

Moraine Lake - 2007 Group Access Study: Visitor Experience, Compliance and Awareness

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Group Access strategy in the Moraine Lake area has been implemented in 1999 with an intention to reduce bear-human encounters and improve safety for the visitors to the area by legally requiring visitors to the area to travel in a tight group of six or more. This year that requirement has been changed from a tight group of six to a tight group of four. This study evaluates the effectiveness of the Group Access strategy by examining compliance rates, visitor awareness, visitor experience, levels of use and the number of encounters. Compliance rates and trail usage were measured using a variety of tools from haphazard warden patrols, to the use of electronic equipment such as counters, cameras and GPS track sticks. Paper based intercept survey was used to collect information about visitors. The study found that since the reduction in the required minimum group size both the compliance rate and visitor satisfaction increased, while the number of aggressive bear encounters remained low. The study concludes that the group access in the Moraine Lake area has been a successful management strategy for achieving a goal of preserving the ecological integrity while providing positive visitor experience opportunities.

Key words: bear-human conflict, Group Access, visitor experience

Background

The Moraine Lake area is home to several local grizzly bears. All of the bears using the Moraine Lake area show varying degrees of habituation (Morrison and Tucker undated). Berry production attracts bears to the area (Integrated Risk Control Inc. 2002) and bear habitat in the area is rated as high or very high existing in discontinuous patches (Morrison and Tucker undated). In addition to providing bear habitat, the Moraine Lake area contains important travel corridors (Tremblay 2001).

Moraine Lake also attracts a large number of visitors and provides various opportunities for the visitors to use the area. The Moraine Lake area attracts 500 000 to 600 000 visitors annually, with a majority of the 8000 visitors a day being day users (Peterson 2000). There are nine high-use hiking trails, one hiking/biking trail and a total of 44.5 kilometers of maintained trails

(Morrison 2000; Morrison and Tucker undated).

As a result of the high levels of human use, the Moraine Lake grizzlies became habituated and began to exhibit bold behavior. The area was subject to closures between 1996 and 1998. Group access was implemented as an interim management protocol in 1999, to enable human use in the area and to reduce the chances of bear-human conflict. Under group access, hikers in the backcountry were required to hike in groups of six or more, bikers were not allowed on the Highline Trail and horse users had to be in groups of two or more when there was a bear in the area. In 2000, an 80% overall compliance rate was set (Tucker 2001, Gray 2000).

The summer of 2007 brought about a change in the minimum number of hikers required in a party when group access was in effect. When group access was implemented, hikers were required to hike in groups of four or more in the backcountry. The three kilometers of the Highline Trail closest to Moraine Lake were not affected by group access, but was subject to closures (for details on decisions see Herrero and Herrero 2000). In 2007 group access was in effect from July 22 until October 9, when the Moraine Lake Road was closed for the summer season. Interpreters from the LLYK Field Unit met hikers at trailheads four days a week, to provide information related to group access and to aid in the formation of groups. Additionally a sign up was available at the Lake Louise Visitor Reception Centre to aid people in forming groups.

The purpose of this study is to continue monitoring of the effectiveness of the group access policy in reducing bear-human conflict, and evaluate minimum group size changes in the group access policy from a group of six to a group of four.

The following research objectives were set in order to address the research problem:

- Profile the visitors to the area.
- Get better understanding of visitor experience in the Moraine Lake area.
- Determine levels of human use in the Moraine Lake area.
- Determine visitor compliance rate during group access.
- Compare compliance rates to previous years.
- Determine visitors' bear awareness levels and familiarity with the group access policy.
- Determine visitors' support of Parks Canada management approach for the Moraine Lake area.

Literature Review

The subject of bear ecology and bear-human interactions have been the focus of several authors and projects. Jalkotzy, *et al* (1999) used cumulative effect modeling (CEM) to assess the impact of humans on grizzly bear habitat and bear use of specified areas. In this study the Lake Louise Bear Management Unit, which includes Moraine Lake, consisted of 14% good to very good potential bear habitat. However, once the effects of human use were factored in, most of the good to very good potential habitat became poor realized habitat. What remained of the good to very good potential habitat became scattered and poorly connected. Other resources on bears

include The Eastern Slopes Grizzly Project (Herrero 2005) and Herrero (1985).

Herrero and Higgins (2003) compiled all incidents involving bears in Alberta between 1960 and 1998 that resulted in serious or fatal injuries. Notably in 90% of incidents involving grizzly bears, when party size was known, the injured parties consisted of one, two or three individuals. The authors suggested that the smaller groups were more likely to surprise a bear due to the amount of noise they generated. When examining incidents where age and sex of the bear was known, 10 out of 17 were identified as adult females. Additionally in 9 out of 10 of the incidents involving adult females, cubs were reported to be present. The incidents were clustered between May and November, with the main peak occurring in September and a second peak occurring in August.

