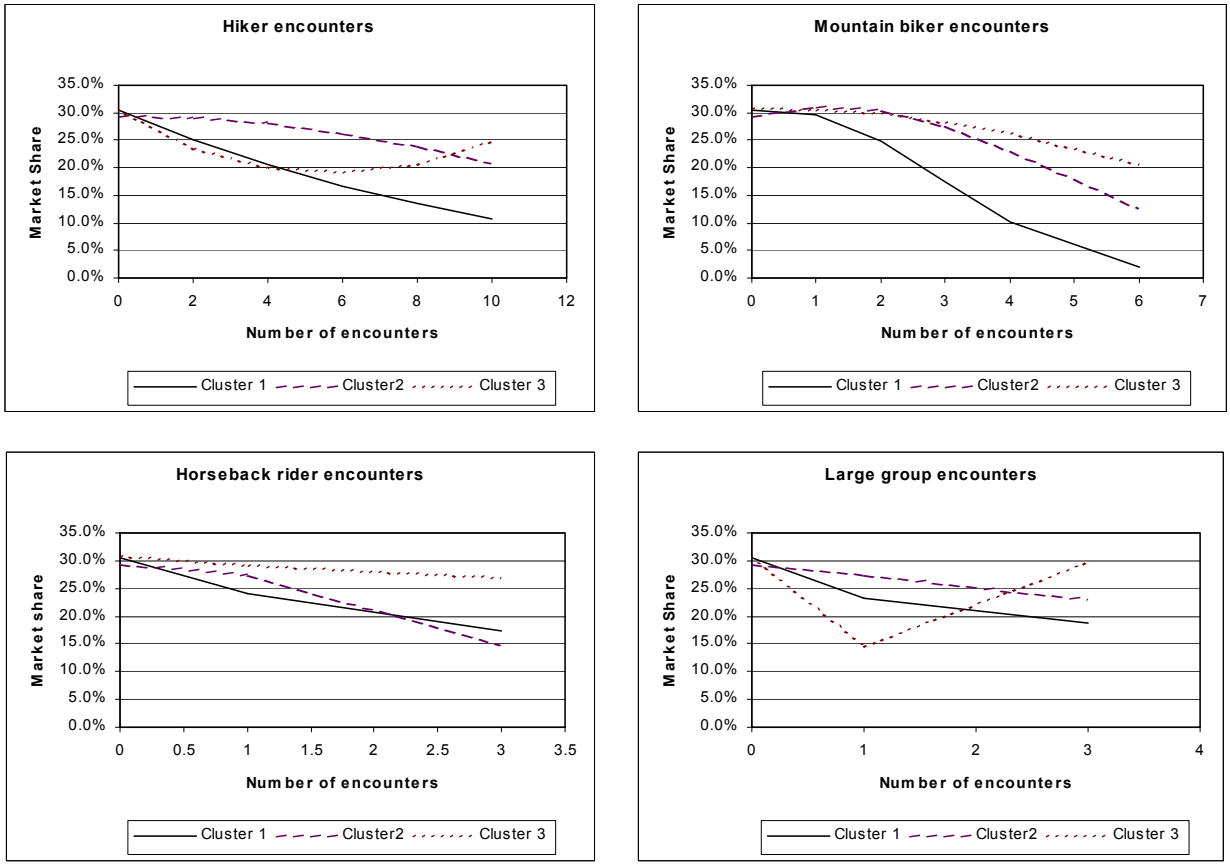


Figure 3. Preferences for encounters with various user groups by activity segments (MNL-results).

encounters, especially above three encounters; of interest here is that mountain bikers actually are more opposed to higher encounters with other mountain bikers than joggers are. Horse encounters are disliked by casuals and bikers, while again the joggers are more accepting of them. Group encounters are perceived as negative by all segments; the aberrance by joggers defies explanation.

Other results

Obvious differences between these three segments are also apparent on the other survey questions. Using the trails to "exercise and challenging myself" is more important for active bikers (sig=0.021) and active joggers (sig=0.031) than for casual users. Similarly, “the presence of challenging or technical sections” is considered a more important trail characteristic by active bikers (sig=0.000) and active joggers (sig=0.023) than it is by casual users.

The responses of casual users and active bikers also differ on some of the management questions. Casual users are more in favor of designating trails for both hikers/joggers (sig=0.013) and mountain bikers (sig=0.043). “Seeing others using unofficial trails” detracts more from their experience than it does from that of active bikers (sig=0.029). Results also suggest that “seeing few other users on the trail” enhances the experience of casual users much more than that of active bikers (sig=0.005). These differences in other survey sections confirm the heterogeneity of these segments.

Discussion

The results above indicate that the residents around the town of Jasper are a heterogeneous group of users. Of interest to researchers is the fact that these segments did not differ drastically among a long list of regular survey questions (most are not reported here), but that they differ in many respects when responding to the trade-off questions posted in the discrete choice experiment.

When the results of the DCE are used to calculate the likely support for certain management scenarios by substituting the estimates into Equation 3, one can derive shares for the various management profiles. In the simulation tool consisting of three trails and a base alternative (just like the survey), with all trails set to the most preferred level, and encounter levels at the respective highest levels, it turns out that more than half of the casual users would opt to recreate somewhere else, while only 19% of the joggers, and 33% of the mountain bikers would do so. When simulating the effects of closing a trail to mountain biking, which also implies that there will be no encounters with these users, the likelihood of choice for this trail changes from 16% to 47% for casual users, while it would drop from 22% to 20% for mountain bikers (obviously members of that segment would still use that trail for other activities), and would also drop for joggers from 27% to 26%, presumable because they could no longer mountain bike. Equally important is the fact that the demand for trails outside of the study area would actually decrease with this managed segregation of use. Our model is limited in the sense that we investigated only up to a limited number of encounters. There are several management implications from this.

From a recreation management point of view, it appears to make sense to separate certain uses, as different user groups desire different trail characteristics for their enjoyment. Towards that goal, apparently physical trail characteristics, including signage and whether or not the trails are patrolled, are less important than regulating user type and the actual encounters with various user groups. Wildlife managers are especially concerned about managing the recreation activities in the most sensitive habitats. Trails on the periphery of the network are considered particularly important for wildlife movement. While use volumes are generally lower in these areas, some individuals ignore the voluntary closures in place on these trails. Identifying the trail attributes valued by these users could help park managers to develop similar trails in less sensitive areas.

While some other survey questions indicate that the majority of respondents are opposed to trail closures, the choice experiment results indicate that closing select trails for one use appears to be an option acceptable to most users, as long as they find compensating alternatives. Given these results, trail closure to some user groups may be an option, especially when considering that the area contains a total of 145km of trails. However, if too many trails get closed, then the number of users on adjacent trails will most likely increase, leading to unsatisfactory conditions there.

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