Peterson (2000) examines group access as an approach to human use management, which allows for people to enjoy national parks, but should not be seen as imposing on people's freedoms. Alternatives to human use management include better signage and education to more active approaches such as area closures and permits. Furthermore, bear warnings and area closures should only be used when needed to prevent complacency (Protected Areas Conservation 2002).

The impact of access restriction on human behaviour has been studied by Mattson *et al.* (1996). The public is affected by management decisions that can impact recreational activities; such management decisions may adversely affect people perceptions of bears. Access restriction could lead to increase the antipathy felt by local people towards bears and the government, such as the case of the Selway-Bitterroot Recovery Area in Idaho. However, the authors do suggest that access restrictions may promise the greatest gains where visitors are unarmed, such as in National Parks.

Tucker (2000) and Gray (2001) evaluated the effectiveness of group access in 2000. Data was based on a total of 653 surveys taken during group access as well as before and between group access periods; trail counters were also used but there were some problems in the data collected. Overall compliance of 62% to group access was below the target of 80%, when separated into in and out compliance it was found that only 52% of outbound groups were compliant while 70% of inbound groups were compliant. Support for the management strategy also changed. There tended to be a higher level of satisfaction as well as a higher level of dissatisfaction during group access. The majority of the respondents found that there wasn't any impact on their experience in the area. Among those that did experience an impact, more found it to be a positive impact (24%) than a negative impact (16%).

Methodology

Moraine Lake case study investigates visitor experience and bear-human conflict in the Moraine Lake area, as well as it contributes to monitoring process, which has been in place since 1999 when the Group access was first introduced. In order to allow for easier comparison between the studies and hence easier monitoring, this study followed similar research design to that implemented by Tucker in the summer of 2000. A questionnaire was administered throughout the summer to the users of the Moraine Lake area. Trail counters and cameras were also installed in an attempt to supplement the levels of use information gathered through a

questionnaire. The use of track sticks, to determine which areas the visitors are using, was a new addition to this year's design.

Moraine Lake area, and in particular the area affected by the group access policy was the site of this study. Please see Figure 1 - Area affected by Group Access for the exact location of the area. Group Access area is outlined in black. Questionnaire was administered in three different locations: Consolation Lake trailhead, Larch Valley trailhead and Paradise Valley trailhead. Based on the previous studies, these are the three main access points for the Moraine Lake area. Trail counters were also set up in these locations.

Stratified random sampling technique was used to select participants for the study, with an over-sampling of the user population during group access. Convenience sampling, grabbing whichever group will stand long enough to fill out our survey (Bernard 2002), was used to select the group and ensure that all group sizes are represented in the study. Person within the group was then selected randomly to answer the questionnaire.

Use of track sticks was a new method of data collection that we experimented with this year. Purposive sampling technique was used to select participant who carried track sticks during their hike. Participants who were willing to participate in the track stick portion of the study were approached at the Larch Valley trailhead.

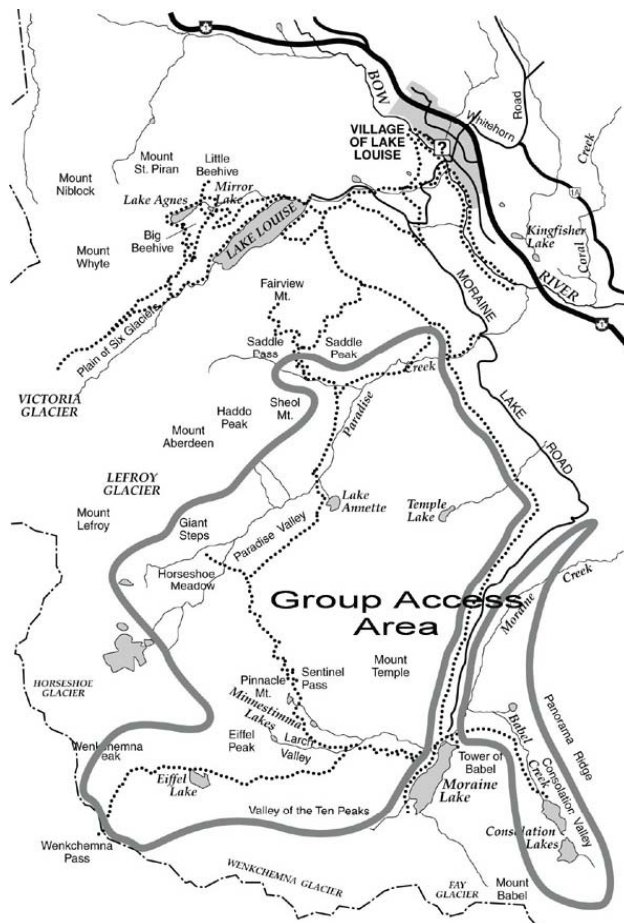


Figure 1 - Area affected by Group Access

Questionnaires were used to collect data about the visitor, such as demographic information, activity information, awareness perception of Parks' policies and legal requirements, bear awareness and visitor experience. Infrared counters and cameras were used to gather information on the human levels of use before and during the group access. Two different tools were used for triangulation purposes. Infrared cameras were also used to evaluate the compliance rate, as it was easier to determine from a camera if the people were in a "tight group". Track sticks are small GPS units that recorded geographical information for the groups carrying them.

In total 472 self-administered surveys were completed, 154 prior to group access and 318 during the group access period. Most of the surveys were completed at Larch Valley (251) and Consolation Lakes (219) trail heads, as these proved to be considerably busier two of the three chosen initially. A total of 42 track stick data sets were collected over the summer. All track sticks were handed out at the Larch Valley trailhead. Larch Valley trailhead is an access point for many different areas and by using track sticks we were able to see where people tend to go and in that way determine high use areas.

Both quantitative and qualitative analysis was performed on survey data. Univariate analysis was performed on demographic data for the purpose of profiling of the participants. Bivariate and multivariate analysis was performed to make comparisons in compliance between different groups, as well as between different study years. For open-ended questions code categories were created, so that data can be quantified.

Counter data was compared to camera data in order to get a more accurate picture of the levels of use. Furthermore, as two cameras were placed on the Larch Valley trail, one at the trailhead and one half an hour into the hike, it was possible to determine whether the groups who met at the trailhead tend to stay together, or whether they break up due to different hiking speeds.

Track sticks data was analyzed using GIS tool, ArcView. Plotting of all the different tracks on the Moraine Lake area map identified the high use areas. Different participant statistics, such as average hiking speed, distance covered, rest stops, and turn around point on the trail, were also identified from the track sticks data using ArcView software.

Results

Demographic Profile of visitors to Moraine Lake area

Most of the visitors surveyed in the Moraine Lake area are day hikers (over 90%). The rest of the users, such as climbers, bikers, and people on overnight trips represent a very small portion of the population surveyed (less than 1 % each).

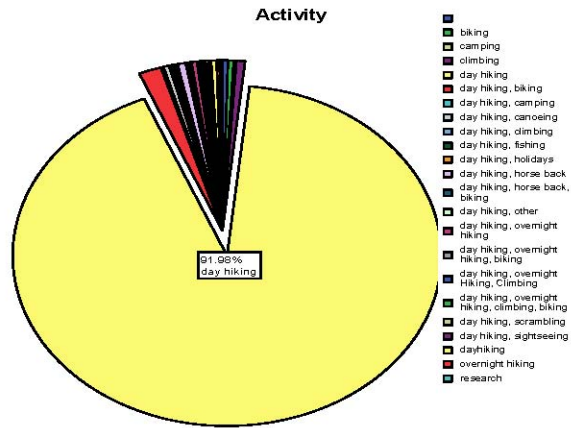


Figure 2 - Activities that visitors to Moraine Lake participate in

There was an even split between men and women, 52 percent and 48 percent respectively, and the age of our sample population was normally distributed, with the mean age being 43.

Based on the statistics for the night spent prior to the trip, one quarter of the visitors are local residents. Most of the visitors to the area are North Americans. European, Chinese and Australian visitors are a majority of overseas market (see Figure 3 - World distribution for the visitors to the Moraine Lake area).

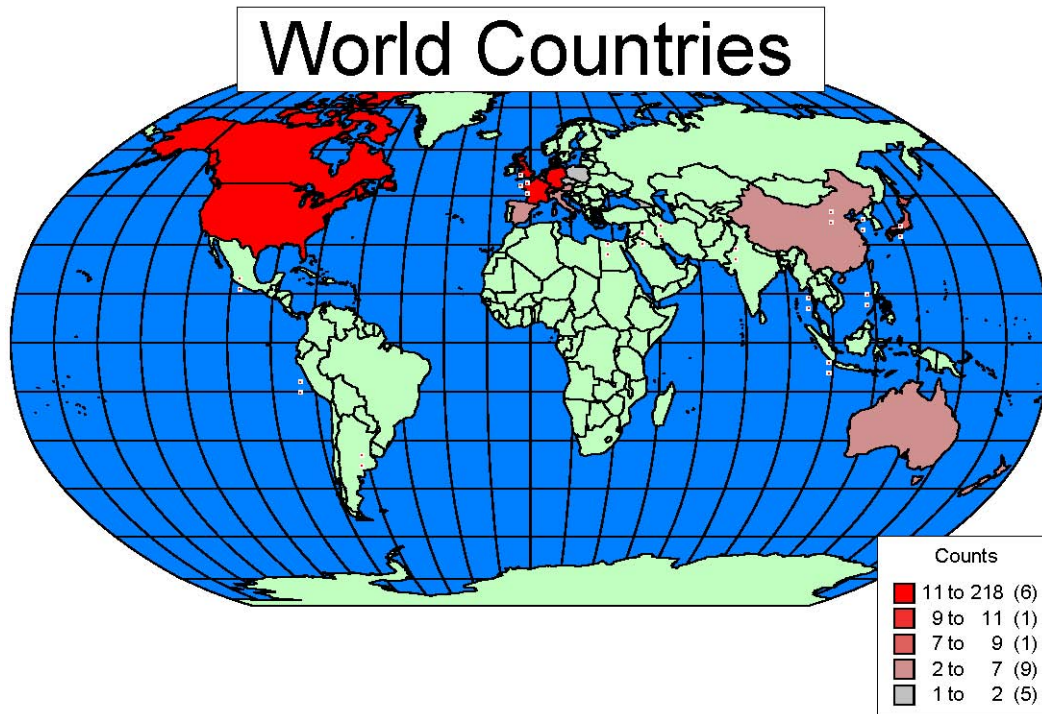


Figure 3 - World distribution for the visitors to the Moraine Lake area

Great majority of people who came from Calgary were local residents. As you moved closer to Lake Louise, the proportion of locals decreased. Similarly, the further away from Lake Louise people stayed, the less likely they were to camp (see graph below).

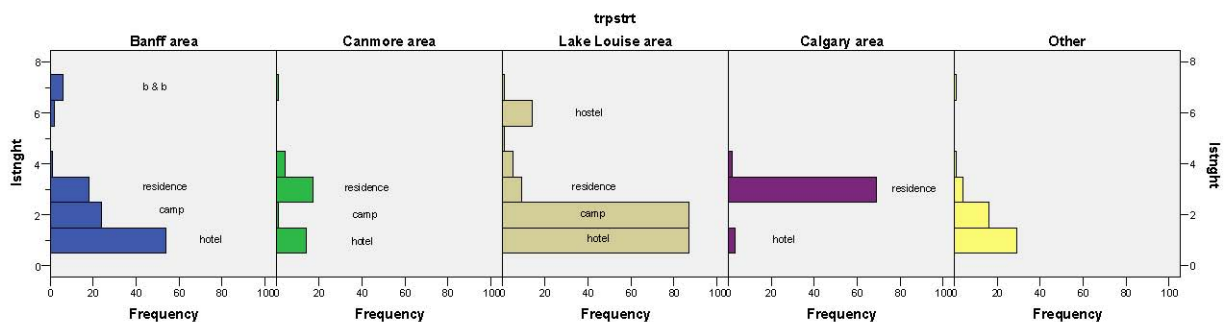


Figure 4 - Accommodation distribution based on the location

Preferred mode of transportation to Moraine Lake was by a vehicle (94%), either personal or rental. This accounted for a very busy parking lot throughout the summer, especially since Moraine Lake road and the parking lot were being repaved.

Visitor Experience

A lot of the people (n=82) stated that group access did not impact their experience in the Moraine Lake area with only 12 percent stating that group access affected their plans. More respondents replied that group access had enhanced their experience in the area than respondents who replied that they had a negative experience. Respondents suggested better communication and education and the availability of organized hikes as a way of improving their experience during group access. There were also a few visitors who mentioned clarifying the legal requirement to be in a group of four or more, as some people thought that it was only suggested that they hike in larger groups and were unaware that it was a legal requirement.

Better signage was the most common response from visitors regarding the things Parks Canada could do better to improve their experience. Additionally, respondents had concerns related to traffic and crowds. Parking and the restriction of large vehicles in the parking lot were listed as things Parks Canada can improve upon in the Moraine Lake area.

Services provided by Parks Canada were met expectations of many respondents. A lot of the respondents (n=62) were very satisfied with trail maintenance. The management of the Moraine Lake area was also something that respondents felt Parks Canada was doing well to meet their expectations. Participants liked the accessibility of the area, the general layout and the balance between social and ecological needs.

Levels of Human Use

Counters placed at the three trailheads, Paradise Valley, Consolation Lake and Larch Valley, as well as a bike counter on Moraine Lake highline trail, were used to determine the levels of use during the summer of 2007. Larch Valley trailhead was noticeably the busiest access point with the total of 35,811 counts for the duration of the whole summer. Consolation Lake trailhead had the total of 24,635 counts, and Paradise Valley had the fewest counts of all the hiking trailheads with the total of 5,144. Bike counter on the highline trails counted only 683 bike events throughout the whole summer.

Group Access was introduced on July 22nd and it stayed in effect until the Moraine Lake road closed on October 9th. July was the busiest month on all the trailheads. It is hard to tell if the visitation after July dropped because of the Group Access, or if it is just a general trend, as visitation continued to decline in the months to follow. Data from the summer of 2000 shows the similar general trend, where the visitation numbers started declining after July. However, it is important to note that group access was introduced and removed more than once during the summer of 2000 and were some spikes in visitation related to this.

Track sticks, were handed out at the Larch Valley trailhead throughout the summer to visitors willing to participate in the study. As Larch Valley trailhead is an access point to various different areas, we wanted to find out where our visitors go and what are some high use areas. Data was analyzed using ArcView, and below is a map showing all the tracks from the visitors participating in the study.

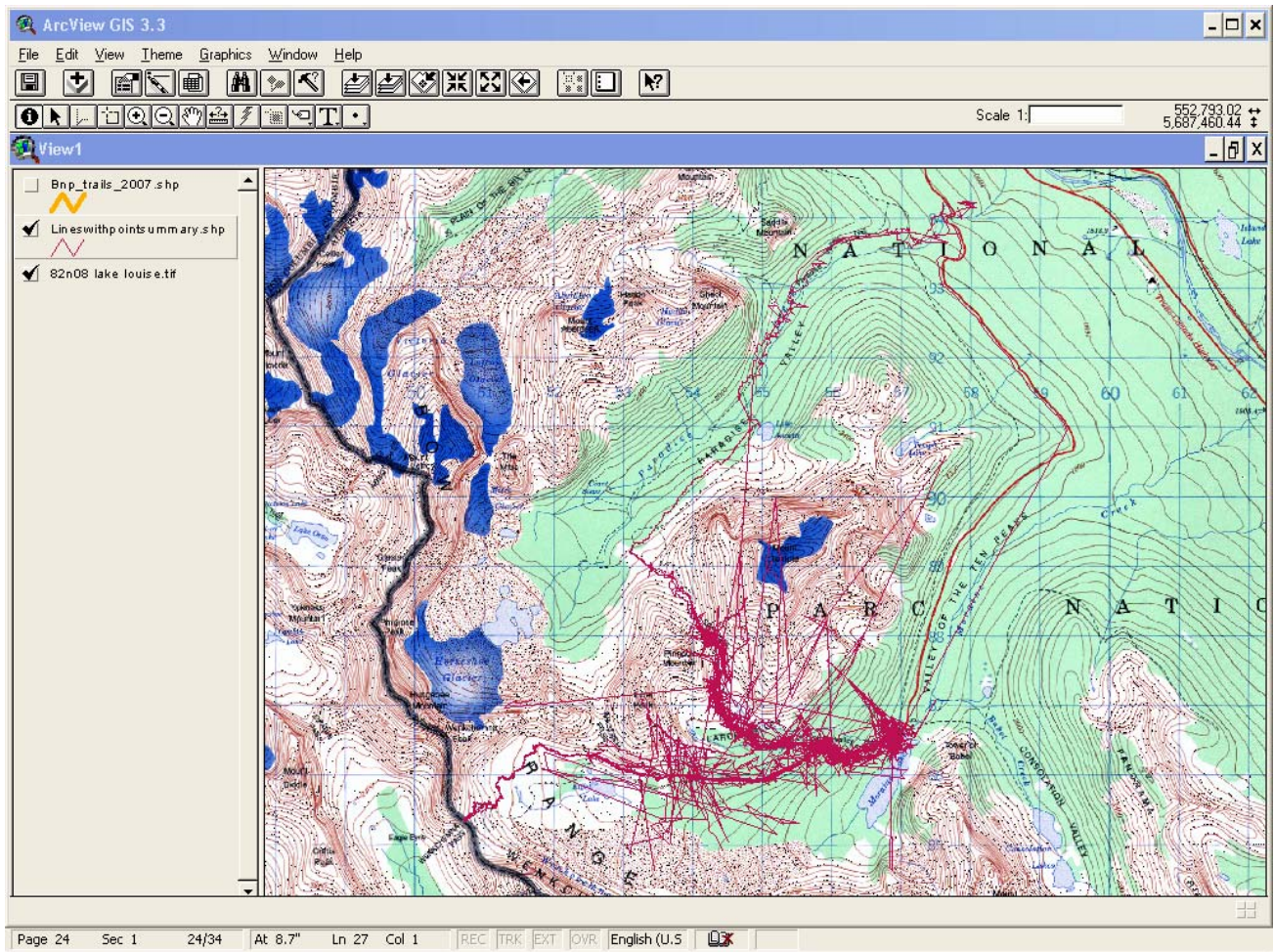


Figure 5 - Track sticks data

Red lines on the map represent the GPS tracking information. Higher concentrations of red lines would indicate high use areas. Based on this map, it seems that most groups from the Larch Valley trailhead seem to go to Sentinel Pass and somewhat smaller percentage to Eiffel Lakes. Very few groups go all the way to Wenkemna Pass or make a loop from Larch Valley, over the Sentinel Pass and back down the Paradise Valley.

Compliance

In order to achieve better compliance one of the key information tools was the trailhead kiosk. All of the information pertinent to the Group Access strategy was presented on the posters displayed in the kiosks. During the group access all the trailheads from which Moraine Lake area can be accessed head a sandwich board in the middle of the trail that informed visitors to the area of the legal requirement to travel in a minimum group of 4 for hikers, 2 for horseback riders and none for mountain bikers (see picture below).



Further signs were displayed in the congregation areas along the trail. The purpose of these signs was to remind people of the Group Access and the legal requirement. See picture below for an example of such a sign.



Based on the survey data, 89% compliance rate was achieved during the Group Access. This data will be triangulated with information from infrared cameras in the near future. Users that were aware of the Group Access legal requirement were more likely to be more compliant.

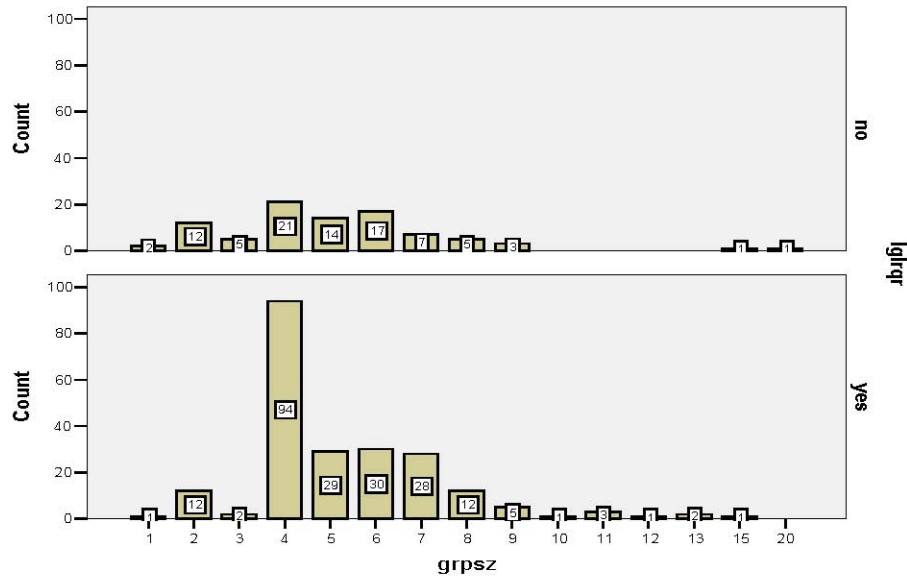


Figure 6 - Compliance based on the awareness of the legal requirement

There was no significant difference found between locals and non-locals when it comes to compliance. North Americans were most likely to break the rules, with 12% of North American groups being non-compliant compared to 11% non-compliant groups from Asia, 9% from Europe and 0% from Australia and New Zealand. Compliance on the way out was significantly lower than on the way in, as only 69% compliance was achieved on the way out compared to 95% on the way in.

Compliance rates improved significantly in 2007 compared to the compliance rates found by the studies conducted in 2000 and 2001 (see Tucker 2000 and Tucker 2001). Overall compliance in 2007 was 89% compared to 60% in 2000. However, if we were to use Tucker's (2001) suggestion on using mean group size as the indicator of the effectiveness of the strategy, mean group size didn't decrease this year compared to previous years, even though the required group size has decreased. Mean group size for this year was 5.25 compared to 5.2 in 2001.

Visitor Bear Awareness

Overall there does not seem to be any difference in precautions people take prior to or during group access. Principally when examining precautions, visitors were asked whether they increased their group size prior to hiking the trail and whether or not any member of their group was carrying bear spray. Group access did not impact whether or not people carried bear spray. Very few participants prior to group access indicated that they increased their group sizes. During the group access period there were more participants who indicated they had increased their group size prior to hiking the trail. However, people were often surveyed at the trailhead where they were waiting to increase their group size, which would bias this result.

When examining the effects of group access on group size, there does seem to be larger group sizes during group access than prior to group access. In both cases the extremely large groups (greater than ten individuals) tend to be an exception. During group access the mean group size was 5.25 individuals, while prior to group access the mean group size was 2.97 individuals.

Prior to group access most groups tended to consist of 5 or less individuals. During group access, the most frequent group size was a party of four individuals.

Discussion

Since the introduction of the Moraine Lake group access in 1999, the goal of the management strategy was to reduce the bear-human encounters. The main premise of the strategy is that people in larger groups were safer. This premise is founded on the work of Dr. Herrero (Herrero 1985). Initially the safe margin was set at the group size of 6 people. Although bear encounters resulting in injury or death have completely been eliminated since the introduction of the strategy, the group access strategy failed to meet the targets set out by the Parks Canada.

One of the main targets not met was 80% compliance by the groups hiking out. However, the end results, serious bear-human encounters, show that the strategy worked. As Tucker (2001) suggests, maybe the indicators used for the measurement of effectiveness of the strategy need to be modified. So, rather than measuring compliance in the percentage of groups that complied, maybe we should measure it in the increase in the mean group size. Over the years, the group size has consistently increased from 2.9 to 5.2 people between non-group access and group access periods.

Based on further suggestions from Dr. Herrero, and in order to make the Moraine Lake area accessible to more people with less hassle, the minimum required group during the group access was reduced from six people to four people. This change in the requirements brought about improvements in the compliance rate from the previous years. Although we cannot say for sure why the compliance rates improved this year, we would like to speculate that it was due to the increased Parks Canada presence, better interpretive programs, and reduced group size requirement.

Presence of the Parks Canada interpreters at the trailhead was probably the main reason why the compliance rate for the people hiking in was as high as 95%. Furthermore, it was easier for people to form a smaller group, group of four, and there was a better chance that people who came in a smaller group would be able to form a minimum group of four with people who had the same destination and moved at the same pace than it would be to form a group of six. Higher compliance rates can also be attributed to the lowered group size as the minimum requirement. Groups of four and six would have been considered non-compliant in the previous years and this year they were considered “good visitors”.

While there was an improvement in the awareness of the group policy by the visitors to the area over the years, it seemed to make little difference in the precautions that people took to ensure their safety. For example, introduction of the group access didn't seem to make the difference with people carrying a bear spray. On the positive side better awareness and education of the visitors seemed to affect their decision to group up (see Figure 7 - Number of people who increased their group size).

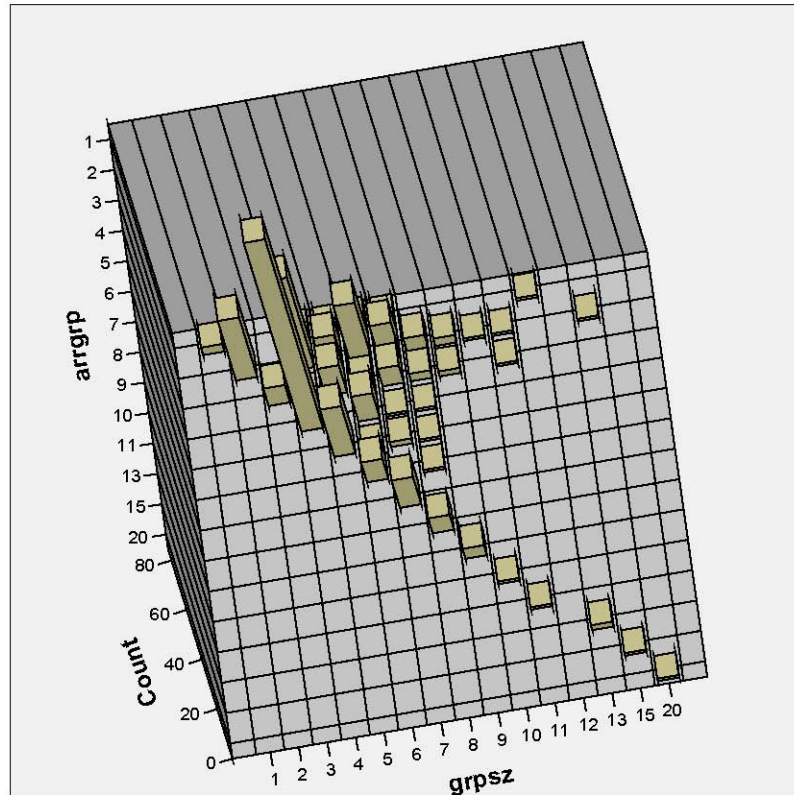


Figure 7 - Number of people who increased their group size

It is evident from the graph above that people who arrived in the groups of three or less tended to merge into larger groups, mainly group of four and five. There is also a big tower in the graph that shows that people who arrived in groups of two, merged with other people to form the group of six. Some groups of two even merged into very large groups, group of fifteen.

Consistent with the findings from previous years, Canadians, and North Americans in general, are less compliant than other visitor groups, such as Europeans, Asians and Australians. We were unable to explain why this is the case with this study, but Tucker (2001) suggests that it could be because of the complacency due to their experience with hiking in the bear country. However, due to the consistent data, it is obvious that education programs should target domestic visitors, as they are the largest group of visitors and at the same time the least compliant. If Tucker's suggestion for why Canadians have lower compliance rates is correct, then safety should not be the focus for their education, but rather some other issue that they might care about, such as preserving ecological integrity.

The public support for the group access strategy has remained high during the whole summer regardless of whether group access was in effect or not. Although not all targets set out initially by the group access management strategy were met, significant gains have been made (reduced number of aggressive bear encounters, increased mean group size, increased group compliance rate, reduced number of landscape disturbances (Tucker 2001), and improved levels of visitor satisfaction), and the strategy should be applied in the years to come, especially since the public support is there.

References

- Babbie, E. 2004. *The Practice of Social Research*. Wadsworth/Thomson Learning. Belmont, CA.
- Bernard, H. J. 2000. *Social Research Methods: Qualitative and Quantitative Approaches*. Sage Publications. London.
- Den Otter, M. 2006. Visitors and Bears in Yoho: Knowledge, Attitudes and Risk. Produced for: Lake Louise, Yoho and Kootenay National Parks Field Unit; The Friends of Yoho National Park.
- Gray, D.L. 2000. Restricted Access 2000: An Evaluation of the Social Effects. Prepared for Lake Louise, Yoho and Kootenay National Parks Field Unit. 31 pp.
- Herrero, J., and S. Herrero. 2000. Management Options for the Moraine Lake Highline Trail: Grizzly Bears and Cyclists. Prepared for Parks Canada. BIOS Environmental Research Ltd. Calgary, Alberta, Canada. 31 pp.
- Herrero, S. 1985. *Bear Attacks; Their Causes and Avoidance*. Winchester Press. Piscataway, N.J. 287pp.
- Herrero, S. 2005. Biology, Demography, Ecology and Management of Grizzly Bears in and Around Banff National Park and Kananaskis Country. The Final Report of the Eastern Slopes Grizzly Bear Project. Faculty of Environmental Design, University of Calgary, Alberta, Canada.
- Herrero, S., and A. Higgins. 2003. Human Injuries Inflicted by Bears in Alberta 1960-1998. *Ursus*. 14(1). pp 44-54.
- Integrated Risk Control, Inc. 2002. Analysis of Bear-Human Conflict in the Lake Louise Area. Prepared for Parks Canada.
- Jalkotzy, M.G., R.R. Riddell, and J. Wierzchowski. 1999. Grizzly Bears, Habitat and Humans in the Skoki, Baker, South Pipestone and Lake Louise Bear management Units, Banff National Park. Prepared for Parks Canada and the Skiing Louise Group. Arc Wildlife Services Ltd., Riddell Environmental Research Ltd. And Geomar Consulting Ltd. 101pp.
- Kellert, S.R., and J.K. Berry. 1987. Attitudes, Knowledge and Behaviour toward Wildlife as Affected by Gender. *Wildlife Bulletin*. 15(3). pp. 363-371.
- Kellert, S.R. 1994. Public Attitudes towards Bears and Their Conservation. *Bears: Their Biology and Management, Vol 9, Part 1: A Selection of Papers from the Ninth International Conference on Bear Research and Management. Missoula Montana. February 23-28, 1992*. pp 43-50.

- Mattson, J.M., Herrero S., R.G., and Wright, C.M. Pease. 1996. Science and Management of Rocky Mountain Grizzly Bears. *Conservation Biology*. 10(4). pp 1013-1025.
- Morrison, H. 2000. Moraine Lake Grizzly Bear Issue Analysis/Chronology: 1996-1999. Prepared for Lake Louise, Yoho and Kootenay National Parks Field Unit. 7 pp.
- Morrison, H., and W. Tucker. Undated. Maintaining Grizzly Bears in the Moraine lake Area of Banff National Park. Unpublished Work Term Report for the University of Victoria and Parks Canada.
- Peterson, D. 2000. Grizzly Bears as a Filter for Human Use Management in Canadian Rocky Mountain National Parks. USDA Forest Service Proceedings RMRS-P-15-Vol 5. pp 354-361.
- Protected Areas Conservation. 2002. Bear-People Conflict Prevention Plan. Prepared for BC Parks, Conservation Services.
- Tremblay, M. 2001. Wildlife Corridors in the Lake Louise Area, Alberta: A Multi-scale, Multi-species management Strategy. Prepared for Parks Canada. 168pp.
- Tucker, W. 2001. Preliminary Evaluation of Restricted Access as Applied During Summer 2000. Prepared for the Lake Louise, Yoho and Kootenay National Park Field Unit. 21pp.